

Dominion Energy®

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Before the State Corporation Commission of Virginia

Carmel Church and Ruther Glen 230 kV Transmission Line Projects

Application No. 344

Case No. PUR-2024-00221

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Environmental Routing Study

Carmel Church 230 kV Line Extension

PREPARED FOR

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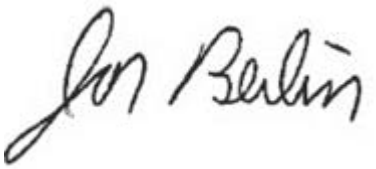
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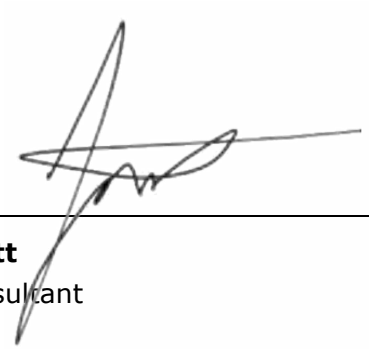
Environmental Routing Study

Carmel Church 230 kV Line Extension

993244



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ACRONYMS AND ABBREVIATIONS

Acronym	Description
AGL	Above ground level
AISDC	American Indian Society of Washington, D.C.
B	Business
BMP	Best management practice
B-ranking	VDCR biodiversity significance ranking
CBG	Census block group
CCB	Center for Conservation Biology
CFR	Code of Federal Regulations
Company	Virginia Electric and Power Company

Acronym	Description
CSC	Commercial Service Corridor
CWA	Clean Water Act
DNH	Division of Natural Heritage
DoD	US Department of Defense
EJ	Environmental justice
EMF	Electromagnetic field
ERM	Environmental Resources Management, Inc.
ESA	Endangered Species Act
ESRI	Environmental Systems Research Institute, Inc.
FAA	Federal Aviation Administration
FCV	Forest Conservation Value
GIS	Geographic information system
HCOD	Highway Corridor Overlay District
HUC	Hydrologic unit code
I-95	Interstate 95
IFP	Instrument flight procedure
INSTAR	Interactive Stream Assessment Resource
IPaC	Information for Planning and Consultation System
IVMP	Integrated Vegetation Management Plan
KOP	Key observation point
kV	Kilovolt
LZ	Landing zone
M-1	Industrial
MP	Milepost
NAIP	National Agricultural Imagery Program
NHD	National Hydrography Dataset
NHL	National Historic Landmark
NHP	Natural Heritage Program
NHR	natural heritage resource
NLEB	Northern long-eared bat
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory

Acronym	Description
Ordinance	The Caroline County Zoning Ordinance
PEM	Palustrine emergent
PFO	Palustrine forested
PIRT	Planned Innovation, Research, and Technology
PMU	Planned Mixed Use
Project	Carmel Church 230-kilovolt Line Extension Project
PSS	Palustrine scrub-shrub
PUB	Palustrine unconsolidated bottom
PUD	Planned Unit Development
REC	Rappahannock Electric Cooperative
RMA	Resource Management Area
RP	Rural Preservation
RPA	Resource Protection Area
Rt.	Virginia State Route
SCC	State Corporation Commission
SCS	Stream conservation site
T&E	Threatened and Endangered
TCB	Tricolored bat
TERP	Terminal instrument procedure
TOYRs	time-of-year restrictions
U.S.	United States
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VAC	Virginia Administrative Code
Va. Code	Virginia State Code
VaFWIS	Virginia Fish and Wildlife Information Services
VCRIS	Virginia Cultural Resources Information System
VDCR	Virginia Department of Conservation and Recreation
VDEQ	Virginia Department of Environmental Quality
VDHR	Virginia Department of Historic Resources
VDOT	Virginia Department of Transportation

Acronym	Description
VDWR	Virginia Department of Wildlife Resources
VEJA	Virginia Environmental Justice Act
VGIN	Virginia Geographic Information Network
VSR	Visually sensitive resource
WERMS	Wildlife Environmental Review Map Service

1. INTRODUCTION AND BACKGROUND

This report presents the results of an environmental constraint identification and routing study prepared by Environmental Resources Management, Inc. (ERM) on behalf of Virginia Electric and Power Company (Dominion Energy Virginia, Dominion, or the Company) for the proposed Carmel Church 230-kilovolt (kV) Line Extension Project (the Project) in Caroline County, Virginia.

1.1 PROJECT DESCRIPTION

The Project is necessary to provide electrical service requested by Rappahannock Electric Cooperative (REC) to support data center development in Caroline County, maintain reliable service for overall load growth in the area, and comply with mandatory North American Electric Corporation Reliability Standards. To meet these objectives, Dominion proposes to construct and operate the following:

- A new, double-circuit, overhead 230-kV transmission line (Carmel Church Loop) in new rights-of-way that will cut Dominion's existing Ladysmith CT–Four Rivers #256 (Line #256) and connect to the proposed Carmel Church Switching Station; and
- A new 230-kV delivery point switching station (Carmel Church Switching Station) in Caroline County, which will provide interconnection to REC to serve existing and planned development in the area.

Figure 1.1-1 depicts the general location of the Project. All figures referred to in this document are provided in Appendix A, Figures.

In developing potential routes for the Project, the Company considered the facilities required to construct and operate the new infrastructure, the length and width of new right-of-way that would be required, the amount of existing development in the area, the potential for environmental impacts and impacts on communities, and cost.[1]

For the purposes of developing route alternatives, ERM considered options connecting to existing Lines #256 and #574. ERM identified two viable overhead route alternatives (referred to as Carmel Church Line Routes 1 and 2) connecting to existing Line #256 and no viable overhead route alternatives connecting to existing Line #574.

1.2 STRUCTURE TYPES AND RIGHT-OF-WAY WIDTHS

Dominion would construct the proposed Carmel Church Line entirely within new rights-of-way, measuring approximately 100 feet wide. Dominion would use weathered steel monopoles with heights ranging from 85 to 135 feet and an average height of approximately 110 feet based on preliminary conceptual design, excluding foundation reveal, and subject to change based on final engineering (see the proposed structure types in Appendix B, Structural Drawings). Each line

[1] Cost is addressed elsewhere in Dominion's application to the State Corporation Commission (SCC) of Virginia for the Project.

structure would support two circuits. Structures would be installed at approximately 500-to-700-feet intervals along the Project's right-of-way.

1.3 CONSTRUCTION, OPERATION, AND MAINTENANCE PROCEDURES

Construction of new overhead transmission lines may involve the steps listed below:

- Detailed survey of the route alignment;
- Right-of-way acquisition and clearing;
- Construction of access roads, where necessary;
- Installation of tower foundations;
- Assembly and erection of new structures;
- Stringing and tensioning of conductors; and
- Final cleanup and land restoration.

All required materials for the Project's 230-kV structures would be delivered and assembled at each structure location within the proposed right-of-way. Detailed foundation design would be completed prior to construction. The foundation design could include poured concrete requiring excavation or steel piles or caissons that might be vibrated, drilled, or driven into place depending on soil conditions and final design. Structures would be erected with a crane and anchored to the foundation during final assembly. Excess soil from foundation construction (if any) would be evenly distributed at each structure, and the vegetation would be replanted and stabilized. In wetland areas, excess soil would be removed and evenly distributed on an upland site within Dominion's proposed right-of-way. Typical construction equipment could include hole diggers or drilling equipment, cranes, wire stringing rigs, tensioners, backhoes, and trucks.

All conductors and shield wires would be strung under tension. This system involves stringing a "lead line" between structures for the conductors and ground wires. The rope pulls a steel cable that is connected to the conductors and shield wires, which are pulled through neoprene stringing blocks to protect the conductor and shield wire from damage. Stringing the conductors and shield wires under tension protects the wires from possible damage should they be allowed to touch the ground, fences, or other objects.

Once the Project is in-service, maintenance of the right-of-way under the transmission lines will be essential for the reliable operation of the line as well as for public safety. Operation and maintenance of the Project will include periodic inspections of the line and the right-of-way; occasional replacement of hardware as necessary; periodic clearing of vegetation, either mechanically or by selective, low-volume application of approved herbicides within the corridor; and the cutting of danger trees outside the right-of-way. Danger trees are trees outside the cleared corridor that are sufficiently tall enough to fall into the right-of-way and potentially impact the transmission line. Periodic inspections would occur through both aerial and walking patrols. Normal operation and maintenance would require only infrequent visits by the Company or its contractors.

Most maintenance activities would consist of selective, low-volume herbicide applications targeting only tree species on the right-of-way every 3 to 5 years and the cutting of danger trees every 3 years. Dominion uses only herbicides that are approved by the U.S. Environmental Protection Agency on power line rights-of-way.

Based on a discussion between the Company and representatives of the Virginia Department of Conservation and Recreation (VDCR) Division of Natural Heritage (DNH), the Company reviewed its Integrated Vegetation Management Plan (IVMP) for application to both woody and herbaceous species based on the species list available on the VDCR website. The Company continues to coordinate with DNH on an addendum to the IVMP to further explain how the Company's operations and maintenance forestry program addresses invasive species. In November 2023, the Company submitted the addendum draft to VDCR for review and continued discussions. VDCR provided an initial response to the addendum in January 2024. The Company will continue to meet with VDCR to further discuss the documentation provided. Once the addendum is finalized, the Company will report on the results of its communications with VDCR in future transmission filings.[2]

1.4 OBJECTIVES OF THE STUDY

The Company requested ERM's services to complete the following: a) define and collect information about resources within the study area; b) identify and compare route alternatives; and c) document this information in a report. More specifically, ERM's scope of work consisted of:

- Defining and describing a study area for routing the transmission lines proposed for the Project;
- Gathering and assessing information about routing constraints and opportunities to be considered as part of the study;
- Identifying and mapping routing constraints and opportunities within the study area;
- Participating in public outreach efforts for the Project (i.e., public open house and agency meetings) to gather information from stakeholders, agency staff, and the public regarding constraints in the study area;
- Identifying buildable route alternatives for the proposed transmission lines meeting the siting criteria provided in the Virginia State Code (Va. Code) and included in the SCC's minimum filing guidelines for transmission projects;

[2] See, Application of Virginia Electric and Power Company, For approval and certification of electric transmission facilities: 230-kV Line #293 and 115-kV Line #83 Rebuild Project, Case No. PUR-2021-00272, Final Order at 9-11 (August 31, 2022) (The Commission agreed with the Chief Hearing Examiner and declined to adopt VDCR-DNH's recommendation regarding an invasive species management plan, but directed the Company to meet with VDCR-DNH and to report on the status of the meetings in the Company's next transmission certificate of public convenience and necessity filing); see also Report of Alexander F. Skirpan, Jr., Chief Hearing Examiner (June 22, 2022) at 22 (agreeing with the Company that, with its IVMP, the Company should not be required to undergo the additional cost of VDCR-DNH's invasive species management plan; however, recommending that the Company meet with VDCR-DNH regarding its IVMP and report the results of the meeting in the next transmission certificate of public convenience and necessity filing).

- Comparing the route alternatives based on an analysis of environmental impacts and use of routing opportunities; and
- Recommending preferred routes.

2. METHODOLOGY

The process of routing a new electric transmission line begins with the definition of a study area encompassing and surrounding the beginning and end points for the new line. This is followed by evaluating routing opportunities and constraints within the area, such as collocation opportunities (e.g., roads, existing utility lines, or other linear infrastructure), land uses, planned developments, and environmental, visual, recreational, and cultural features. The study area is adjusted as needed based on constraints and opportunities, and viable route alternatives are developed to avoid constraints and use opportunities to the extent practicable. Communication with stakeholders and analysis of impacts results in adjustments to routes throughout the process.

The fundamental goals of the routing process are to maximize collocation with compatible linear features or land uses; avoid, minimize, or mitigate impacts to the human and natural environment; and provide regulators with viable route alternatives meeting the purpose and need of the Project that are efficient and equitable. Route viability is assessed through consideration of permitting risk, constructability, right-of-way acquisition, and cost after the least impactful alternatives are identified.

The routing process steps, outlined below, provide a framework for understanding the Project, how routes are identified and screened, and the selection of a preferred alternative.

2.1 DEFINING THE STUDY AREAS

The first step in the routing process is to define a geographic study area based on the Company's electric transmission and service obligations specific to a project—encompassing the beginning and end points of the route—that will allow for a reasonable range of potential alternatives. Additionally, and to the extent practicable, the limits of the study area are defined by reference to easily distinguishable landmarks, such as roads or other features. Doing so helps Dominion and ERM describe the boundaries to stakeholders, such as potentially affected landowners or county and agency staff. Section 3.1 describes the study area for the Project.

2.2 INVENTORY OF ROUTING CONSTRAINTS AND OPPORTUNITIES

The second step in the routing process involves the identification and mapping of environmental and built features within the study area. Based on extensive data collection, this step results in an inventory of routing constraints and opportunities in the study area, including but not limited to:

- Locations of delivery points;
- Electric transmission and other utility rights-of-way;
- Residences and residential areas;
- Planned developments;
- Commonwealth, county, and private road rights-of-way;
- Public lands;
- Conservation and open space easements;
- Parks and trails;

- Wetlands and waterbodies;
- Forested land;
- Schools, cemeteries, and places of worship or other public gatherings;
- Areas of ecological significance (e.g., conservation sites and habitat for threatened and endangered [T&E] species);
- Visually sensitive resources (VSRs)—locations where views are protected by regulation, or where higher quality views are an expected condition, regardless of regulatory status; and
- Archaeological and historic sites and other nationally or locally significant cultural resources.

2.3 IDENTIFYING AND ASSESSING ROUTE VARIATIONS

The third step in the routing process is the identification of potential route corridors—swaths of the study area feasible for routing new transmission infrastructure—and the exclusion of areas where transmission line routing is impracticable due to land use or other constraints. This step is critical in larger, heavily developed or developing areas, where planned developments or protected lands, like parks, can limit potential routes. This step can also aid in the refinement of the study area. Agencies such as the Virginia Department of Transportation (VDOT) and locality staff are engaged at this stage by the Company to provide insight on current and future developments and land use planning. The viability of a potential route corridor is assessed by evaluating environmental impacts, compatibility with existing and future land uses, permitting risk, community input, ability to acquire new right-of-way, constructability, and cost.

After a route corridor is identified, potential route alternatives or variations within that corridor are developed using geographic information system (GIS) software, and field reconnaissance is conducted to better inform the understanding of the area. To the extent practicable, routes are developed that avoid constraints and use opportunities. Throughout this step, the Project team continues to collect and assess data on constraints, obtained through desktop sources, field reconnaissance, and ongoing stakeholder/public engagement activities (e.g., photography, targeted mailings, a Project website, open houses, and virtual and in-person meetings). Information obtained from these sources is used to qualify and better understand resources that could be affected and to refine routes to avoid or reduce potential impacts.

Public engagement opportunities for the Project are discussed in Section 3.3. Routes considered but rejected and the viable routes developed for the Project are described in Section 3.4.

2.4 ROUTE ALTERNATIVE ANALYSIS AND RECOMMENDATION

Using data gathered and stakeholder outreach feedback, route alternatives are analyzed and compared quantitatively and qualitatively based on constraint data and community/stakeholder input. After completing this analysis, a preferred route is selected through comparison of the advantages and disadvantages of each alternative relative to SCC Guidelines. A Proposed Route and route alternatives or route variations, if applicable, are presented for notice in the SCC

Application for the Project. Routes deemed too impactful and/or infeasible or impracticable are not carried forward for notice.

3. ROUTING PROCESS

3.1 STUDY AREA DESCRIPTION

The study area identified for the Project encompasses approximately 36,200 acres (56.6 square miles) within southwestern Caroline County and in northwestern Hanover County (approximately 43.0 square miles in Caroline County and 13.6 square miles in Hanover County). The Project origin is the Company's existing Line #256, terminating at the proposed Carmel Church Switching Station located adjacent to the west side of Interstate 95 (I-95). There are no incorporated cities within the study area. The limits of the study area, depicted on Figure 1.1-1, are generally defined by the following features:

- The Lake Caroline community and the intersection of Dominion's existing Line #256 at Rogers Clark Boulevard to the north;
- Verdon Road at U.S. Route 1 (also signed as Jefferson Davis Highway) and the industrial development along US 1 to the south;
- Dominion's existing Line #256 transmission corridor to the east; and
- Dominion's existing Line #574 transmission corridor to the west.

3.2 GIS MAPPING AND INVENTORY OF ROUTING CONSTRAINTS AND OPPORTUNITIES

In accordance with the Guidelines for Transmission Line Applications Filed Under Title 56 of the Va. Code, ERM assessed opportunities for routing the Project. Sources used by the ERM team to identify constraints and opportunities within the study area included:

- Caroline County Parcel Viewer GIS datasets (Caroline County 2024);
- Environmental Systems Research Institute, Inc. (ESRI) World Elevation Terrain 2-foot contours (ESRI et al. 2024);
- VDOT Fredericksburg Virginia District project website (VDOT 2024);
- VDCR Conservation Lands Database (VDCR 2024a);
- VDCR Natural Heritage Database (VDCR 2024b);
- Virginia Geographic Information Network (VGIN) statewide land cover dataset (VGIN 2024);
- U.S. Census Bureau American Community Survey, 5-Year Estimates (2018–2022);
- U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) mapping (USFWS 2024);
- Virginia Cultural Resources Information System (VCRIS; VDHR 2024);
- National Agricultural Imagery Program (NAIP) aerial imagery flown October 2023 (NAIP 2023);
- Planet Lab Imagery aerial imagery flown by December 2023 (Planet Lab Imagery 2023);
- Google Earth Aerial Imagery (Google, Inc. 2024);

- Existing utility transmission and distribution lines (Rextag 2023); and
- American Battlefield Protection Program (ABPP 2009).

ERM researched, studied, mapped, and incorporated resources identified through these sources into GIS, where the layers were organized by resource type.

3.3 FIELD RECONNAISSANCE AND STAKEHOLDER ENGAGEMENT

ERM and Company staff conducted field reconnaissance of the study area and potential route corridors from public roads and rights-of-way in the summer of 2024. During these visits, ERM took photographs to aid in the analysis of impacts, particularly on visual and cultural resources.

Starting in spring 2024, the Company conducted individual meetings seeking stakeholder input on conceptual routing. Dominion gathered feedback on the routes through engagement with stakeholders consisting of landowners, elected officials, businesses, and agencies, including but not limited to, Caroline County, Hanover County, VDOT, REC, and AVAIO Digital (the developer for Washington DC South). These agencies provided information on developing land use changes occurring along and east of I-95 in Caroline County (see Section 4.1.3).

Dominion announced the Carmel Church Project jointly with the Ruther Glen Project via mail and website[3] in early July 2024 and held two in-person open houses to share information and receive feedback in July and September 2024. Dominion maintained the website with up-to-date Project information and an interactive public comment map. Feedback obtained through stakeholder engagement resulted in ERM making adjustments to optimize routes and helped inform the Company's decision to reject others.

Route 2 was adjusted following the first open house based on community feedback, including (but not limited to) a community preference that route alternatives avoid areas not designated for commercial or industrial development, and a request to avoid a parcel owned by the American Indian Society of Washington, D.C. (AISDC). The original version of Route 2 (Eliminated Route 2) is discussed further in Section 3.4.1.2.

3.4 IDENTIFYING AND ASSESSING ROUTE ALTERNATIVES

Within the study area, ERM initially identified four potential cut-in locations along the Company's existing Line #256 on the eastern edge of the study area and two potential cut-in locations along the Company's existing Line #574 on the western edge of the study area. ERM identified four potential route options to connect to Line #256 and two route options to connect to Line #574. Of these, two potential cut-in locations (both on existing Line #256) and their associated routes (Carmel Church Routes 1 and 2) were retained for further analysis, while the others were eliminated. Descriptions of the routes are provided in the subsections below. The routes are shown on Figure 3.4-1.

[3] https://www.dominionenergy.com/projects-and-facilities/electric-projects/power-line-projects/carmel-church-ruther-glen.

3.4.1 ROUTES REJECTED FROM FURTHER CONSIDERATION

3.4.1.1 ELIMINATED ROUTE 1

Eliminated Route 1 originates at a cut-in on the Company's existing Line #256, approximately 3.7 miles northeast of the proposed Carmel Church Switching Station site. Heading east, the route parallels existing easements held by the CSX Railway and Columbia Natural Gas for approximately 2.5 miles through the Swan's Corner area of Caroline County. The route continues east for another approximate 1.1 miles through existing and planned industrial parks on either side of Ruther Glen Road, south of Rogers Clark Boulevard and north of the CSX rail line before connecting to the switching station.

Eliminated Route 1 measures approximately 3.7 miles long. Ultimately, the route was eliminated because the existing rail and gas rights-of-way lines adjacent to existing residential areas would not allow for the necessary 100-foot transmission line right-of-way.

3.4.1.2 ELIMINATED ROUTE 2

Eliminated Route 2 was a preliminary variation of Carmel Church Route Alternative 2 (see Section 3.4.2.2). Eliminated Route 2 originates at a cut-in on the Company's existing Line #256 approximately 0.5-mile north of the existing Line's crossing of Ruther Glen Road and continues west for approximately 0.60 mile across forested property and a segment of agricultural land before spanning Ruther Glen Road. Following the road crossing, Eliminated Route 2 remains in forested land and turns northwest into properties held privately and by Caroline 544 LLC (Carmel Church Data Hub) for approximately 1.0 mile before turning west to cross I-95. After crossing I-95, Eliminated Route 2 runs north, paralleling the western edge of I-95 for approximately 1.0 mile. Route 2 crosses a Columbia Natural Gas easement and the CSX Railroad line approximately 0.5 mile before connecting into the Carmel Church Switch Station.

Eliminated Route 2 measures approximately 2.7 miles. This route was eliminated due to impacts on property held by the American Indian Society of Washington DC, who stated that the actively use the property for ceremonial purposes.

3.4.1.3 ELIMINATED ROUTE 6

Eliminated Route 6 originates at a cut-in on the Company's existing Line #574 approximately 0.7-mile north of the line's crossing of Jericho Road. From there, it runs east-northeast across primarily forested land for approximately 1.6 miles before turning southeast and extending approximately 2.9 miles to a crossing of Jericho Road. From the Jericho Road crossing, Eliminated Route 6 runs approximately 1.2 miles on the south side of Jericho Road, within the North Anna Battlefield Boundary, for approximately 1.2 miles before entering the proposed Carmel Church Switching Station.

Eliminated Route 2 measures approximately 5.7 miles. This route was eliminated due to its overall length, right-of-way requirements, and proximity to cultural features associated with the North Anna Battlefield.

3.4.1.4 ELIMINATED ROUTE 7

Eliminated Route 7 originates at a cut-in on the Company's existing Line #574 approximately 0.6-mile north of the line's crossing of the North Anna River. From there, it runs east, south around a residential area along Oxford Road, and then east to the proposed Carmel Church Switching Station. Except for the residential area, Eliminated Route 7 crosses primarily forested and agricultural land, all of which is south of Jericho Road. Approximately 3.5 miles of Eliminated Route 7 would be within the North Anna Battlefield.

Eliminated Route 7 measures approximately 4.7 miles. This route was eliminated primarily due to the extent of its crossing within the North Anna Battlefield and its proximity to the North Anna Battlefield Core Area.

3.4.1.5 ELIMINATED ROUTE 8

Eliminated Route 8 originates at a cut-in on the Company's existing Line #256 approximately 0.25-mile south of that line's crossing of the North Anna River, adjacent to the existing junction with the Company's existing Pinewood 115-kV Substation. From the cut-in, Eliminated Route 8 extends west-northwest adjacent to (north of) the existing Pinewood 115-kV line right-of-way for approximately 1.0 mile, north along the east side of I-95 for approximately 0.4 mile, and then across I-95. After crossing I-95, the route would extend approximately 2.9 miles along the western edge of I-95 to the proposed Carmel Church Switching Station. The intent of Eliminated Route 8 was to maximize use of land held by AVAOI Digital (the data center developer) and to maximize collocation with existing utility and road rights-of-way.

Eliminated Route 8 measures approximately 4.3 miles. This route was eliminated due to its total length and right-of-way requirements, impacts on the North Anna River and North Anna Battlefield, and the inclusion of an additional county not crossed by other potential routes.

3.4.2 ROUTE ALTERNATIVES

The route alternatives carried through for evaluation in this Routing Study are described below and are shown on Figure 3.4-2.

3.4.2.1 CARMEL CHURCH ROUTE 1

Route 1 extends from a cut in along the Company's existing Line #256 to the proposed Carmel Church Switching Station at the northern end of the Washington DC South development. The cut in is approximately 100 feet south of the Line #256 crossing of Old CC Road. From there, Route 1 extends west-northwest across primarily forested land for approximately 0.7 mile, then turns west-southwest, continuing through primarily forested land. The easternmost 1.0 mile of Route 1 is within Caroline County's Planned Innovation, Research, and Technology (PIRT) District. Approximately 1.2 miles west of the cut in point, Route 1 crosses portions of Reedy Creek, a Columbia Natural Gas easement, and the CSX Railroad line. Following those crossings, the route continues west-southwest for approximately 1.1 miles, passing behind existing industrial development and crossing Ruther Glen Road. The remaining 0.5 mile of the route extends west

across forested property held by AVAOI Digital, across I-95, and into the proposed Carmel Church Switching Station.

Route 1 measures approximately 2.5 miles. The right-of-way for this alternative (29.8 acres) and the proposed Carmel Church Switching Station site (10.0 acres) would encompass a combined 39.8 acres.

3.4.2.2 CARMEL CHURCH ROUTE 2

Route 2 extends from a cut in along the Company's existing Line #256 to the proposed Carmel Church Switch Station at the northern end of the Washington DC South development. The cut in is approximately 0.5-mile north of the existing line's crossing of Ruther Glen Road. From there, Route 2 travels west-northwest through forested land for approximately 0.5 mile parallelling south of Granny's Way, then approximately 0.2 mile west-southwest along the edge of an agricultural field (also to the south of Granny's Way) before crossing Ruther Glen Road. Route 2 continues west for about 0.5 mile through forested between residential parcels land before turning northwest for approximately 0.4 mile through forested property held by AVAOI Digital. Route 2 crosses I-95 and then continues north paralleling the western edge of I-95 for approximately 1.0 mile. Route 2 crosses a Columbia Natural Gas easement and the CSX Railroad line approximately 0.5 mile before connecting into the Carmel Church Switch Station.

Route 2 measures approximately 2.8 miles. The right-of-way for this alternative (33.1 acres) and the proposed Carmel Church Switching Station site (10.0 acres) would encompass a combined 43.1 acres.

4. RESOURCES AND IMPACTS

After defining the study area, ERM developed a list of features to consider and assess as part of the routing process and provide a basis for comparing routes (Table 4-1). These include constraints (e.g., land uses, planned developments, and biological resources) and opportunities (e.g., existing transmission lines, roads, and other linear features). ERM inventoried existing conditions, constraints, and opportunities using information from publicly available GIS and other databases; agency websites; published documents, such as county or municipal land use plans; communication with agency and county staff, stakeholders, and elected officials; and field reconnaissance. In cases where GIS data were not available for a particular environmental resource or other feature, ERM obtained the best available hard-copy or online version, and hand digitized the information needed to complete the study. In addition to the identification and discussion of the resources within the Project area, a Feature Crossing Table of the resources discussed throughout Section 5 is included as Appendix C, Features Crossing Table.

TABLE 4-1 FEATURES CONSIDERED FOR ROUTING

Feature Type	Description
Existing Corridors	
Existing electric facilities	• Transmission or distribution lines and substations
Other utilities	• Pipelines
Transportation infrastructure	• Highways, roads, railroads, and related corridors
Land Uses	
Land ownership	• Federal, state, and local lands • Private lands
Land uses and cover types	• Cover types (e.g., forested, agricultural, developed, open) • Subdivisions and residential areas • Residences, churches, schools, and cemeteries
Recreational areas	• Federal, state, county, or municipal parks or other managed recreation areas • Golf courses • Trails (e.g., for biking, hiking, birding, or wildlife viewing)
Land use planning and zoning	• Zoning districts • County Comprehensive Plan and related planning documents
Planned developments	• Planned, proposed, or conceptual residential, commercial, or industrial developments
Conservation lands and easements	• VDCR conservation lands and easements • Virginia Outdoors Foundation easements • Prince William County conservation easements • Wetland mitigation banks • Other conservation lands

Feature Type	Description
Transportation	• Road and railroad crossings • Public and private airport facilities
Natural Resources	
Surface waters	• Wetlands • Waterbodies
Protected or managed areas	• Resource Protection Areas and Resource Management Areas • Conservation sites • Wildlife management areas • Ecological cores
Protected species	• Natural heritage resources • Threatened and endangered species • Bald eagles
Vegetation	• Vegetation characteristics • Forested land
Visual Resources	
Visual resources	• Viewsheds to and from visually sensitive areas • Scenic rivers and byways
Cultural Resources	
Cultural resources	• Archaeological sites • Historical or architectural sites and districts • NRHP-listed and eligible properties • Battlefields • VDHR easements
Geological Resources	
Mineral resources	• Mines or quarries
Contamination Sites	• Brownfields • Solid and Hazardous Waste sites
Environmental Justice	• Low-income populations • Minority populations • Age groups (under age 5 and over age 64) • Linguistically isolated communities

NRHP = National Register of Historic Places; VDCR = Virginia Department of Conservation and Recreation; VDHR = Virginia Department of Historic Resources.

4.1 LAND USE

4.1.1 LAND OWNERSHIP AND PUBLIC LANDS

4.1.1.1 EXISTING CONDITIONS

ERM reviewed information about land ownership in the study area using digital parcel data obtained from Caroline County. These data indicate that most of the parcels within the study area are privately owned. The route alternatives do not cross any federal-, state-, county-, or municipal-owned lands. Figure 4.1-1 depicts land ownership in the study area. Route 1 would cross 14 private parcels, while Route 2 would cross 12 private parcels. The Carmel Church Switching Station would occupy one private parcel. County- and state-owned properties in the study area are described below.

Federal Lands

ERM identified several federally owned parcels in Hanover County. These sites include the Fontaine House, the North Anna Battlefield, and Richmond Battlefield Park. Cultural resources are discussed in Section 4.4. None of the Project facilities are located with 0.25 mile of federal lands.

Commonwealth of Virginia

VDOT owns and maintains most road rights-of-way in the study area, including major roadways such as I-95, Rogers Clark Boulevard, and Jericho Road. In addition, ERM identified one VDOT-owned parcel within the study area, the Carmel Church Park and Ride at the northwest corner of US 1 and Jericho Road. Two other VDOT-owned parcels, the Ladysmith Safety Rest Area North (adjacent to the northbound lanes of I-95) and South (adjacent to the southbound lanes of I-95) are just north of the study area boundary. None of the Project routes are located with 0.25 mile of state-owned lands.

Caroline County Board of Supervisors

ERM identified several parcels owned by the Caroline County Board of Supervisors. These parcels primarily consist of lands associated with the Caroline County Visitors Center, county utility infrastructure such as water towers, or other county facilities, or are undeveloped county lands. Caroline County recently completed Fire and Rescue Station 10 on Carmel Church Loop. None of the Project routes are within 0.25 mile of property owned or administered by the Caroline County Board of Supervisors.

City of Richmond

The City of Richmond Police Department’s outdoor shooting range is a 184-acre property accessed via Hunter Lane approximately 0.6-mile north of Ruther Glen Road. Neither of the Project routes cross the shooting range parcel; however, Route 1 is less than 0.1 mile north of the of the parcel’s northern boundary near milepost (MP) 0.8.

Hanover County

Hanover County owns two parcels in the study area. North Anna Battlefield Park is maintained by the Hanover County Parks and Recreation Department and encompasses more than 172 acres between Verdon Road and the North Anna River and along the river beginning approximately 1.5 miles east of US 1. The park provides recreational activities (see Section 4.1.7) and has historic significance as a Civil War battlefield (see Section 4.4.). The second Hanover County owned property is south of New Market Mill Road and east of Little River and is completely forested. This parcel is designated for future development as the replacement building for the aging Beaverdam Elementary School. The Hanover County School Board indicates that the school is set to open in the 2026–2027 school year.

None of the Project facilities are located within 0.25 mile of Hanover County-owned parcels. Additionally, the Project routes are more than 3 miles from the identified parcels.

4.1.1.2 IMPACT ASSESSMENT

Because the route alternatives would only cross privately owned lands, no public lands would be physically impacted by the Project and no direct impacts on the use of public properties would occur. Some of the public lands in the study area could be visually impacted by transmission structures and conductors during the construction and operation of the Project. The severity of these impacts depends on factors such as surrounding tree cover, landscaping, orientation of development in relation to transmission infrastructure, topography, and screening from other objects. Visual impacts from the Project are addressed in Section 4.3.

Carmel Church Route 1

No federal or state lands are located within 0.25 mile of the route. Route 1 is approximately 300 feet north of the City of Richmond Police Department's outdoor shooting range property near MP 0.8. No visual impacts are anticipated on the police shooting range facility due to the existing vegetation between the site and the route and the location of the range itself more than 0.5 mile south of Route 1 at MP 0.8.

Carmel Church Route 2

No federal, state, or local lands are located within 0.25 mile of Route 2.

Carmel Church Switching Station

No federal, state, or local lands are located within 0.25 mile of the Carmel Church Switching Station.

4.1.2 LAND USE AND LAND COVER

4.1.2.1 EXISTING CONDITIONS

Table 4.1-1 summarizes land use and land cover in the study area, based on the VGIN Land Cover Dataset (VGIN 2024). Figure 4.1-2 depicts land use/land cover in the study area. Land use and

land cover in the study area are broken down into the five main categories described below. The corresponding VGIN (2024) classifications are provided in parentheses.

- Developed (Impervious): These are areas characterized by medium to high density constructed buildings, such as certain residential subdivisions, industrial areas, commercial areas, and impervious surfaces.
- Open space (Turf Grass, Shrub/Scrub): These are areas primarily covered by planted grasses, including vegetation planted in developed settings for erosion control or aesthetic purposes but also natural herbaceous vegetation and undeveloped land, parks, and open space recreational facilities.
- Forest (Forest, Tree): These are areas where land cover consists of natural or semi-natural woody vegetation.
- Agricultural (Harvested/Disturbed, Pasture, Cropland): These are areas used for commercial farming (e.g., commercial row crops or specialized agricultural activities) or grazing.
- Open water (Hydro): These are open-water features, including rivers, streams, and natural and artificial ponds.
- Wetland (Woody Wetlands/Emergent Wetlands): These are areas classified as wetlands, other than open waters.[4]

The predominant land use and land cover types in the study area are forested and agricultural lands. Developed land is primarily found along main roads in the Project area, including Rogers Clark Boulevard, US 1, and Ruther Glen Road.

TABLE 4.1-1 LAND USE/LAND COVER CROSSED BY THE PROJECT

Land Use/Land Cover	Measure	Carmel Church Route 1	Carmel Church Route 2	Carmel Church Switching Station
Total right-of-way [a]	Miles	2.5	2.8	NA
	Acres	29.8	33.1	10.0
Forested	Acres	25.6	28.7	10.0
Agricultural	Acres	0.9	1.9	0
Developed	Acres	0.7	0.7	0
Open Space	Acres	2.1	1.6	0
Open Water	Acres	0.4	0.0	0
Wetland	Acres	0.2	0.2	0

[4] The VGIN (2024) methodology for identifying wetlands differs from ERM's desktop wetland inventory methodology and findings (Appendix D); therefore, wetland acreages in Table 4.1-1 differ from those provided in Section 4.2.1. ERM's estimates in Section 4.2.1 and Appendix D are used for evaluating impacts on wetlands, while the VGIN classifications are for generalized comparison purposes only.

Source: VGIN 2024.
NA = not applicable.
[a] Land use/land cover acreage the totals may not match the sum of the addends due to rounding.

4.1.2.2 IMPACT ASSESSMENT

Carmel Church Route 1

Route 1 crosses 2.5 miles of land encompassing approximately 29.8 acres of right-of-way. If Route 1 is selected for the Project, the primary land use/land cover impact would be the conversion of approximately 25.6 acres are forested land to grassy open space within the maintained right-of-way or to industrial development within the switching station parcel. Typically, open space, agricultural land, developed land, and open water would only incur temporary impacts due to disturbances during construction, except for permanent impacts at the site of transmission tower installation.

Carmel Church Route 2

Route 2 crosses 2.8 miles of land encompassing approximately 33.1 acres of right-of-way. If Route 2 is selected for the Project, the primary land use/land cover impact would be the conversion of approximately 28.7 acres of forested land to grassy open space within the maintained right-of-way or to industrial development within the switching station parcel. Typically, open space, agricultural land, developed land, and open water would only incur temporary impacts due to disturbances during construction, except for permanent impacts at the site of transmission tower installation.

Carmel Church Switching Station

The proposed Carmel Church Switching Station encompasses 10.0 acres of forested land, all of which would be cleared and graded by the developer prior to Project construction.

4.1.3 LAND USE PLANNING AND ZONING

Section 15.2-2223 of the Va. Code requires each local planning commission to adopt a comprehensive plan that provides guidance for the physical development within its jurisdiction. Comprehensive plans assess existing and future land uses, anticipate development trends, and make recommendations for guiding the long-term development decisions of a city or county. Virginia also requires that a comprehensive plan be reviewed at least once every 5 years to adjust to actual or projected changes in land use conditions or needs (Va. Code Section 15.2-2230).

As discussed in Section 3.0, the Project is located entirely in Caroline County, which has an adopted Comprehensive Plan and zoning. While portions of northern Hanover County are within the study area, the Project would not directly affect land use planning and zoning in Hanover County; therefore, Hanover County is not further discussed in this section.

4.1.3.1 LAND USE PLANNING

Comprehensive Plan

Caroline County's current Comprehensive Plan was adopted in 2010 and amended in 2023 and seeks to guide growth and development within the County through 2030 (Caroline County 2023). Future land uses for this area include Commercial/Office along Rogers Clark Boulevard, Heavy Industrial and Office/Industrial south of Rogers Clark Boulevard, and along the existing railroad that traverses the study area, and Rural Transition Areas east and west of the I-95/US 1 corridor. The areas designated for future industrial parks primarily occupy forested parcels adjacent to existing industrial facilities. Current land uses and development patterns in the area reflect the goals of the Comprehensive Plan for this area of the County.

Carmel Church Community Plan

Much of the Project study area is also addressed by the Carmel Church Community Plan (Caroline County 2007), a component of the county's overall Comprehensive Plan that focuses on the Carmel Church community. Adopted in 2007, the Carmel Church Community Plan has three goals: help establish the boundaries of the Carmel Church Community; navigate the future direction of the community; and provide guidance towards establishing a community identity. The boundaries of the Carmel Church Community are generally formed by Dominion's existing Line #256 in the east, the North Anna River in the south, Long Creek and Telegraph Road in the west, and Pole Cat Creek in the north.

The Community Plan highlights the Carmel Church area's potential role in helping to address the County's economic development goals for the I-95/Virginia State Route (Rt.) 207 interchange. Specifically, the community plan identifies the area between Rt. 207 and the CSX rail line as important for commercial and industrial activity.

4.1.3.2 ZONING

Local governments use zoning to formally designate land use districts, identify intended and compatible land uses in those districts, establish standards to guide orderly and efficient land use and development, and implement the objectives of their comprehensive plan. A zoning ordinance can be modified by the local Board of Supervisors and governing bodies or through requests from residents or businesses to change zoning designations or approve new uses. The Caroline County Zoning Ordinance (Ordinance) includes the following zoning districts within the study area.

- Rural Preservation (RP): This district is established specifically to maintain rural character, facilitate existing and future crop farms and non-intensive agricultural operations, conserve natural resources, and discourage suburban sprawl.
- Business (B): This district provides for and promotes the development of a variety of business, commercial uses, and service activities, particularly near population centers and transportation network hubs.
- Industrial (M-1): This district is to encourage the development of industrial parks and individual manufacturing facilities.

- Planned Unit Development (PUD): This district provides flexibility to accommodate a variety of planning objectives. Development in this district is substantially different in character, and specific standards are established for such developments. The PUD district includes the Planned Mixed Use (PMU), Planned Residential Development, Planned Shopping District, Planned Industrial Park, Planned Recreation and Entertainment District, and PIRT designations, each of which has its own development standards and requirements. The PIRT designation is discussed in more detail below.
- PMU blends residential land uses with commercial and industrial development. Design guidance for PMU encourages cluster development around a community center. Development growth is controlled by the presence of available water and sewer infrastructure.
- Residential, Low Density: This district provides for low density residential development and residential communities.
- Rural Residential-2: This district provides for limited residential development in rural areas that does not conflict with adjacent agricultural uses. This district includes 2-to-5-acre lot sizes on land that is not suitable for agricultural uses due to soil, topography, or other natural features and conditions.
- Rural Residential-5: This district provides for areas of a rural and residential character and serves as a transitional district between rural and more intensive zoning designations.

4.1.3.3 OVERLAY ZONES

Overlay zoning districts add requirements to or identify additional permitted uses in the underlying "base" zoning district, such as those listed above. This section describes overlay districts in the study area.

Highway Corridor Overlay District

The Highway Corridor Overlay District (HCOD) includes access management requirements to minimize vehicle conflicts and produce mobility for lands along major roads in the County. Roads in the study area subject to HCOD regulations include Rt. 207 (Rogers Clark Boulevard), Rt. 639 (Ladysmith Road), and US 1.

Commercial Service Corridor

The Ordinance designates four Commercial Service Corridors (CSCs) within the HCOD. CSCs are generally areas along major roads where commercial development like truck stops and fast-food restaurants are concentrated. Additional design standards apply to areas in the CSC, such as reduced minimum setbacks and access standards designed avoid impeding traffic on the roads/corridors identified in Article XV, Section 15.2 of the Ordinance. In the study area, these corridors include the portion of Rt. 207 from the intersection of US 1 to the intersection of Enterprise Parkway, Rt. 652 (Ruther Glen Road) from the intersection of Rogers Clark Boulevard to Rt. 782 (Cool Water Drive), and the portion of Ruther Glen Road from the intersection of Cool Water Drive to the CSX Railroad Bridge.

PIRT

Approved by the Board of Supervisors in 2023, the PIRT Area overlay district is intended to preserve land for high value technology uses, including research and development, data centers, higher education, and appropriate ancillary uses (Caroline County 2023). Two PIRT Areas exist within the study area, the first is located along the western border of the study area, near the intersection of Mount Airy Drive and Jericho Road. No Project facilities would be within this PIRT Area; therefore, it is not discussed further in this document.

The second PIRT Area is along the study area's eastern border and is generally bounded by Polecat Creek to the North, existing Line #256 to the east, the CSX Railroad to the west, and Reedy Creek to the south (Figure 4.1-3). On September 24, 2024, the Caroline County Board of Supervisors amended the Comprehensive Plan to expand the PIRT Area and to expand Carmel Church Growth Area to match the new PIRT boundaries. The additional 1,635 acres of PIRT Area, shown on Figure 4.1-3, are primarily east of existing Line #256, as well as land between the railroad and Rogers Clark Boulevard. A portion of Route 1 (between MPs 0.0 and 0.9) crosses the southern portion of the PIRT Area. Route 2 and the proposed switching station would not be within a PIRT Area.

4.1.3.4 IMPACT ASSESSMENT

This section describes the zoning districts and overlay areas crossed by each route alternative, which are shown on Figure 4.1-3. Table 4.1-2 shows the centerline mileage and acreage of each zoning district and overlay district within the Project footprint. Project construction would not alter any planning designations or zoning districts, and the construction and operation of transmission lines is exempt from compliance with local comprehensive plans and zoning ordinances (Title 9, Section 25-830-150 of the Virginia Administrative Code [9 VAC 25-830-150]).

TABLE 4.1-2 ZONING AND OVERLAY DISTRICTS CROSSED BY THE PROJECT

Zoning District/Designation [a]	Measure	Carmel Church Route 1	Carmel Church Route 2	Carmel Church Switching Station
RP	Miles	1.5	1.1	NA
	Acres	17.8	13.8	0
M-1	Miles	0.4	0	NA
	Acres	4.8	0	0
PMU	Miles	0.5	1.6	NA

Zoning District/Designation [a]	Measure	Carmel Church Route 1	Carmel Church Route 2	Carmel Church Switching Station
	Acres	15.8	28.2	10.0
Planned Innovation and Research Technology Overlay	Miles	1.0	0	NA
	Acres	24.9	0	0

M-1 = Industrial; NA = not applicable; PMU = Planned Mixed Use; RP = Rural Preservation.
[a] Overlay district mileage and acreage are coterminous with base districts.

Both route alternatives primarily cross land areas with rural preservation and mixed-use land use and zoning designations. Route 1 also crosses land with industrial land use and zoning designations, as well as the southern portion of the PIRT Area from approximately MP 0 to MP 1.0.

A review of the Caroline County Economic Development webpage shows the county is actively targeting industrial developments, including data centers, to locate in the PIRT area. One such example is the Caroline County Center for Innovation and Industry, an industrial park totaling over 500 acres located along Rogers Clark Boulevard and the CSX Railroad. Additionally, as depicted on Figure 4.1-4, the Comprehensive Plan designates much of the undeveloped lands crossed by Route 1 as either heavy industrial or industrial/office, which is compatible with transmission line development. Much of the land crossed by Route 1 is associated with industrial parks, further highlighting the existing and future industrial nature of the area. Route 2 does not cross through the PIRT Area and crosses primarily through undeveloped lands designated in the comprehensive plan as rural transition.

The Comprehensive Plan states that rural transition lands are intended to serve as a transition from parcels designated for growth to rural areas through the use of conservation subdivisions, which prioritize open space (Caroline County 2023). Route 1 runs mainly through lands designated for industrial uses, while Route 2 runs through lands designated for the preservation of rural character. The switching station would be entirely within the PMU zoning district.

4.1.4 PLANNED DEVELOPMENTS

4.1.4.1 EXISTING CONDITIONS

ERM obtained information on planned future developments through publicly available data on Caroline County websites and consultations with county planning officials and other stakeholders.[5] Table 4.1-3 lists planned developments within the study area. Figure 4.1-5 depicts the planned developments within the study area. The Project would cross two of the developments in Table 4.1-3: the Carmel Church Data Hub and Washington DC South (which is the site of the proposed Carmel Church Switching Station). All other developments are more than 0.25 mile from the Project and would not be impacted.

[5] "Planned developments" refers to projects that have been submitted to Caroline County for review/approval (or that have been shared with Dominion through stakeholder outreach) but where construction had not yet been completed as of September 2024.

TABLE 4.1-3 PLANNED DEVELOPMENTS IN THE STUDY AREA

Planned Development Name	Description
Luck Stone Data Center	Data Center
Verizon Wireless McDuff Tower	Communications Tower
Beary Fun Daycare	Daycare facility
Carmel Church Industrial Center	Manufacturing and distribution centers
Harris Teeter NOVA Phase 1 Grocery Relay Station	Distribution center
Carmel Church Data Hub	Data center
Belmont North Proffer Amendment	Residences
VALCO Data Center Park	Data Center
Sheetz	Gas Station
Belmont Villas	Age-restricted townhomes
Washington DC South	Transit-oriented development

In 2010, the Caroline County Board of Supervisors approved the Carmel Church Data Hub's rezoning for approximately 1,059 acres south of Rogers Clark Boulevard and north of the Hanover County border along I-95. This project's footprint makes it the dominant planned development within the study area. The rezoning organized the property into eight land bays, each with a different planned mix of uses such as residential, commercial, industrial, hotels, and transportation. In May 2024, the County approved a proffer amendment for the data hub property. This approval allows for 1.6 million square feet of data center development and an associated substation within 97 acres of Land Bay A and requires a generalized development plan for the data center. Washington DC South is the development's current title for marketing. The Project's customer (REC) is also located within Land Bay A.

Figure 4.1-6 shows the land bays within the Carmel Church Data Hub, while Table 4.1-4 provides information on the approved densities and intensities for each Land Bay.

TABLE 4.1-4 CARMEL CHURCH DATA HUB LAND BAYS

Land Bay	Residential (dwelling units)	Commercial/Service/ Light Industrial (square feet)	Other Uses
A	1,930	723,800	None
B and C	4,130	1,400,000	Hotel (1,000 Units) Rail Station
D	1,575	499,200	None
E	500	10,000	None
F	262	20,000	None
G	0	500,000	None
H	262	10,000	None

4.1.4.2 IMPACT ASSESSMENT

Carmel Church Route 1

Route 1 crosses Land Bay G (MPs 1.9 through 2.3) and A (MPs 2.4 through 2.5). A proposed generalized development plan for Land Bay G has not submitted for locality review; therefore, the path of Route 1 was selected to avoid open areas for future development. Impacts on Land Bay A are minimal and specific to the switching station approach.

Carmel Church Route 2

Route 2 crosses Land Bay H (MPs 1.1 through 1.6), D (MPs 1.7 through 2.2), and A (MPs 2.2 through 2.7). The route generally follows the eastern edges of each Land Bay and is collocated with the western edge of I-95 through Land Bays D and A to minimize impacts on future build out. Route 2 would span areas designated for buffering, future development, and open space in Land Bay A on its approach to the switching station.

Carmel Church Switching Station

The Carmel Church Switching Station sits within the northern portion of Land Bay A in the area designated by the May 2024 proffer amendment for substation development. The switching station accounts for 10 acres of impacts within Land Bay A.

4.1.5 RESIDENTIAL AND NON-RESIDENTIAL BUILDINGS

4.1.5.1 EXISTING CONDITIONS

ERM identified residences, commercial structures, and other non-residential buildings within 60 feet of the rights-of-way and within 100, 250, and 500 feet of the centerline of each route through review of digital datasets, maps, and recent (2023) digital aerial photography. There are no buildings within the rights-of-way, within 60 feet of the rights-of-way, or within 100 feet of the centerline of the route alternatives. Only Route 2 has residential or non-residential structures within 250 feet of the centerline (Table 4.1-5). The locations of existing buildings along the routes

are depicted on Figure 4.1-7. There are no buildings within the boundary of the proposed Carmel Church Switching Station. The subsections below provide additional information on the residential areas along each route alternative.

TABLE 4.1-5 RESIDENTIAL, COMMERCIAL, AND OTHER BUILDINGS WITHIN 250, AND 500 FEET OF THE ROUTE ALTERNATIVES

Feature	Carmel Church Route 1	Carmel Church Route 2
Dwellings within 250 feet of centerline [a]	0	6
Dwellings within 500 feet of centerline [a]	4	9
Non-residential buildings within 250 feet of centerline [b]	0	0
Non-residential buildings within 500 feet of centerline [b]	4	3

Notes
[a] "Dwellings" in this context refers to single-family detached residences.
[b] Non-residential buildings include commercial structures, outbuildings, and non-residential structures on residential-use parcels (sheds, barns, garages, etc.).

Only Route 2 passes within 250 feet of a residence. Both routes pass within 500 feet of residences and non-residential buildings. Most buildings within the study area are single-family dwellings on privately owned parcels, particularly along Ruther Glen Road and US 1 or within a residential subdivision, such as Caroline Pines and Belmont. No dwellings are located within the rights-of-way of either of the route alternatives.

Commercial and industrial uses in the study area are concentrated mainly along Rt. 207 and US 1. Uses in these areas include, but are not limited to, a travel center, drive-through and sit-down restaurants, and manufacturing and distribution centers. As mentioned in Section 4.1.3, the study area includes areas identified by the County for residential, commercial, and industrial growth (e.g., the Carmel Church Growth Area and PIRT overlay zone). Section 4.1.5 discusses the planned developments in the study area.

4.1.5.2 IMPACT ASSESSMENT

In accordance with SCC Guidelines, routing through commercial and industrial areas, when practicable, is preferred to crossing residential areas to minimize potential conflicts with existing and planned land uses. Only Route 2 passes within 250 feet of residential dwellings; however, none of those structures are within the right-of-way for (or within 100 feet of the centerline of) Route 2. Route 1 does not pass within 250 feet of any residential dwellings or non-residential buildings.

Except for temporary impacts such as noise or traffic during construction, the Project would have no direct impacts on the operation or use of commercial and other non-residential buildings. Regardless of the route selected, in the event of temporary access impacts on commercial businesses, Dominion would coordinate directly with the affected business owners to plan for and mitigate effects.

In developing the route alternatives, the Company attempted to minimize visual impacts to residences and residential areas to the extent practicable by using existing tree cover to visually obscure transmission infrastructure from existing residences. There are no buildings within the rights-of-way of any of the route alternatives, and all route rights-of-way would be greater than 100 feet from any existing residential dwellings or non-residential buildings. Potential impacts on residential and other buildings are discussed below. Section 4.3 discusses the Project's visual impacts.

The closest structures to each route alternative are described below.

Carmel Church Route 1

The nearest dwelling to Route 1 is a single-family residence approximately 300 feet north of the centerline at MP 0.1. This dwelling is separated from Route 1 by a tree line that provides some vegetative screening between the home and the proposed transmission line infrastructure.

Carmel Church Route 2

The nearest dwellings to Route 2 are four residences along Grannys Way that are located just north of the centerline MPs 0.6 and 0.7. Additionally, two residences are within 200 feet of the route near MPs 0.8 and 0.9. An existing strip of forested land (measuring approximately 100-feet wide) between the edge of the right-of-way and the residences provides some visual screening between the homes and Route 2.

Carmel Church Switching Station

The nearest dwellings to the Carmel Church Switching station are two residences, both along Patterson Avenue, approximately 0.25-mile northeast of the switching station. I-95 runs between the switching station and the two residences. Additionally, a tree line separates and provides some visual screening of the switching station from the residences.

4.1.6 CONSERVATION EASEMENTS AND LANDS

4.1.6.1 EXISTING CONDITIONS

Land conservation easements help preserve Virginia's heritage, provide recreational opportunities, and improve water and habitat quality and overall quality of life. In addition to managing lands under its jurisdiction, the VDCR helps landowners, land trusts, and localities by serving as a clearinghouse, keeping an inventory of protected lands, and providing grants and information on easements and land protection. The agency also helps by identifying important open space and lands rich with plant and animal diversity.

Conservation Easements

Based on VDCR's Managed Conservation Lands Database, ERM identified two conservation easements within the study area (VDCR 2024a). VDCR's Natural Heritage Sites database (VDCR 2024b) indicates that there are no Virginia Natural Area Preserves in the study area. Figure 4.1-8 shows the conservation easements present in the study area.

The North Anna Battlefield Park, managed by Hanover County, is located along the south bank of the North Anna River, extending along a segment of the river approximately 1 to 3 river miles upstream of the crossing of US 1. All 172 acres of the conservation easements associated with this park are within the Project study area.

The Richmond National Battlefield Park North Anna Unit, managed by the National Park Service, occupies approximately 613 acres along the North Anna River in Hanover County, north of the community of Noel. The entirety of the conservation easement for this property is within the Project study area.

Virginia Outdoors Foundation

There are no Virginia Outdoors Foundation easements within the Project study area.

Resource Protection Areas and Resource Management Areas

Virginia enacted the Chesapeake Bay Preservation Act (the Act; Va. Code §62.1-44.15:67) in 1988 to protect the water quality of the Chesapeake Bay, its tributaries, and other State waters. The Act requires municipalities to implement water quality protection measures in zoning and planning ordinances, reduce non-point source pollution to State waters, and designate Chesapeake Bay Preservation Areas—lands that would adversely impact water quality in the Chesapeake Bay and its tributaries if improperly developed. Chesapeake Bay Preservation Areas are composed of Resource Protection Areas (RPAs) that identify lands considered necessary to protect the quality of state waters and Resource Management Areas (RMAs) that include lands that could degrade water quality or the value of RPAs if disturbed.

Caroline County includes the Chesapeake Bay Preservation Overlay District in Article XV of the Ordinance. The Overlay District designates RPAs in the form of a vegetated 100-foot buffer around all perennial waterbodies in the study area, with RMAs forming a nominal 300-foot buffer from the outer edge of the RPAs. These buffers provide protection to the waterbodies, helping minimize runoff pollutants such as nutrients and sediment, stabilizing stream banks and shorelines, and reducing velocity and volume of floodwaters. Any development activities on RPA lands, including transmission line infrastructure, must comply with the provisions of the overlay zone, along with relevant state laws regarding erosion and sediment control (Va. Code §10.1-560 et seq.) and stormwater management (Va. Code §10.1-603.1 et seq.). Wetlands are discussed in further detail in Section 4.2.1.2.

4.1.6.2 IMPACT ASSESSMENT

No conservation easements are within 0.25 mile of Routes 1 or 2 or the proposed Carmel Church Switching Station. Accordingly, the Project would have no impact on any conservation easements.

Dominion understands that properties are placed under easements throughout the year, and that additional easements could be identified in the study area as the Project moves forward. Dominion will continue to consult with the various land managing entities and conservation agencies for the study area regarding potential new easements along the routes.

Route 1 would cross about 0.5 mile of RPAs and RMAs, located around a tributary to Reedy Creek between MPs 0.9 and 0.1 and Reedy Creek between MPs 1.4 and 1.5. Route 2 would cross about 0.3 mile of RPAs and RMAs around tributaries to Reedy Creek at approximate MPs 0.0 and MP 0.2 and a tributary to North Anna River between MPs 1.1 and 1.2. There are no RPAs or RMAs within the footprint of the proposed switching station. Impacts to the RPAs and RMAs crossed by the routes would be the permanent clearing of trees and shrubby vegetation and conversion to maintained herbaceous vegetation within the right-of-way, reducing riparian buffer benefits at these locations. Impacts to waterbodies are further discussed in Section 4.2.1.

The construction, installation, operation, and maintenance of electric transmission lines are conditionally exempt from the Chesapeake Bay Act, pursuant to 9 VAC 25-830-150, however, the Company would adhere to applicable state requirements and would implement appropriate best management practices (BMPs) to limit impacts on RPAs and RMAs to the minimum extent possible while safely and effectively constructing and maintaining the Project.

4.1.7 RECREATIONAL RESOURCES

4.1.7.1 EXISTING CONDITIONS

ERM collected information on recreation resources from digital data sets and maps, recent digital aerial photography, publicly available information on County websites, and consultation with County officials and other stakeholders. ERM identified two recreational resources in the study area: the North Anna Battlefield Park and the East Coast Greenway Trail. These resources are shown on Figure 4.1-9.

The North Anna Battlefield Park encompasses 172 acres in Hanover County on the south bank of the North Anna River. The park includes lands along approximately 2 miles of the river (beginning approximately 1 mile west of US 1), as well as a larger contiguous area between the river and the Martin Marietta quarry on Verdon Road. Park amenities include historic battlefield sites, walking trails, birding and wildlife trails, and a picnic area.

The East Coast Greenway Trail is a 3,000-mile walking and biking route that runs from Maine to Florida, connecting local, firm-surface trails across 15 states (East Coast Greenway Alliance 2024). Within the study area, the East Coast Greenway runs along Telegraph Road and US 1. These segments of the trail are on-road (i.e., there is no designated or separate infrastructure for users) and the segment along US 1 is designated as “High-Stress Road—Extreme Caution” (East Coast Greenway Alliance 2024).

4.1.7.2 IMPACT ASSESSMENT

All Project infrastructure would be more than 0.25 mile from the recreational resources listed above. As a result, the Project would have no impact on either the North Anna Battlefield Park or the East Coast Greenway Trail.

4.1.8 SCHOOLS, CEMETERIES, AND PLACES OF WORSHIP

4.1.8.1 EXISTING CONDITIONS

ERM reviewed the following sources to identify cemeteries, schools, and places of worship within 0.25 mile of the right-of-way of each route alternative:

- Recent and historic topographic maps (USGS 2024a)
- Recent and historic digital aerial photography (ESRI 2024; Google, Inc. 2024)
- Cemetery and burial data (Find a Grave 2024)
- Publicly accessible county datasets (Caroline County 2024)
- Cultural resource data from the VCRIS (VDHR 2024); and
- Information from open house attendees.

Schools

Based on review of the sources identified above, there are no schools within 0.25 mile of the route alternatives.

Cemeteries

Based on review of the sources identified above, one cemetery was identified within 0.25 mile of the route alternatives. The Fontaine Hill Cemetery is located approximately 360 feet northwest of the Ruther Glen Road grade separated CSX railroad crossing, about 0.2 mile south of MP 1.9 of Route 1. Images from Find a Grave show approximately 10 headstones in the cemetery, which is surrounded by a white fence.

Places of Worship

Based on review of the sources identified above, there are no places of worship within 0.25 mile of the route alternatives.

4.1.8.2 IMPACT ASSESSMENT

No schools or places of worship are within 0.25 mile of proposed Project features; therefore, the Project would have no direct impact on schools or places of worship. Figure 4.1-10 shows the existing cemetery within 0.25 mile of the route alternatives. Visual impacts of the route alternatives on are discussed in more detail Section 4.3.

Fontaine Hill, the only identified cemetery within 0.25 mile of a route alternative, is located more than 500 feet (approximately 0.2 mile) from the nearest route alternative right-of-way (Route 1 at MP 1.9). Due to the distance, the Project would not directly or indirectly impact this cemetery.

4.1.9 TRANSPORTATION INFRASTRUCTURE

4.1.9.1 EXISTING CONDITIONS

The road network in the study area includes a variety of functional classifications, including a freeway (I-95), arterial roads (US 1 and Rogers Clark Boulevard/Rt. 207), and collector and local

roads (such as Jericho Road, Grannys Way, and Railroad Lane). I-95 runs generally north-south through the middle of the study area. Rt. 207 extends northeastward from US 1, with an interchange at I-95. VDOT owns and maintains most road rights-of-way in the study area.

A CSX railroad line (also used by Amtrak as part of the Northeast Corridor) runs north-south between I-95 and US 1 from the study area's southern boundary before turning northeast prior to reaching Rt. 207. A second CSX railroad runs parallel and adjacent to the south side of Verdon Road in Hanover County.

The Caroline County Comprehensive Plan identifies several roads in the study area needing improvements to accommodate anticipated growth, including US 1, Rt. 207, and Jericho Road (Caroline County, 2023). ERM reviewed VDOT's Six-Year Improvement Plan to identify possible future road projects within the study area. There are no planned county or VDOT projects within 0.25 mile of the routes.

4.1.9.2 IMPACT ASSESSMENT

Project impacts on transportation infrastructure would include temporary road closures and traffic during construction, and visual impacts from the installation of transmission structures and conductors along and across roads, which are discussed in Section 4.3. Both of the route alternatives would cross I-95, Ruther Glen Road, and the CSX railroad in Ruther Glen. VDOT guidelines indicate a preference for perpendicular road crossings, which reduce the distance spanned and the visual impacts of a crossing. VDOT also prefers that transmission structures are placed outside their rights-of-way to avoid conflicts with future road improvements.

Carmel Church Route 1

Carmel Church Route 1 has four road crossings (I-95, Ruther Glen Road, Railroad Lane, and Taylor Drive). All crossings road crossings are perpendicular. Route 1 would cross the CSX railroad at an acute angle.

Carmel Church Route 2

Carmel Church Route 2 has three road crossings (I-95, Ruther Glen Road, and Oak Haven Trail). All road crossings are perpendicular. Route 2 would cross the CSX railroad at a nearly right angle. Additionally, the route parallels I-95 for approximately 1.03 miles from MP 1.7.

Additionally, the Company corresponded with VDOT, who did not express concerns about the proposed route alternatives.

Carmel Church Switching Station

The switching station would be entirely within the Washington DC South data center development and would not be within or adjacent to any existing public roads.

4.1.10 AIRPORTS AND HELIPORTS

4.1.10.1 AIRPORT FACILITIES

Transmission structures have the potential to affect airspace in and around airports. The following sections describe the airports in the vicinity of the study area, the airspace regulations that could impact the Project, and potential impacts on airports and airspace.

4.1.10.2 AIRPORTS NEAR THE PROJECT AREA

ERM reviewed the Federal Aviation Administration's (FAA's) website to identify public use airports, airports operated by a federal agency or the US Department of Defense (DoD), airports or heliports with at least one FAA-approved instrument approach procedure, and public use or military airports under construction (FAA n.d.-a, FAA n.d.-b). Based on this review, there are 4 airports, private airstrips, or heliports within 10 nautical miles (nm) of the proposed Project infrastructure (Figure 4.1-11). Table 4.1-4 lists the airports, heliports, and private airstrips in the Project vicinity, including airport identification number, and the distance and direction from the nearest Project infrastructure to the nearest runway or heliport, type of use, and maximum runway length.

TABLE 4.1-6 AIRPORTS AND HELIPORTS LOCATED WITHIN 10 NAUTICAL MILES OF THE PROJECT

Airport/Heliport Name	Use	FAA Identifier	Approximate Distance and Direction from Nearest Project Facility (miles)	Maximum Runway Length (feet)
Cool Water Airport	Private	4VG2	5.3 nm southeast of Route 2. 5.5 nm southeast of the Carmel Church Switching Station and western terminus of both route alternatives.	1,600
Mayers Airport	Private	VG24	8.1 nm south of Route 2.	2,000
Woodford Airpark Airport	Private	20VA	9.0 nm north of Route 1. 9.1 nm north of the Carmel Church Glen Switching Station and western terminus of both route alternatives.	2,600
Marry Walker LZ Airport	Military/ Private	APH	9.3 nm northeast of Route 2 eastern cut-in to the end of the nearest runway.	2,202

FAA = Federal Aviation Administration; LZ = landing zone; nm = nautical mile.

4.1.10.3 FEDERAL AVIATION ADMINISTRATION REGULATIONS

The FAA oversees air transportation in the U.S., focusing on air transportation safety, including the enforcement of safety standards for aircraft manufacturing, operation, and maintenance. The FAA also manages air traffic in the U.S. and evaluates physical objects that may affect the safety of aeronautical operations through an obstruction evaluation. The prime objective of an FAA obstruction evaluation is to ensure the safety of air navigation and the efficient utilization of navigable airspace by aircraft.

The regulations that govern objects that may affect navigable airspace are codified in the Code of Federal Regulations (CFR), Title 14, Part 77 (14 CFR Part 77). A summary of the rule as it relates to the Project is provided below, and the full rule is available online at: https://www.ecfr.gov/current/title-14/chapter-I/subchapter-E/part-77.

The FAA only regulates public use and federally operated (military use) airports and heliports. Of the airports identified in Table 4.1-4, the only FAA regulated facility within 10 nm of any route alternative is the Mary Walker landing zone (LZ) military use airport. There are no public use airports within 10 nm of any route alternative, and private use airports do not require evaluation under 14 CFR Part 77. As such, only FAA regulations specific to military use facilities are discussed in the following sections.

4.1.10.4 MILITARY AIRPORT IMAGINARY SURFACES

The FAA has established military airport imaginary surfaces for all airports operated by the DoD, including the United States Army, Navy (including the U.S. Marine Corps) and Air Force. Imaginary surfaces are intended to prevent existing or proposed objects from extending from the ground into navigable airspace. Below is a description of the imaginary surfaces applicable to all military airports as defined in 14 CFR 77.21:

- **Inner horizontal surface:** This surface is an oval-shaped plane 150 feet above the established airfield elevation, the perimeter of which is constructed by swinging 7,500-foot arcs from centerline at the end of each runway and interconnecting these arcs with tangents.
- **Conical surface:** This surface extends outward and upward from the periphery of the inner horizontal surface at a slope of 20 to 1 for a horizontal distance of 7,000 feet to a height of 500 feet above the established airfield elevation.
- **Outer horizontal surface:** This surface is a plane located 500 feet above the established airfield elevation, extending outward from the outer periphery of the conical surface for a horizontal distance of 30,000 feet.
- **Primary surface:** This ground-level (or water-level) surface is longitudinally centered on each runway and has the same length as the runway. The width of the primary surface for runways is 2,000 feet. However, at established bases where substantial construction has taken place in accordance with a previous lateral clearance criterion, the 2,000-foot width may be reduced to the former criteria.
- **Clear zone surface:** This ground-level (or water-level) surface is located at each end of the primary surface and has a length of 1,000 feet and the same width as the primary surface.
- **Approach clearance surface:** This surface is an inclined plane aligned symmetrical about the extended runway centerline. It begins 200 feet beyond each end of the primary surface at the centerline elevation of the runway end and extends for 50,000 feet. The slope of the approach clearance surface is 50 to 1 along the extended runway centerline until it reaches an elevation of 500 feet above the established airport elevation. The

approach clearance surface then continues horizontally at this elevation to a point 50,000 feet from the point of beginning. The width of this surface at the runway end is the same as the primary surface. From there, it flares uniformly to a width of 16,000 feet at a point 50,000 feet from the point of beginning.

- **Transitional surfaces:** These surfaces connect the primary surfaces, the first 200 feet of the clear zone surfaces, and the approach clearance surfaces to the inner horizontal surface, conical surface, outer horizontal surface or other transitional surfaces. The slope of the transitional surface is 7 to 1 outward and upward at right angles to the runway centerline.

None of the route alternatives discussed in this report would overlap the military airport imaginary surfaces of Mary Walker LZ Airport. Additional information on this determination is provided in the impact section below.

4.1.10.5 TERMINAL INSTRUMENT PROCEDURES

In addition to the civil and military airport imaginary surfaces, FAA Order 8260.3G establishes imaginary surfaces associated with terminal instrument procedures (TERPs). TERPs are guidelines created by the FAA that prescribe standardized methods for designing and evaluating airport specific instrument flight procedures (IFPs), including approach and departure procedures, for civil and military airports. IFPs detail required flight paths, altitude restrictions and maximum descent and takeoff gradients that guide aircraft through approach airspace and provide protocols for missed approaches. IFPs consider obstructions around the airport, including natural topography and manmade structures, to establish Minimum and Required Obstacle Clearance Surfaces. This facet of TERPS allows safe aeronautical navigation in poor visibility conditions.

The FAA establishes IFPs for all civil public use airports; however, IFPs for military airports are established, approved, and can be altered by the military entities that operate military airports, with notification to the FAA. Military airport IFPs are established in accordance with and considered equivalent to 14 CFR Part 77 procedures and are normally authorized for civil use; however, military IFPs can deviate from civil airport safety standards because of operational necessity. Deviations may result in lower minimum flight altitudes within military airport airspace.

Typically, Airport Imaginary Surfaces are more restrictive than surfaces associated with TERPs. If a structure were to penetrate imaginary surfaces and/or FAA imaginary “Notice” surfaces (described in the following section) of an airport, the IFP for that airport would typically be required to consider that obstruction. Pursuant to 14 CFR Part 77, an existing object (including a mobile object) is, and a future object would be an obstruction to air navigation if it is of greater height than any of the following heights or surfaces:

- 499 feet above ground level (AGL) at the site of the object;
- 200 feet AGL or above the established airport elevation, whichever is higher, within 3 nm of the established reference point of an airport (excluding heliports) where the longest runway is more than 3,200 feet in actual length. That height increases in the proportion of 100 feet for each additional nm from the airport up to a maximum of 499 feet;

- A height within a terminal obstacle clearance area, including an initial approach segment, a departure area, and a circling approach area, that would result in the vertical distance between any point on the object and an established minimum instrument flight altitude within that area or segment to be less than the required obstacle clearance;
- A height within an enroute obstacle clearance area, including turn and termination areas, of a Federal Airway or approved off-airway route, that would increase the minimum obstacle clearance altitude; or
- The surface of a takeoff and landing area of an airport or any imaginary surface established under 14 CFR §§ 77.19, 77.21, or 77.23.

None of the route alternatives discussed in this report would overlap with the military airport imaginary surfaces or would exceed obstruction standards associated with TERPs of the Mary Walker LZ Airport.

4.1.10.6 FEDERAL AVIATION ADMINISTRATION NOTICE REQUIREMENTS AND TIMING

Based on the runway categories and dimensional standards described above, a notice must be filed with the FAA for the following:

- Any construction or alteration that is more than 200 feet AGL at its site;
- Any construction or alteration exceeding an imaginary surface as defined in 14 CFR Part 77, including surfaces extending outward and upward at the following slopes:
  - 25 to 1 for a horizontal distance of 5,000 feet from the nearest point of the nearest landing and takeoff area of each heliport;
  - 50 to 1 for a horizontal distance of 10,000 feet from the nearest point of the nearest runway that is no more than 3,200 feet in actual length; or
  - 100 to 1 for a horizontal distance of 20,000 feet from the nearest point of the nearest runway that is more than 3,200 feet in actual length; or
- If requested by the FAA.

Construction or alteration of any structure that meets the notification requirements set forth above requires submittal of an FAA Form 7460-1, Notice of Proposed Construction or Alteration, to the FAA regional office with jurisdiction over the area, or submitted electronically via the FAA website. The information that needs to be provided with the notice includes the coordinates, site elevation, and structure height AGL for each pole/structure and the height of construction equipment, such as cranes.

None of the route alternatives discussed in this report would overlap with the Mary Walker LZ Airport imaginary "Notice" surfaces. The proposed transmission line structures for the Project would not exceed 200 feet in height. Temporary cranes would likely be required to install the structures; however, based on the typical maximum crane height needed for tower construction (approximately 35 feet above the structure height), temporary cranes are also unlikely to exceed the FAA notification thresholds.

4.1.10.7 STATE AND LOCAL REGULATIONS

It is unlawful to erect any structure that penetrates into or through any licensed airport's clear zone, approach zone, imaginary surface, obstruction clearance surface, obstruction clearance zone, or surface or zone as described in regulations of the Virginia Department of Aviation or the FAA without first securing a permit from the Board of Aviation (Va. Code §5.1-25.1). This requirement does not apply to any structure erected in a jurisdiction that has an ordinance regulating the height of such structures to prevent the penetration of zones and surfaces established in 14 CFR Part 77 and Rule 19 of the Virginia Department of Aviation.

State law (Va. Code §§15.2-2280, 15.2-2282, 15.2-2293, and 15.2-2294) gives local jurisdictions the power to establish and regulate zoning districts, make airspace subject to their zoning ordinance, and establish airport safety zoning. Caroline County has no special zoning laws or airspace restrictions associated with airports. As such, neither of the route alternatives or associated structures would conflict with any local regulations.

4.1.10.8 IMPACT ASSESSMENT

ERM conducted an airport analysis to review the height limitations associated with the FAA-defined imaginary surfaces for all runways at the airports identified in Table 4.1-4. As part of a typical airport analysis, ERM conducts preliminary evaluations of transmission infrastructure heights and locations using the FAA-defined Civil and DoD airport imaginary surfaces, and applies standard GIS tools, including ESRI's ArcGIS Pro software with Spatial Analyst, 3D Analyst, and Aviation Airports Extensions, to create and georeference imaginary surfaces in space and in relationship to transmission structures.

Of the four airports identified within 10 nm of all the route alternatives, there are no public use airports; three are private use airports, and one is a military use airport (Mary Walker LZ Airport). Private airports and heliports are not regulated by the FAA. Neither of the route alternatives would conflict with the private facilities listed in Table 4.1-4.

Mary Walker LZ Airport has one runway oriented southwest-to-northeast, referred to as Runway 05/23. The end of the southwestern approach of Runway 05/23 would be approximately 9.3 nm, or 56,500 feet, northeast of the closest Project component (at the Route 1 eastern cut-in location). The airport is greater than 10 nm from any component of Route 2.

Because the nearest component of Route 1 is greater than 50,000 feet from the end of the nearest runway, neither route alternative would overlap with FAA-defined military airport imaginary surfaces. In addition, none of the proposed structures associated with the route alternatives or temporary cranes used during construction would exceed 200 feet AGL. As such, the Project would not penetrate any FAA notification thresholds. Unless specifically requested by the FAA, notification to the FAA would not be required. If the FAA were to request additional information regarding the proposed project for any reason, Dominion may be required to submit FAA Form 7460-1, Notice of Proposed Construction or Alteration, pursuant to 14 CFR Part 77 for FAA notification. Any such submittal would occur after a route is selected by the SCC during the permitting phase of the Project.

4.2 NATURAL RESOURCES

4.2.1 SURFACE WATERS

ERM identified and mapped watersheds, wetlands, and waterbodies (e.g., lakes, streams, ponds, and stormwater features) within the study area using publicly available desktop sources, including:

- Recent aerial imagery, taken in October and December of 2023 (NAIP 2023; Planet Lab Imagery 2023);
- Google Earth Aerial Imagery (Google, Inc. 2024);
- ESRI World Elevation Terrain 2-foot contours (ESRI et al. 2024);
- NWI maps from the USFWS online data mapping portal (USFWS 2024);
- The National Hydrography Dataset (NHD) Plus High Resolution (USGS 2024b); and
- Soil Survey Geographic Database soils data from the U.S. Department of Agriculture-Natural Resources Conservation Service (USDA-NRCS 2023).

For reference, an overview map illustrating the locations of NWI-mapped wetlands, NHD-mapped waterbodies, and watershed boundaries in the study area are provided as Figure 4.2-1 and 4.2-2.

4.2.1.1 WATERSHEDS

Watersheds define the geographic area within the boundaries of drainage divides throughout the country. For purposes of classifying watersheds, the U.S. is divided into hydrologic units in four levels—regions, subregions, accounting units, and cataloging units—which may contain an entire or part of a watershed. Each level is identified by a hydrologic unit code (HUC), beginning with major geographic areas or regions. The first level of the code, two-digit HUCs, identify a major geographic area or region containing either several rivers or the drainage area of a major river. Subsequent levels encompass progressively smaller areas based on the drainage divides of lower order waterbodies.

The study area is within the following HUC areas:

- The Mid-Atlantic two-digit HUC region (02), which discharges into the Atlantic Ocean, Long Island Sound, or the Riviere Richelieu, a tributary of the St. Lawrence River;
- The Lower Chesapeake four-digit HUC subregion (0208), which drains about 18,500 square miles within the Chesapeake Bay watershed, including Washington DC, Maryland, Pennsylvania, Virginia, and West Virginia; and
- The lower-Chesapeake six-digit HUC watershed (020801), which drains about 8,320 square miles into the Chesapeake Bay (USGS 2023).

The study area is further split into two 8-digit HUCs, with the watershed divide crossing the study area from northwest (near Cedar Fork) to southeast (near Burruss Corner), approximately following Ruther Glen Road. About 40% (approximately 15,100 acres) of the study area lies northeast of the divide within the Mattaponi 8-digit HUC subregion (02080105), which further

divides into the Polecat Creek-Mattaponi River 10-digit HUC watershed (0208010503). Most of Route 1 and about a quarter of Route 2 cross through the 10-digit HUC. Aquatic resources within the Polecat Creek-Mattaponi River watershed generally flow into the perennial Reedy Creek, running northwest to southeast and ultimately to the Mattaponi River to the east. The remaining 60% (approximately 21,000 acres) of the study area lies southwest of the divide within the Pamunkey 8-digit HUC subregion (02080106), which further divides into the Northeast Creek-North Anna River HUC 10-digit watershed. The proposed Carmel Church Switching Station, about 0.6 mile of Route 1, and about 2.0 miles of Route 2 cross through this 8-digit HUC. Aquatic resources within the Northeast Creek-North Anna River watershed generally flow into the perennial North Anna River, running northwest to southeast

4.2.1.2 WETLANDS

Wetlands within the rights-of-way for the route alternatives (inclusive of the proposed Carmel Church Switching Station site) were identified based on ERM's desktop wetland and waterbody probability analysis, described in the Wetland and Waterbody Desktop Summary (Appendix D). Wetlands and waterbodies have been classified based on the Cowardin classification system as described below.

- Palustrine emergent (PEM) wetlands: characterized by erect, rooted, herbaceous hydrophytes (i.e., aquatic plants) and woody species less than 3 feet in height, excluding mosses and lichens;
- Palustrine scrub-shrub (PSS) wetlands: characterized by woody vegetation, excluding woody vines, approximately 3 to 20 feet in height;
- Palustrine forested (PFO) wetlands: characterized by woody vegetation, excluding woody vines, approximately 20 feet or more in height and 3 inches or larger diameter at breast height;
- Palustrine unconsolidated bottom (PUB) open waters: characterized by bottom substrate particles smaller than stones (less than 10 inches in diameter) covering greater than 25% of the area, with plants covering less than 30% of the area; or
- Riverine streams: channels containing periodically or continuously moving water, with two exceptions: wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens; and habitats with water containing ocean-derived salts in excess of 0.5% (USFWS 2013).

Wetlands provide a wide range of ecological functions, including flood storage and groundwater recharge, nutrient and sediment capture, erosion control, filtration of pollutants from adjacent waterbodies, and diverse fish and wildlife habitat. PFO wetlands are of especially high value because of their habitat biodiversity and carbon sequestration functions, as well as their increased filtration capabilities.

Most wetlands in the study area are adjacent to, or contiguous with streams and associated tributaries regulated by the U.S. Army Corps of Engineers (USACE) and Virginia Department of

Environmental Quality (VDEQ) under Sections 404 and 401 of the Clean Water Act (CWA), respectively.

ERM did not conduct an onsite delineation of wetlands or waterbodies along the route alternatives; however, a field delineation was completed by WSP USA Inc. in July 2024 on the parcel containing the proposed Carmel Church Switching Station, which identified aquatic resources along Route 2 between MPs 2.3 and 2.6 (WSP 2024). The boundaries of these field-delineated aquatic resources were used in the desktop wetland delineation and are included in the wetland and waterbody numbers provided in this report.

Table 4.2-1 summarizes the calculated acres of wetlands identified within the right-of-way of each route alternative. These are areas of high, medium-high, or medium probability of containing wetlands or waterbodies, based on the probability analysis described in Appendix D and the field delineation mentioned above. Maps in Attachment 2 of Appendix D depict these wetlands and waterbodies. Riverine (stream) and PUB (open water) features are described in the Waterbody Crossings section below.

TABLE 4.2-1 HIGH, MEDIUM-HIGH, AND MEDIUM PROBABILITY WETLANDS AND WATERBODIES WITHIN THE PROJECT FOOTPRINT

Aquatic Resource Type Classification	Unit [a]	Route 1	Route 2
Total	Acres	2.5	1.7
PFO	Acres	0.8	1.6
PSS	Acres	NA	NA
PEM	Acres	0.4	NA
PUB	Acres	1.2	NA
Riverine	Acres	0.1	0.1

NA = Not applicable due to absence of a wetland type within the Project footprint; PEM = palustrine emergent; PFO = palustrine forested; PSS = palustrine scrub-shrub; PUB = palustrine unconsolidated bottom.

[a] Wetland acreage the totals may not match the sum of the addends due to rounding.

These wetlands are generally forested and are concentrated around Reedy Creek and its tributaries in the northeastern part of the study area and North Anna River and its tributaries in the southwestern part of the study area. No wetlands were identified within the footprint of the Carmel Church Switching Station.

Carmel Church Route 1

The Route 1 right-of-way encompasses approximately 2.5 acres of wetlands and waterbodies. Approximate locations of larger concentrations of wetlands along Route 1 include:

- PFO and PEM wetlands associated with Reedy Creek and intermittent tributaries to Reedy Creek between MPs 0.1 and 0.2, 0.4 and 0.5, 1.1 and 1.2, and 1.5 and 1.6; and

- PFO wetlands near MP 1.6 and 2.2.

If Route 1 is selected for the Project, construction and operation of the transmission line would convert the approximately 0.8 acre of PFO to PSS/PEM-type wetlands within the maintained right-of-way.

Carmel Church Route 2

The Route 2 right-of-way encompasses approximately 1.7 acres of wetlands and waterbodies. Approximate locations of larger concentrations of wetlands along Route 2 include:

- PFO wetlands associated with an intermittent tributary to Reedy Creek between MPs 0.2 and 0.3; and
- PFO wetlands associated with intermittent tributaries to Bull Run between MPs 1.1 and 1.2, and at approximate MPs 1.9, 2.1, and between 2.5 and 2.6.

If Route 2 is selected for the Project, construction and operation of the transmission line would convert the approximately 1.6 acres of PFO to PSS/PEM-type wetlands within the maintained right-of-way.

Impact Assessment

To minimize impacts on wetland areas, the Project has been designed to span or avoid wetlands, keeping transmission structures outside of wetland boundaries to the extent practicable. Most direct impacts on wetlands from Project construction would be temporary in nature. The Company would use temporary timber matting for construction equipment to travel over wetlands, as appropriate. Due to the absence of an existing right-of-way, some new access roads may be necessary along the route. If a section of line cannot be accessed from existing roads, Dominion may need to install a culvert, ford, or temporary bridge along the right-of-way to cross small streams. In such cases, some temporary fill material in wetlands adjacent to such crossings may be required. This fill would be placed on erosion control fabric and removed when work is completed, returning ground elevations to preexisting conditions.

Permanent direct impacts to wetlands would be limited to placement of structures within wetlands, if unavoidable, and, due to the necessity of removing trees and shrubby vegetation from the right-of-way, the permanent conversion of PSS/PFO wetlands within the right-of-way to PSS or PEM type wetlands. Forested wetlands and riparian buffers provide functions such as peak flood flow reduction, nutrient and sediment capture, filtration of pollutants to adjacent waterbodies, and habitat diversity. The conversion of forested wetlands would reduce or eliminate some of these functions.

Where the removal of trees or shrubby vegetation occurs within wetlands, Dominion would use the least intrusive method reasonably possible to clear the corridor. Hand cutting of vegetation would be conducted, where needed, to avoid and minimize impacts on streams and/or wetlands.

No change in contours of wetlands and waterbodies, or redirection of the flow of water, is anticipated and the amount of spoil from foundation and structure placement would be minimal.

Excess spoil in wetlands generated through foundation construction would be controlled through construction BMPs (e.g., the implementation erosion and sediment controls).

Upon SCC approval of a route and final line engineering, Dominion will obtain the appropriate permits from the USACE and VDEQ for work within wetlands and waterbodies to ensure full compliance with Section 404 and 401 of the CWA and minimize potential impacts on aquatic resources within the approved transmission line corridor.

4.2.1.3 WATERBODIES

ERM identified and mapped waterbodies, including streams, rivers, and other open waterbody features (e.g., reservoirs, lakes, impoundments, ponds, and stormwater features) within the study area using the publicly available GIS databases identified above. Waterbody crossings are regulated by the USACE and VDEQ under Sections 404 and 401 of the CWA and the Virginia Water Protection permit program. No navigable waters are crossed by the route alternatives; therefore, no Rivers and Harbors Act Section 10 authorization from the USACE would be required for the Project.

Named waterbodies crossed include the perennial Reedy Creek (Routes 1 and 2) and North Anna River (Route 2). The routes also cross unnamed perennial and intermittent tributaries and open waterbody features. Table 4.2-2 shows the number of NHD-mapped waterbody crossings for each route alternative. The locations of those waterbodies are described below. Appendix D provides a general location map illustrating waterbodies crossed by each route.

TABLE 4.2-2 WATERBODIES CROSSED BY THE ROUTE ALTERNATIVES

Waterbodies Crossed	Unit	Route 1	Route 2
Total	Number	6	4
Perennial Streams/Rivers	Number	0	0
Intermittent Streams/Rivers	Number	5	4
Perennial Lakes/Ponds	Number	1	0

Source: USGS 2024b.

Carmel Church Route 1

Route 1 crosses six NHD-mapped waterbodies, as listed in Table 4.2-2, including one perennial lake/pond, and five unnamed, intermittent streams. Based on ERM's desktop wetland and waterbody analysis, the right-of-way for Route 1 would encompass approximately 0.1 acre of riverine features and 1.2 acres of PUB open water features. Waterbody crossing locations are summarized below:

- Unnamed, intermittent tributaries to Reedy Creek between MPs 0.1 and 0.2, 0.4 and 0.5, 0.9 and 1.0, and at approximate MP 1.1;

- An open waterbody feature associated with Reedy Creek between MPs 1.4 and 1.5; and
- An unnamed, intermittent tributary to Bull Run between MPs 2.1 and 2.

Carmel Church Route 2

Route 2 crosses four NHD-mapped waterbodies as listed in Table 4.2-2, all of which are unnamed, intermittent streams. Based on ERM's desktop wetland and waterbody analysis, the right-of-way for Route 2 would encompass approximately 0.1 acre of riverine features. Waterbody crossing locations are summarized below:

- An unnamed, intermittent tributary to Reedy Creek between MPs 0.2 and 0.3; and
- Unnamed, intermittent tributaries to Bull Run between MPs 1.1 and 1.2, 1.9 and 2.0, and 2.5 and 2.6

Impact Assessment

Waterbodies crossed by route alternatives would be spanned as practicable, with permanent waterbody impacts limited to riparian buffer transition from tree cover to herbaceous vegetation within the maintained right-of-way. Tree removal adjacent to waterbodies would reduce riparian buffer functions such as stream bank stabilization and erosion control, nutrient and sediment filtration, floodwater storage and peak flow reduction, and water temperature changes due to loss of shading. The right-of-way would be maintained with a cover of herbaceous vegetation during operations, which would provide some filtration and stabilization to protect waterbodies from runoff.

Where removal of trees and/or woody shrubs is required, clearing within 100 feet of a stream would be conducted by hand. Vegetation would be cut at or slightly AGL and there would be no grubbing of stumps. Dominion would use sediment barriers along waterways and steep slopes during construction to protect waterways from soil erosion and sedimentation.

Temporary, minor impacts on water quality could occur during construction from disturbed soils transported by storm water into adjacent surface waters during rain events. Increased turbidity and localized sedimentation of stream bottoms may occur because of runoff. Potential impacts would be mitigated by the implementation of erosion control measures.

Waterways crossed by the Project would be maintained for proper drainage using culverts or other crossing devices in accordance with Dominion's standard policies. If a section of line cannot be accessed from existing roads, Dominion may need to install a culvert or temporary bridge to cross small streams. In such cases, temporary fill may be required. The fill would be placed on erosion control fabric and removed when work is completed, returning the surface to original contours.

Upon SCC approval of a route and final line engineering, Dominion will obtain the appropriate permits from the USACE and VDEQ for work within wetlands and waterbodies to ensure full compliance with Section 404 and 401 of the CWA and minimize potential impacts on aquatic resources within the approved transmission line corridor.

4.2.2 NATURAL HERITAGE RESOURCES

The Virginia Natural Area Preserves Act of 1989 defines natural heritage resources (NHRs) as habitats of rare, threatened, or endangered plant and animal species; rare or state-significant natural communities or geologic sites; and similar features of scientific interest benefiting the welfare of the citizens of the Commonwealth (Va. Code § 10.1-209 through 217). The species, natural communities, and geologic features categorized by NHRs are assigned a state rank (an "S-ranking") by VDCR staff to indicate their conservation status and rarity within the Commonwealth of Virginia. State rankings range from S1 to S5 as follows (VDCR 2021a):

- Critically imperiled (S1);
- Imperiled (S2);
- Vulnerable (S3);
- Apparently secure (S4); or
- Secure (S5).

ERM consulted the VDCR's Natural Heritage Program (NHP) and requested an environmental review of the routes to identify NHRs along and near each alternative. ERM also reviewed ecological datasets provided via the NHP for the area within 1.0 mile of what would be the rights-of-way for each route alternative. Resources reviewed included natural area preserves, conservation sites, stream conservation sites, and ecological cores (VDCR 2024b).

The VDCR responded to ERM's request for environmental review of the Project in a letter dated September 20, 2024 (attached as Appendix E). The VDCR letter indicates that no natural area preserves or state-listed insects are present along the routes; therefore, no further discussion of these resource types is provided in this study. However, the VDCR's review did identify several NHRs along the routes, including conservation sites, stream conservation sites (SCSs), and ecological cores. Each type of NHR is described below.

4.2.2.1 CONSERVATION SITES

Conservation sites identify a planning boundary delineating the NHP's best determination of the land and water area occupied by one or more rare, threatened, or endangered species; rare or significant natural communities, or geologic sites and are necessary to maintain ecological processes that will facilitate long-term survival of these resources. The size and dimensions of a conservation site are based on the habitat requirements of the rare, threatened, or endangered plant and animal species or natural communities present and the physical features of the surrounding landscape. Features taken into consideration include hydrology, slope, aspect, vegetation structure, current land uses, and potential threats from invasive species. Conservation sites do not necessarily preclude human activities, but a site's viability may be greatly influenced by human activities. Conservation sites may require ecological management, such as invasive species control or water management, to maintain or enhance their viability.

Each conservation site is given a biodiversity significance ranking (a "B-ranking") by VDCR based on rarity, quality, and number of NHRs it contains. Conservation site rankings range from B1 to B5 as follows (VDCR 2021a):

- Outstanding significance (B1);
- Very high significance (B2);
- High significance (B3);
- Moderate significance (B4); or
- General significance (B5).

Rankings for conservation sites can also include indicators of the presence/absence of federal-listed species, state-listed species, or no listed species.

VDCR identified two conservation sites within the Project study area, including Reedy Creek Seeps Conservation Site and North Anna Bluffs Conservation Site. Descriptions of each conservation site are provided below, and the two sites are depicted on Figure 4.2-3.

Reedy Creek Seeps Conservation Site

The Reedy Creek Seeps Conservation Site consists of 1,116 acres of land with a B3 ranking, indicating a site of high significance. The conservation site is in the eastern portion of the study area, north of Ruther Glen Road, south of Dry Bridge Road, and east of a CSX Railroad track. The site is bisected by the Company's existing Line #256 and several roads, and a small portion of the site has been cleared. A freshwater perennial stream tributary named Reedy Creek flows from west to east through the middle of the conservation site. The Reedy Creek floodplain is approximately 500-feet wide, often with freshwater forested wetlands, and receives surface flow from multiple unnamed stream tributaries located north and south of Reedy Creek.

The rare or T&E species associated with the Reedy Creek Seeps Conservation Site include eight rare species and one state-threatened species, including:

- One rare amphibian species, the Lesser siren (*Siren intermedia*);
- One state-threatened plant species, the New Jersey rush (*Juncus caesariensis*); and
- Seven rare plant species, including Little-leaf sensitive-brier (*Mimosa microphylla*), Northern white beaksedge (*Rhynchospora alba*), Curtiss' yellow-eyed grass (*Xyris curtisii*), Velvet sedge (*Carex vestita*), Sheep laurel (*Kalmia angustifolia*), Purple pitcher plant (*Sarracenia purpurea*), and Small white fringed orchid (*Platanthera blephariglottis*).

Most of these species are associated with aquatic habitats, wetlands, or clearings in power-line rights-of-way. More detailed habitat descriptions for these species are provided in Section 4.2.3.

North Anna Bluffs Conservation Site

The North Anna Bluffs Conservation Site consists of 3,829 acres of land with of B2 ranking, indicating a site of very high significance. The conservation site is located in the southwestern portion of the study area, northeast of Verdon Road, south of Jericho Road, and west of Jefferson Davis Highway. The North Anna River flows from northwest to southeast through the interior of the site. The North Anna River floodplain is approximately 500-feet wide in the northern portion of the site and approximately 1,500-feet wide where it exits the site in the southeast. The North Anna River floodplain contains freshwater forested wetland complexes that receive surface flow

from multiple unnamed stream tributaries within the conservation site. Most of the land outside the floodplain is forested; however, multiple parcels within the conservation site have been cleared for agriculture or development.

The VDCR has documented four natural community types associated with the conservation site: Coastal Plain/Outer Piedmont Basic Mesic Forest, Coastal Plain/Piedmont Floodplain Swamp (Green Ash—Red Maple Type), Piedmont/Coastal Plain Hemlock—Hardwood Forest, and Water-Willow Rocky Bar and Shore. The VDCR descriptions of each natural community type are summarized below.

Coastal Plain/Outer Piedmont Basic Mesic Forest

Also known as the American beech (*Fagus grandifolia*)—Tuliptree (*Liriodendron tulipifera*)—Bitternut Hickory (*Carya cordiformis*)—Northern Spicebush (*Lindera benzoin*)—Mayapple (*Podophyllum peltatum*) Forest, this terrestrial natural community type comprises lush forests that thrive in sheltered ravines and slopes with semi-moist and base-rich soils. Large trees like American beech, Tuliptree, Bitternut hickory, and Northern red oak (*Quercus rubra*) are dominant in the forest canopy, while the understory is typically vegetated with smaller tree and shrub species like Common pawpaw (*Asimina triloba*) and Northern spicebush. The herbaceous plants layer consists of dense forbs and ferns such as Mayapple, Jack-in-the-pulpit (*Arisaema triphyllum*), Broadleaf enchanter's nightshade (*Circaea lutetiana ssp. canadensis*), Feathery false lily of the valley (*Maianthemum racemosum ssp. racemosum*), and Christmas fern (*Polystichum acrostichoides*). This community is classified as S3 (Vulnerable) in Virginia (NatureServe 2024a).

Coastal Plain/Piedmont Floodplain Swamp (Green Ash—Red Maple Type)

Also known as the Red Maple (*Acer rubrum*)—Green Ash (*Fraxinus pennsylvanica*)/Lizard's Tail (*Saururus cernuus*) Swamp Forest, this freshwater natural community type is found atop poorly-to-very-poorly-drained sandy or silt clay loamy soils on flats or along waterbodies that are seasonally or semi-permanently flooded. The swamp floor has hummocks and hollows, and the tree canopy is closed to partially open. Red maple and Green ash trees typically dominate the forest canopy, and the shrub layer includes Northern spicebush, Fetterbush (*Eubotrys racemosa*), Winterberry (*Ilex verticillata*), and Possumhaw viburnum (*Viburnum nudum*). Herbaceous plants such as Lizard’s tail, Green arrow arum (*Peltandra virginica*), False nettle (*Boehmeria cylindrica*), Greater marsh St. Johnswort (*Triadenum walteri*) thrive in the understory. This community is classified as S3 (Vulnerable) in Virginia (NatureServe 2024a).

Piedmont/Coastal Plain Hemlock—Hardwood Forest

Also known as the Eastern Hemlock (*Tsuga canadensis*)—American Beech—(Chestnut Oak (*Quercus montana*), White Oak [*Quercus alba*]) Forest, this terrestrial natural community type can be found on steep, north-facing slopes along rivers and large streams. The mixed forest canopy includes mostly eastern hemlock, American beech, Chestnut oak, and White oak. Shrubs occur infrequently in the understory, but species like Mapleleaf viburnum (*Viburnum acerifolium)*, Mountain laurel (*Kalmia latifolia*), American witch hazel (*Hamamelis virginiana*), Pinkster flower (*Rhododendron periclymenoides*), and Common greenbrier (*Smilax rotundifolia*). The herbaceous

plant layer is usually sparsely vegetated with White wood aster (*Eurybia divaricate*), Christmas fern, Indian cucumber (*Medeola virginiana*), and Four-leaf yam (*Dioscorea quaternate*). This community is classified as S1 (Critically Imperiled) in Virginia (NatureServe 2024a).

Water-Willow Rocky Bar and Shore

Also known as American Water-Willow (*Justicia americana*) Herbaceous Vegetation, this freshwater natural community type occurs on riverbed substrates of sand, gravel, or cobbles with occasional silt and muck on ridges or banks of rocky streams and rivers. Vegetation is normally dominated by dense colonies of herbaceous wetland plants, like American water-willow and Lizard's tail, that can withstand frequent high-energy flooding. Small amounts of other herbaceous species may also be present, such as Beggar-ticks (*Bidens* spp.), Flatsedges (*Cyperus* spp.), Rough buttonweed (*Diodia teres*), and Common waterweed (*Elodea canadensis)*. Non-dominant shrub and tree seedlings can be found rooted within herbaceous communities, such as Black willow (*Salix nigra*), Carolina willow (*Salix caroliniana*), Sycamore (*Platanus occidentalis*), and River birch (*Betula nigra*). This community is classified as S4 (Apparently Secure) in Virginia (NatureServe 2024a).

Impact Assessment

Both Route 1 and Route 2 cross the Reedy Creek Seeps Conservation Site. Route 1 crosses the northern half of the site between approximate MPs 0.0 and 0.9. Most of the land within the site that is crossed by Route 1 has been cleared at some point since 2006. Approximately 0.3 mile of the site crossed by Route 1 comprises managed timber land, approximately 0.2 mile of the crossing is through currently or recently cleared land, and approximately 0.5 mile of the crossing is through regenerated forests that were cleared sometime between 2006 and 2007.

Route 2 crosses the southern half of Reedy Creek Seeps Conservation Site between approximate MPs 0.0 and 0.2. The area of the site that Route 2 crosses is a regenerating forest that was cleared of trees sometime between 2012 and 2014. Although both route alternatives intersect managed timber land or regenerating forest that does not reflect the natural conditions of the area, Route 2 would require less right-of-way clearing within the Reedy Creek Seeps Conservation Site than Route 1, at 2.4 acres and 10.9 acres, respectively. Following construction, the Company would restore the land within the right-of-way as closely as possible to preconstruction contours and maintain the right-of-way during operations with an herbaceous cover.

The Lesser siren is an aquatic salamander that is found primarily in and breeds in waterbodies. Although Route 1 crosses two tributaries of Reedy Creek within the Reedy Creek Seeps Conservation Site, the Project would require no in-stream construction. Route 2 does not cross any waterbodies within the Reedy Creek Seeps Conservation Site. No impact on the Lesser siren is anticipated for either route alternative. Section 4.2.3.3 provides additional information on rare species.

VDCR has confirmed the presence of New Jersey rush within the study area and within the Reedy Creek Seeps Conservation Site (VDCR 2024c). The nearest observations of New Jersey rush are approximately 0.2 mile north of the cut-in location of Route 1 and approximately 0.1 mile south of

the cut-in location of Route 2. Disturbance of any New Jersey rush population would likely be limited to the new cut-in locations along the existing right-of-way, which is common suitable habitat for the New Jersey rush; however, the establishment of new maintained right-of-way could create additional habitat to support New Jersey rush. Section 4.2.3.1 provides additional information on all T&E species.

Neither route alternative crosses North Anna Bluffs Conservation Site. Route 2 at about MP 1.7 is approximately 2.1 miles northeast of the site, the closest point on either route alternative to the site. Based on this distance, the Project would not impact the North Anna Bluffs Conservation Site or its four natural community types.

4.2.2.2 STREAM CONSERVATION SITES

Stream conservation sites "encompass stream/river reaches, waterbodies, and terrestrial contributing areas containing or associated with aquatic or semi-aquatic resources, including upstream and downstream reaches and tributaries up to 3-km stream distance from the aquatic resources" (VDCR 2024c). The hydrology of the waterway and surrounding landscape, dam locations, and determination of tidal waterways are considerations upon which the VDCR determines the size and dimensions of an SCS. The SCS can be used to identify land management needs, protection priorities, and potential conflicts with development activities.

VDCR assigns a B-ranking to SCSs using the same scale as described for conservation sites in Section 4.2.2.1. VDCR identified one SCS within the Project study area named the Little River at Rt. 688 Stream Conservation Site. The site is depicted on Figure 4.2-3, and additional site details are provided below.

Little River at Rt. 688 Stream Conservation Site

The Little River at Rt. 688 Stream Conservation Site consists of 660 acres of land with a B3 ranking, indicating a site of high significance. This SCS intersects the southwestern boundary of the study area in Hanover County, and is crossed by New Market Mill Road, just west of Verdon Road and the Martin Marietta Doswell Quarry. Most of the SCS comprises forested land that surrounds riparian communities of the Little River, its floodplain, and multiple stream tributaries.

The natural community type associated with this NHR is designated as an Aquatic Natural Community (Northern Piedmont–Pamunkey Fourth Order Stream) in Virginia Commonwealth University's Interactive Stream Assessment Resource (INSTAR) database (VDCR 2024c). The INSTAR database represents over 2,000 statewide aquatic collections of fish and macroinvertebrates, and allows for analysis of fish and macroinvertebrate assemblages, instream habitat, and stream health assessments (VDCR 2024c). Virginia Commonwealth University has classified the streams within the SCS as Grade B (indicating relative regional significance) with a "Healthy" stream designation per the INSTAR Virtual Stream Assessment score. VDCR (2024b) also indicates evidence that streams within this SCS contribute to high biological integrity at the watershed level (6th order), due to the presence of multiple native/non-native, pollution-tolerant/intolerant and rare, threatened, or endangered fish and macroinvertebrate species.

Impact Assessment

Neither Route 1 nor Route 2 cross the Little River at Rt. 688 Stream Conservation Site. The closest point on either route alternative to the site is along Route 2 at about MP 1.7, approximately 3.9 miles northeast of the SCS. Therefore, the Project would not impact the Little River at Rt. 688 Stream Conservation Site.

4.2.2.3 ECOLOGICAL CORES

Ecological cores are areas comprising at least 100 acres of continuous interior, natural cover (e.g., forests or woodlands) that provide habitat for a wide range of species, from interior-dependent forest species to habitat generalists. Interior ecological core areas begin 100 meters inside the nearest core edges and continue to the deepest parts of the ecological core. Smaller areas of continuous interior cover (i.e., 10 to 99 acres), called habitat fragments, support ecological cores and provide similar functions and values. Ecological cores and habitat fragments together provide the natural and economic benefits of open space, recreation, water quality (including erosion prevention and drinking water recharge and protection), and air quality (including carbon sequestration and oxygen production). VDCR ranks the integrity of ecological cores from C1 to C5 (see description below) using nine prioritization criteria, including the NHR habitats within the cores. Habitat fragments are similarly classified, although none are ranked above C3 (VDCR 2024c).

The VDCR ranking system for the integrity of ecological cores includes the following categories:

- Rank C1—Outstanding
- Rank C2—Very High
- Rank C3—High
- Rank C4—Moderate
- Rank C5—General

Generally, the VDCR assigns a higher ranking (e.g., C1 or C2) to larger and more biologically diverse ecological cores. Ecological integrity can be considered enhanced if the core is part of a larger complex of natural lands, or if the core contributes to water quality enhancement. Ecological cores ranked C1 and C2 are typically connected by extended landscape corridors with forests that comprise a statewide network of natural lands. Therefore, the VDCR recommends avoidance of ecological cores ranked C1 or C2 and a formal impact analysis to minimize impacts if they are unavoidable (Gustafson 2024). Lower ranked ecological cores may have smaller fragments of forested habitat (10 to 99 acres of contiguous landcover); however, the VDCR notes that habitat fragments can also provide important ecological functions and values and recommends avoiding impacts to habitat fragments when feasible.

The VDCR review of the Project found that the Project route alternatives intersect multiple ecological cores with rankings of C3, C4, or C5. Because the route alternatives do not cross any ecological cores ranked C1 or C2, no formal impact analysis is provided for the ecological cores crossed, per the recommendation of VDCR (Gustafson 2024; VDCR 2024c; see Appendix E). Table 4.2-3 summarizes the area of C3, C4, and C5 ecological cores crossed by the Project's route

alternatives. Figure 4.2-4 shows the locations of each ecological core unit crossed by the Project route alternatives.

TABLE 4.2-3 VDCR-MAPPED ECOLOGICAL CORES CROSSED BY ROUTE ALTERNATIVES

Ecological Cores	Unit	Route 1	Route 2	Carmel Church Switching Station
Outstanding (C1)	acres	0.0	0.0	0.0
Very High (C2)	acres	0.0	0.0	0.0
High (C3)	acres	10.5	0.0	0.0
Moderate (C4)	acres	0.0	13.3	0.0
General (C5)	acres	7.7	1.0	6.7
Total	acres	**18.3**	**14.2**	**6.7**

VDCR = Virginia Department of Conservation and Recreation.
Totals may not equal the sum of addends due to rounding.
This table is inclusive of ecological cores and habitat fragments.

Impact Assessment

Impacts on ecological cores occur when their natural cover is partially or completely converted to developed land uses. Habitat conversion can result in changes that reduce ecosystem processes, biodiversity, population viability, and habitat quality (VDCR 2024c). The Project would affect ecological cores ranked C3, C4, and C5 through tree clearing for the new transmission right-of-way (VDCR 2024c).

ERM calculated potential impacts on ecological cores by estimating the amount of tree-clearing that would be required for each route alternative. As shown in Table 4.2-3, Route 2 would impact the smallest area of ecological cores and would only impact cores ranked C4 and C5. By comparison, Route 1 would impact cores ranked C3 and C5. Additional descriptions of potential impacts to ecological cores from Project route alternatives are provided below.

Route 1

Route 1 crosses four ecological cores, including one core ranked C3 and three cores ranked C5. Table 4.2-5 provides information on each of the ecological cores crossed by Route 1 based on ERM's observations of aerial photography.

TABLE 4.2-4 DESCRIPTION OF ECOLOGICAL CORES CROSSED BY ROUTE 1

Core ID	Core Rank	Total Core Acres	Location	MP (Start)	MP (End)	Condition	Miles Crossed [a]	Acres Crossed [a]
51653	C3	918	South of Dry Bridge Road, east of CSX Railroad, north of Grannys Way, and west of existing Line #256	0.0	1.2	Land managed for silviculture within unfragmented forests; tree-clearing occurred between 2006 and 2023; northern half with managed timber the past 20 years.	0.9	10.5
51781	C5	128	South of Route 207, east of Carmel Church Road, north of Chesterfield Road, and west of CSX Railroad	1.3	1.5	Western half of core is developed land; approximately 58.0 acres have been developed.	0.2	2.6
51853	C5	111	South of Patterson Lane, east of I-95, north of CSX Railroad, and west of Ruther Glen Road	1.9	2.4	Land managed for silviculture within unfragmented forests; tree-clearing occurred between 2003 and 2005.	0.4	5.1
51879	C5	315	South of Route 207, east of Route 1, north of Opal Lane, and west of I-95	2.4	2.4	Land managed for silviculture within unfragmented forests; tree-clearing occurred between 2003 and 2005.	0.1	<0.1
Total		1,472					1.6	18.3

ID = identification; MP = milepost.
Totals may not equal the sum of addends due to rounding.

Route 1 bisects Core ID 51653 (ranked C3) for approximately 0.9 mile and has a right-of-way footprint of approximately 10.5 acres. The crossing would fragment the core and result in two smaller areas of continuous interior forest. To reduce clearing of mature forest, the route crosses cleared land, managed timber, and immature regenerating forest communities. Approximately 0.8 mile (93% of the total core crossing) of the Route 1 crossing through Core ID 51653 is through either cleared land or managed timber.

Route 1 crosses a combined approximately 0.7 mile of cores ranked as C5, with a combined right-of-way footprint of approximately 7.7 acres within the cores. The crossing would fragment Core IDs 51781 and 51853, but it intersects only the northeastern boundary of Core ID 51879. While the route crosses forested land in the southeastern corner of Core ID 51781, most of the core (approximately 58.0 acres) located west of Reedy Creek has been developed, reducing the ecological integrity of the core's forest habitat.

Route 2

Route 2 crosses four ecological cores, including three cores ranked C4 and one ranked C5. Table 4.2-5 provides information on each of the ecological cores crossed by Route 2 based on ERM's observations of aerial photography.

TABLE 4.2-5 DESCRIPTION OF ECOLOGICAL CORES CROSSED BY ROUTE 2

Core ID	Core Rank	Total Core Acres	Location	MP (Start)	MP (End)	Condition	Miles Crossed	Acres Crossed
52116	C4	125	South of Grannys Way, east and north of Ruther Glen Road, and west of existing Line #256	0.0	0.5	Mostly land managed for silviculture; tree-clearing occurred between 1994 and 2014.	0.4	4.2
52048	C4	380	South of Holly Ridge Lane, southwest of Ruther Glen Road, east of I-95, and northwest of Reservation Lane	0.9	1.6	Mostly land managed for silviculture; tree-clearing occurred between 2012 and 2014.	0.7	8.6
52021	C4	487	Contained by CSX Railroad (to the west) and I-95 (to the east), and the North Anna River Runs through the southern edge	1.8	2.0	Mostly land managed for silviculture; tree-clearing occurred between 2003 and 2017.	<0.1	0.4
51879	C5	315	South of Route 207, east of Route 1, north of Opal Lane, and west of I-95	2.3	2.7	Land managed for silviculture within unfragmented forest; tree-clearing occurred between 2003 and 2005.	0.1	0.9
Total		**1,307**					**1.2**	**14.2**

ID = identification; MP = milepost.

Route 2 crosses a combined 1.1 miles of cores ranked C4, with a combined right-of-way footprint of approximately 13.3 acres within the cores. The route runs through timberland managed for silviculture along the northern boundary of Core ID 52116. Route 2 would cross the northern half of Core ID 52048, with approximately 0.4 mile (about 59% of the total core crossing) through land that was cleared between 2012 and 2014. Route 2 follows the northeastern boundary of Core ID 52021 where it is collocated with the west side of I-95.

Route 2 follows the eastern boundary of Core ID 51879 (ranked C5) where it is collocated with the west side of I-95. Additionally, the route crosses a parcel within this core that is planned for development and will likely require the clearing of most of Core ID 51879.

Carmel Church Switching Station

The Carmel Church Switching Station is partially within Core ID 51879, which is ranked C5. Core ID 51879 includes approximately 315 acres of immature regenerating forested land that was cleared between 2003 and 2005. The core is south of Route 207, east of Route 1, north of CSX Railroad, and west of I-95. Approximately 6.7 acres (approximately 67% of the switching station) is within the ecological core, all of which would be cleared and graded by the developer prior to Project construction.

4.2.3 PROTECTED SPECIES

Protected species are generally defined as animal and plant species that are protected under State or Federal law. ERM reviewed protected species according to regulations under the following State and Federal laws:

- Federal- and state-listed T&E species protected under the federal Endangered Species Act (ESA) enacted in 1973 and administered by the USFWS and the National Oceanic and Atmospheric Administration, in cooperation with the Virginia Department of Wildlife Resources (VDWR), and also protected under the Virginia Endangered Plant and Insect Species Act administered by the Virginia Department of Agriculture and Consumer Services in cooperation with the VDCR;
- Bald eagles (*Haliaeetus leucocephalus*) protected under the federal Bald and Golden Eagle Protection Act enacted in 1940 and administered by the USFWS; and
- Migratory birds protected under the Migratory Bird Treaty Act enacted in 1918 and administered by the USFWS.

ERM identified protected species along and near the Project using the following sources:

- USFWS Information for Planning and Consultation System (IPaC) online system (USFWS n.d.)
- VDCR NHP (VDCR 2024b)
- VDCR Environmental Review (VDCR 2024c)
- VDWR Wildlife Environmental Review Map Service (WERMS) (VDWR 2024a)
- Virginia Fish and Wildlife Information Service (VaFWIS) (VDWR 2024b)

- Center for Conservation Biology (CCB) Eagle Nest Locator (CCB 2022)
- VDWR Little Brown Bat and Tricolored Bat Winter Habitat and Roost Tree Application (VDWR 2024c)
- VDWR Northern Long-eared Bat Regulatory Buffer Interactive Tool (VDWR 2024d)

ERM obtained database query results from the VDCR NHP, the VDWR VaFWIS, the VDWR WERMS, and the USFWS IPaC to identify federal- and state-listed species that may occur within the study area. ERM obtained digital data from the VDCR to identify locations within potential rights-of-way of the route alternatives and switching station (along with an associated 100-foot buffer) that potentially support protected species. Query results from the VDCR include species known to occur in the area and communities known to historically or currently contain protected species (VDCR 2024c).

Query results from IPaC include species that may occur in the study area (USFWS n.d.). Query results from VaFWIS include species known to occur or likely to occur within a 2.0-mile radius of the Project study area (VDWR 2024b), as well as Bald eagle nest and migratory bird information. Data for species known to occur within the Project route alternatives rights-of-way were retrieved using queries of the VDWR WERMS.

4.2.3.1 FEDERAL- AND STATE-LISTED T&E SPECIES

To protect and recover imperiled species and the ecosystems they depend on, Congress passed the federal ESA in 1973, which states that T&E plant and animal species are of aesthetic, ecological, educational, historic, and scientific value to the U.S., and protection of these species and their habitats is required. The ESA is administered by both the National Oceanic and Atmospheric Administration and USFWS. It protects fish, wildlife, plants, and invertebrates that are federally listed as endangered or threatened by prohibiting the "take" of these species and the interstate or international trade of the species, including their parts and products, unless federally permitted.

To take is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct" (33 U.S.C. §1532). A federally endangered species is any species that is in danger of extinction throughout all or a significant portion of its range, with exceptions for certain insect pests (33 U.S.C. §1532). A federally threatened species is any species that is likely to become endangered in the near future throughout all or a significant portion of its range (33 U.S.C. §1532).

Virginia has adopted separate codes for protecting animals and plants in the state. The Virginia ESA (Va. Code, §§ 29.1-563 through -570) designates the VDWR as the state agency with jurisdiction over state-listed endangered or threatened fish and wildlife. The Virginia ESA authorizes the Board of the VDWR to adopt the federal list of endangered and threatened species and to identify and protect state-listed wildlife. The Virginia ESA prohibits the taking, transportation, processing, sale, or offer for sale of those species.

Under the Virginia Endangered Plant and Insect Species Act (2 VAC 5-320-10), the taking or possession of endangered or threatened plant and insect species is prohibited. The VDCR

represents the Virginia Department of Agriculture and Consumer Services, which is responsible for state-listed plants and insects, in providing comments regarding potential impacts on these species.

ERM database queries identified multiple federal- and state-listed T&E species within and adjacent to the study area. Federal-listed species (which are also state-listed) consist of Indiana bat (*Myotis sodalist*), Northern long-eared bat (NLEB; *Myotis septentrionalis*), Dwarf wedgemussel (*Alasmidonta heterodon*), Yellow lance (*Elliptio lanceolata*), Atlantic sturgeon (*Acipenser oxyrinchus*), and Swamp pink (*Helonias bullata*). Three additional state-listed species (which are not also federally listed) identified by the queries include: Tricolored bat (TCB; *Perimyotis subflavus*), Green floater (*Lasmigona subviridis*), and New Jersey rush.

Each federal- and state-listed species was reviewed for potential of occurrence within and adjacent to the route alternatives. Table 4.2-8 provides information on the federal- and state-listed species with potential to occur in the study area or within a 2.0-mile buffer around the study area.

TABLE 4.2-6 FEDERAL- AND STATE-LISTED SPECIES POTENTIONALLY OCCURRING IN THE STUDY AREA

Common Name	Scientific Name	Status	Global Rank	Habitat	Source
Mammals					
Indiana bat	*Myotis sodalis*	FE, SE	G2	Roost in the summer generally under exfoliating bark of dead or dying trees. Maternity roosts occur in forest areas, bottomland and floodplain habitats, riparian zones, wooded wetlands, and upland communities. Hibernate in medium to large sized caves or abandoned mines that remain stable in temperature (below 50 degrees Fahrenheit).	IPaC
NLEB	*Myotis septentrionalis*	FE, ST	G2	Generally associated with old growth or late successional interior forests. Use partially dead or decaying trees for breeding, summer day roosting, and foraging. Hibernation occurs primarily in caves, mines, and tunnels.	IPaC VDWR—Winter Habitat and Roost Tree Map VDWR—NLEB Regulatory Buffer Interactive Tool
Tricolored bat	*Perimyotis subflavus*	FPE, SE	G3	Typically roost in trees near forest edges during summer. Hibernate deep in caves or mines in mountainous areas with warm, stable temperatures during winter.	IPaC VDWR—Winter Habitat and Roost Tree Map
Invertebrates					
Dwarf wedgemussel	*Alasmidonta heterodon*	FE, SE	G1	Large rivers and small streams, often burrowed into clay banks among the root systems of trees; also associated with mixed substrates of cobble, gravel, and sand.	IPaC
Green floater	*Lasmigona subviridis*	FPT, ST	G3	Small to medium streams in quiet pools and eddies with gravel and sand substrates.	IPaC

Common Name	Scientific Name	Status	Global Rank	Habitat	Source
Yellow lance	*Elliptio lanceolata*	FT, ST	G2	Depend on clean, moderately flowing water with high dissolved oxygen and found in medium-sized rivers to smaller streams. Bury deep into coarse to medium sand substrate and sometimes gravel. Move with shifting sand and settles in downstream end of stable sand and gravel bars.	IPaC
Fish					
Atlantic sturgeon	*Acipenser oxyrinchus*	FE, SE	G3	Migrate from the ocean to freshwater rivers to reproduce in the Spring or Fall. Deposit eggs among solid substrates within clean rivers.	VaFWIS
Plants					
Swamp pink	*Helonias bullata*	FT, SE	G3	Perennially saturated, spring-fed, nutrient-poor, shrub swamps and forested wetlands. Thrive when water levels are stable, and flooding is infrequent.	IPaC
New Jersey rush	*Juncus caesariensis*	ST	G2	Acidic hardwood swamps, seeps, swales, pond edges, and seepages (e.g., transmission line rights-of-way).	VDCR

Sources: USFWS n.d.; VDCR 2024c; VDWR 2024b, 2024c, 2024d.

IPaC = Information for Planning and Consultation; NLEB = Northern long-eared bat; VaFWIS = Virginia Fish and Wildlife Information Service; VDCR = Virginia Department of Conservation and Recreation; VDWR = Virginia Department of Wildlife Resources.

Federal/State Status:

FE	Federally listed as endangered	SE	State-listed as endangered	FPE	Federally proposed as endangered
FT	Federally listed as threatened	ST	State-listed as threatened	FPT	Federally proposed as threatened

Global Rank:

G1 Critically Imperiled: At very high risk of extinction due to extreme rarity (often five or fewer populations), very steep declines, or other factors.

G2 Imperiled: At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.

G3 Vulnerable: At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.

G4 Apparently Secure: Uncommon but not rare; some cause for long-term concern due to declines or other factors.
G5 Secure: Common, widespread, and abundant.

Federal-Listed Species

As shown in Table 4.2-8, ERM identified six federal-listed species and two species with a proposed federal listing, each of which is also state-listed, that may potentially occur within the study area. While all eight of these species were identified by either the IPaC database or VaFWIS database as having potential occurrence within a 2.0-mile search radius of the study area boundary, only the Atlantic sturgeon has an occurrence confirmed within a 2.0-mile radius of the study area, specifically within portions of the North Anna River and Mattaponi River (VDWR 2024b). Due to the documented occurrences of this federal- and state-listed species and its habitat, both rivers have been classified as T&E Waters. This designation classifies streams and rivers that contain documented occurrences of federal- or state-listed species and their habitat.

The USFWS proposed that the TCB be listed as endangered in 2022 (USFWS 2022). Potential summer foraging habitat for the TCB, NLEB, and Indiana bat includes multiple forested areas along each route. A review of the VDWR winter habitat and roost trees online mapping system did not show summer habitat (i.e., maternity roosts), winter habitat (i.e., hibernacula), or roost trees for Indiana bat, NLEB, or TCB within the route alternatives (VDWR 2024c, 2024d). Additionally, the VaFWIS and WERMS databases did not show any confirmed occurrences of the Indiana bat, NLEB, or TCB within the route alternatives (VDWR 2024a, 2024b).

State-Listed Species

Nine state-listed species—New Jersey rush, Indiana bat, TCB, NLEB, Dwarf wedgemussel, Green floater, Yellow lance, Atlantic sturgeon, and Swamp pink—were identified as potentially occurring within the study area. Besides the New Jersey rush, each of these species is also federally listed or proposed to be listed, as described above.

Of these nine species, only the Atlantic sturgeon and New Jersey rush have documented occurrences within the 2.0-mile search radius around the study area. New Jersey rush is associated with the Reedy Creek Seeps Conservation Site, which is crossed by both route alternatives (VDCR 2024c). VDCR reports confirmed occurrences of New Jersey rush both within and outside of the conservation site, at several locations along the Company’s existing Line (#256) right-of-way in both Caroline and Hanover counties on the eastern side of the study area.

Impact Assessment

Table 4.4-8 provides information on the nine federal-listed and/or state-listed species identified as potentially occurring within the study area and/or within a 2.0-mile radius of the study area. Potential habitat exists for all nine species along the route alternatives; however, the VDWR, VaFWIS, WERMS, and VDCR data show that only the Atlantic sturgeon and New Jersey rush have been confirmed within the study area or a 2.0-mile radius of the study area boundary.

VDWR data show that occurrences of federal- and state-listed bat hibernaculum (winter habitat) have not been confirmed within a 2.0-mile radius of the study area. However, summer foraging habitat for these species is likely present within forested habitats crossed by each route. No impacts to these bat species are anticipated for any route alternative if trees are cleared during the winter according to VDWR time-of-year restrictions (TOYRs).

The USFWS issued the final NLEB guidance on October 15, 2024, to replace the April 1, 2023, interim guidance. The Company will comply with the final guidance to the extent it applies to the Company's projects. For projects that may require additional coordination, the Company will coordinate with the USFWS.

While no instream construction would be required for the Project, if shade is reduced along the streambanks due to right-of-way clearing, water temperatures may increase in the area adjacent to the tree-clearing, which could adversely impact the spawning of the Atlantic sturgeon if their habitat was crossed; however, no route alternative crosses Atlantic sturgeon habitat (Mattaponi River and North Anna River); therefore, no impacts are anticipated. Shade reduction along the streambank could also adversely impact the Dwarf wedgemussel, Green floater, and Yellow lance.

New Jersey rush has been documented in the study area and in the Reedy Creek Seeps Conservation Site. The cut-in location of Route 1 on Line #256 is approximately 0.2 mile south of the nearest recorded population of New Jersey rush, and the Route 2 cut-in location on Line #256 is approximately 0.1 mile north of the nearest recorded population of New Jersey rush. Figure 4.2-3 provides the locations of VDCR-reported occurrences of New Jersey rush populations.

While no occurrences of Swamp pink were confirmed by the database queries in the study area, potential habitat for Swamp pink includes multiple seepage wetlands and swamps along the route alternatives.

The Company would coordinate with VDCR to determine if surveys are warranted in the study area; however, the presence of Dwarf wedgemussel, Green floater, Yellow lance, and Swamp pink within the study area has not been confirmed. The Atlantic sturgeon has been recorded in the study area, but no routes cross the species habitat. Coordination with the VDCR may be needed to determine if surveys are warranted for the New Jersey rush in the study area. The locations of confirmed documentation are within the existing right-of-way of Line #256; therefore, it is likely that disturbance would be limited to the new cut-in locations along the existing right-of-way, which is common suitable habitat for the New Jersey rush.

Regardless of the route selected for the Project, Dominion will coordinate with state and federal agencies as needed to determine if surveys, construction TOYRs, or other mitigation would be required.

4.2.3.2 BALD EAGLES

Multiple large river tributary systems that flow into Chesapeake Bay host large populations of Bald eagles during winter and summer seasons. Eagles across the Atlantic Coast are attracted to habitat in the Chesapeake Bay watershed due to the temperate climate and abundance of fish and waterfowl prey. Eagles from the southeastern U.S. migrate north to the Chesapeake Bay every spring, and Bald eagles from the northeastern U.S. (and Canada) migrate south to the Bay for the winter. As a result, the Chesapeake Bay watershed supports three populations of Bald eagles, including Chesapeake Bay residents, southeast migrants, and northeast migrants.

While the Bald eagle is no longer federally listed under the ESA and was de-listed from the Virginia List of T&E Species in 2013, the species remains protected under the federal Bald and Golden Eagle Protection Act and Migratory Bird Treaty Act, as well as Va. Code § 29.1-521 and

VDWR regulations (4 VAC 15-30-10). *The Management of Bald Eagle Nests, Concentration Areas, and Communal Roosts in Virginia: A Guide for Landowners*, issued by the then Virginia Department of Game and Inland Fisheries (now VDWR) identifies management practices for avoiding the take of Bald eagles and outlines restrictions on construction activities within defined management zones. Proposed activities that have the potential to affect Bald eagles are evaluated by the VDWR on a case-by-case basis (Virginia Department of Game and Inland Fisheries 2012).

ERM reviewed current eagle datasets in Virginia, including Eagle Concentration Areas and individual Bald eagle nests, available from the CCB VaEagles website (CCB 2022) and the CCB's annual eagle nest survey. ERM also reviewed Bald eagle data provided through the VaFWIS and WERMS databases. According to current data from the CCB and VDWR, the study area is not within an Eagle Concentration Area. Moreover, the eagle nest nearest to the Project (Nest ID CA1601) is along the North Anna River within the study area and was last observed to be occupied in 2016 (CCB 2022). This nest is approximately 4.3 miles west of where both routes terminate in the Carmel Church Switching Station area.

The VDWR provides activity-specific guidelines when working within 330-foot and 660-foot buffer zones surrounding a known Bald eagle nest. If eagle nests are identified within 660 feet of the right-of-way approved by the SCC, Dominion will work with VDWR and other appropriate jurisdictional agencies to minimize any impacts on the species.

4.2.3.3 OTHER SPECIES OF INTEREST

Rare Species

Other species of interest when evaluating projects typically include rare plants and animals that are not afforded the same level of protection as federal- and state-listed T&E species. NatureServe, an international network of NHPs, assigns a global rank to species based on their rarity and conservation status (NatureServe 2024b). Species ranked "G1" (global rank 1/critically imperiled) or "G2" (global rank 2/imperiled) are most at risk. State rankings are similar (S1 and S2), but only indicate the status of the species within Virginia. The VDCR continually catalogues, gathers, and analyzes geographic information about Virginia's rare species to develop land conservation data, provide online mapping tools, and help resource agencies make conservation decisions.

As part of their September 2024 review of the Project, the VDCR concluded that the Project as planned would not affect any documented state-listed insects and does not cross any state natural area preserves under VDCR's jurisdiction. However, the VDCR indicated that seven rare plants and one amphibian have the potential to occur in the study area if suitable habitat is present (VDCR 2024c). Table 4.2-9 provides a summary of these species and their habitat.

TABLE 4.2-7 RARE SPECIES WITH THE POTENTIAL TO OCCUR IN THE STUDY AREA

Common Name	Scientific Name	Status	Global Rank	State Rank	Habitat
Amphibians					
Lesser siren	*Siren intermedia*	None	G5	S2/S3	Shallow freshwater wetlands
Plants					
Little-leaf sensitive-brier	*Mimosa microphylla*	None	G5	S1	Dry, often sandy woodlands, clearings, and roadsides
Northern white beaksedge	*Rhynchospora alba*	None	G5	S2	Bogs, mafic fens, sea-level fens, pocosins, peaty edges of old millponds and beaver ponds
Curtiss' yellow-eyed grass	*Xyris curtisii*	None	G5	S1	Bogs, sphagnous power-line swales, and seepy pond shores
Velvet sedge	*Carex vestita*	None	G5	S2	Bogs (maintained by prescribed fire), seeps, borders of seepage swamps, wet clearings and depressions; often in sandy and peaty soils, and often in low ecotones between mesic upland forests and saturated or seasonally flooded wetlands
Sheep laurel	*Kalmia angustifolia*	None	G5	S2	Seasonally wet flatwoods, sandhill woodlands and pine barrens, borders of seeps and seepage swamps; often occupies habitats that have a seasonally perched water table and are frequently burned
Purple pitcher plant	*Sarracenia purpurea*	None	G5	S2	Thinly canopied acidic seepage swamps, streamhead pocosins, boggy depressions in pine flatwoods, sphagnous power-line seeps and other boggy clearings
Small white fringed orchid	*Platanthera blephariglottis*	None	G5	S2	Bogs and sphagnous seeps; now mostly restricted to artificially maintained powerline clearings

Source: VDCR 2024c.

VDCR = Virginia Department of Conservation and Recreation.

Global Rank:
G1 Critically Imperiled: At very high risk of extinction due to extreme rarity (often five or fewer populations), very steep declines, or other factors.
G2 Imperiled: At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.
G3 Vulnerable: At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.
G4 Apparently Secure: Uncommon but not rare; some cause for long-term concern due to declines or other factors.
G5 Secure: Common, widespread, and abundant.
State Rank:
S1 Critically Imperiled: At very high risk of extirpation in the jurisdiction due to very restricted range, very few populations or occurrences, very steep declines, severe threats, or other factors.
S2 Imperiled: At high risk of extirpation in the jurisdiction due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
S3 Vulnerable: At moderate risk of extirpation in the jurisdiction due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
S4 Apparently Secure: At a fairly low risk of extirpation in the jurisdiction due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
S5 Secure: At very low or no risk of extirpation in the jurisdiction due to a very extensive range, abundant populations or occurrences, with little to no concern from declines or threats.

Impact Assessment

VDCR determined that seven rare plants and one rare amphibian could potentially occur within the study area (VDCR 2024c). No impact on the Lesser siren is anticipated for either route alternative; however, if suitable habitat conditions for this species are identified within the Project, the Company will work with the VDCR and appropriate regulatory agencies to minimize any impacts on the species.

Habitat requirements for the rare plant species indicated by VDCR generally include a variety of wetland habitat types. The amount of actual habitat with suitable conditions for these species is anticipated to be considerably less than the total of all wetlands identified for each route alternative. Site-specific field investigations are necessary for detailed habitat and impact analyses. In suitable habitat types that meet specific habitat requirements for any of these rare plant species, the VDCR recommends conducting detailed plant inventories and coordination with VDCR biologists to minimize habitat impacts. If suitable habitat conditions for these species are identified within the Project, the Company will work with the VDCR and appropriate regulatory agencies to minimize impacts on rare plants and/or rare plant habitat.

4.2.4 VEGETATION

4.2.4.1 LOCAL VEGETATION CHARACTERISTICS

The study area is situated within the Coastal Plain physiographic province. Upland forest vegetation in this province has been extensively altered by clearing as part of ongoing agricultural and silvicultural practices as well as residential and non-residential development occurring since European settlement. As a result, the characteristics of plant species or community types present prior to European settlement are difficult to determine. More recently, forests in the Coastal Plain have undergone a cycle of clearing, farming, and regenerating. Fallow farmlands, when left unattended, undergo a successional regeneration process that generally results in a prevalence of successional tree stands such as Loblolly pine (*Pinus taeda*), American sweetgum (*Liquidambar styraciflua*), and of secondary pine-hardwood forests (VDCR 2021b). The effects of human development activities on the landscape have resulted in a patchwork of early and late successional forests, pastures, and agricultural fields outside of urban places.

Wetlands in the Coastal Plain province have undergone less disturbance from human activity than the upland forests, and many wetland areas still support a variety of natural communities including (but not limited to) freshwater swamps, non-riverine wetland flatwoods, seasonally flooded ponds and depressions, seepage-slope wetlands, and saturated peatlands (VDCR 2021).

The study area contains a mixed composition of dry forest types, forest clearings, freshwater streams and wetlands, agricultural land, and various types of development. The western portion of the study area contains residential areas. The northeastern portion of the study area contains forest and forested wetlands surrounding Hobby Swamp, and the southeastern portion contains forested wetlands interspersed with agricultural lands surrounding Polecat Creek. In the eastern study area, fragments of forested vegetation are interspersed with agricultural fields. In these areas, the vegetation typically includes fragmented areas dominated by Loblolly pine, Virginia pine

(*Pinus virginiana*), hardwood forests, forest "edge" communities that border larger forested tracts, and turfgrass communities associated with developed land.

Forested vegetation within the study area is generally associated with relatively small contiguous tracts of trees found in upland forests. These forests contain both deciduous hardwood stands and evergreen/mixed forests that include stands of Loblolly pine and some natural pine-hardwood successional stands. Early successional stands of pine and sweetgum are prevalent, and mature hardwood stands consist of American beech (*Fagus grandifolia*), various upland oaks (*Quercus spp*.), and American holly (*Ilex opaca var. opaca*). Upland forest communities have usually become smaller because of historic encroachment from agricultural land use and residential development, and usually exist in small contiguous tracts of woodlands or fragmented forests located between croplands, pastures, and developed areas (VDCR 2021b).

Alluvial swamp forests in the study area are found at lower topographic elevations in floodplains and drainageways associated with wetlands and waterbodies. Alluvial swamp forest composition typically includes species like Red maple (*Acer rubrum*), Green ash (*Fraxinus pennsylvanica*), and Swamp tupelo (*Nyssa biflora*). Non-alluvial wetlands include a variety of communities that include depression swamps and seasonal ponds, non-riverine wet flatwoods and swamps, seepage swamps and bogs, peatland Atlantic white-cedar (*Chamaecyparis thyoides*) forests, and pocosins of Pond pine (*Pinus serotina*) and evergreen shrubs such as Shining fetterbush (*Lyonia lucida*) and Inkberry (*Ilex glabra*). Most of these non-alluvial wetland communities are now rare due to post-settlement disturbances (VDCR 2021b).

Sphagnous seepage bog communities of the Coastal Plain now only exist in frequently burned training areas of the Fort A.P. Hill military base and in maintained powerline rights-of-way. Most of these communities outside of these areas are overgrown or destroyed by development.

Beneath the forest canopy of non-riverine wet hardwood stands, understory plants include a variety of shrubs such as Sweet pepperbush (*Clethra alnifolia*), Fetterbush (*Eubotrys racemosus*), and Swamp highbush blueberry (*Vaccinium formosum*).

4.2.4.2 FOREST CONSERVATION VALUES

The Forest Conservation Value (FCV) model is a tool designed by the Virginia Department of Forestry to strategically identify the highest priority forestland for conservation in Virginia (VDCR 2023a). The intent is to maximize the efficiency of limited resources by focusing conservation efforts on the highest quality, most productive, and most vulnerable forestland statewide. The FCV model identifies five conservation values:

- 5: Outstanding
- 4: Very High
- 3: High
- 2: Moderate
- 1: Average

4.2.4.3 IMPACT ASSESSMENT

As noted in Section 4.1.2, ERM used the VGIN Land Cover data to determine land use cover along the route alternatives. As shown in Table 4.2-10, forested land would be the vegetation resource primarily affected by both route alternatives and the Carmel Church Switching Station. Of these, Route 2 would impact the largest extent of forest. Figure 4.1-2 depicts land use/land cover, including forested areas, along the routes.

TABLE 4.2-8 VEGETATION IMPACTS (ACRES)

Vegetation Type	Route 1	Route 2	Carmel Church Switching Station
Forest	25.6	28.7	10.0
Open Space	2.1	1.6	0.0
Agricultural	0.9	1.9	0.0
Total	**28.5**	**32.2**	**10.0**

Totals may not equal the sum of addends due to rounding.

ERM reviewed FCV data to assess the value of forest vegetation along the routes. Upon reviewing recent aerial photography, ERM found that many recently cleared areas have been ranked using the FCV model data; therefore, the model may be outdated and not reflective of current conditions. Table 4.2-11 summarizes the area of FCV within the right-of-way for each route alternative and the Carmel Church Switching Station. Route 1 would impact the most forested land with an Outstanding FCV rating. Route 1 would also impact the most forested land with any FCV rating. Route 2 would impact the least forested land with any FCV rating.

TABLE 4.2-9 FCV ALONG ROUTE ALTERNATIVES

FCV	Unit	Route 1	Route 2	Carmel Church Switching Station
Average (1)	acres	12.4	17.0	4.9
Moderate (2)	acres	5.4	4.0	5.1
High (3)	acres	1.5	4.4	0.0
Very High (4)	acres	7.2	1.3	0.0
Outstanding (5)	acres	1.6	0.3	0.0
Total	**acres**	**28.0**	**27.1**	**10.0**

FCV = Forest Conservation Value.
Totals may not equal the sum of addends due to rounding.

Fragmentation

Loss of habitat presents the greatest risk to biodiversity (VDCR 2023a). When development alters the landscape and fragments large natural tracts of land into smaller, scattered pieces, the

biodiversity of the area declines. Large, contiguous patches of land have more benefits than the same area of land among smaller fragmented pieces including:

- A progressive increase in the number and diversity of species as contiguous habitat size increases;
- Increased habitat diversity and protection from disturbance in adjacent developed areas; and
- Greater ecosystem services (i.e., any direct or indirect benefit that ecosystems provide to people) (VDCR 2023a).

ERM assessed the potential for each route to create new fragments in the forested areas they cross by measuring the length of each route centerline where it crosses the interior of a forest stand and therefore would create a new fragment. Table 4.2-12 displays where fragmentation occurs along the routes.

TABLE 4.2-10 LOCATIONS OF FOREST FRAGMENTATION ALONG ROUTE ALTERNATIVES

Route 1	Route 2
• MPs 0.1 and 0.6 • MPs 0.7 and 1.2 • MPs 1.2 and 1.7 • MPs 1.8 and 1.9 • MPs 1.9 and 2.3	• MPs 0.0 and 0.5 • MPs 0.7 and 0.8 • MPs 0.8 and 1.4 • MPs 1.4 and 1.6

MP = milepost.

Of the two route alternatives, Route 2 would result in the least fragmentation impacts overall. This route primarily spans adjacent to developed or cleared lands and the existing I-95 corridor. Route 2 would impact a greater amount of forested land than Route 1 (approximately 28.7 acres and 25.6 acres, respectively); however, Route 2 does not collocate with any existing corridor, which would result in a greater amount of fragmentated forested areas.

In forested areas, trees would be cleared from the right-of-way, which subsequently would be maintained with an herbaceous cover during Project operations; however, this would differ substantially from the existing conditions. During construction of the transmission line in open areas, herbaceous vegetation could be temporarily impacted by vehicle movement. Impacts on vegetation within open space or agricultural land would be limited to required structure footprints along the routes, temporary construction impacts, and intermittent mowing required for maintenance access. Disturbed areas resulting from use of temporary workspace would revert to preconstruction vegetative conditions.

4.3 VISUAL RESOURCES

Visual resources capture the combination of natural landforms, vegetation, water features, and human modifications that characterize and contribute to a landscape's visual quality. The visual resource assessment identifies important visual features (e.g., natural and/or cultural resources that contribute to scenic quality) and elements (i.e., forms, lines, colors, textures, etc.) of the

surrounding landscape as the basis for determining how and to what degree the project will affect those scenic resources.

4.3.1 EXISTING CONDITIONS

4.3.1.1 METHODOLOGY

ERM conducted a visual resource assessment to characterize the existing scenic/landscape conditions and understand the potential impact from the installation of Project components on these conditions. This assessment included:

- Identification of VSRs through the review of recent (2024) digital aerial photography and other available mapping resources;
- Site reconnaissance and local outreach;
- Definition of potential viewer groups (i.e., groups of people, such as residents or tourists who experience views) within the study area;
- Descriptions of existing conditions from key observation points (KOPs) along the route options;
- Preparation and review of visual simulations or renderings of the proposed transmission infrastructure from KOPs in the study area; and
- Evaluation of the predicted visual impacts from the Project.

The visual impact approach in this section draws on established landscape planning and design techniques for describing existing landscape characteristics and identifying the potential changes or contrasts created by proposed surface-disturbing activities, including (but not limited to) the Bureau of Land Management's Visual Resource Management system (BLM 1984), U.S. Forest Service's Scenery Management System (USFS 1995), and Federal Highway Administration's Visual Impact Assessment for Highway Projects (FHWA 1995).

4.3.1.2 REGULATORY SETTING

The Virginia Outdoors Plan includes guidance on scenic resources in the state (VDCR 2018). In general, VDCR defers to local governments for the protection and management of scenic resources; however, VDCR works with local governments and other stakeholders on scenic resources with statewide importance through the Virginia Scenic Rivers Program and Virginia's Byways. There are no designated Virginia Scenic Rivers or Scenic Byways in the Project study area. The East-Coast Greenway, a pedestrian and bicycle route that connects Maine to Florida, is co-located along US 1 in the western part of the study area (see Section 4.1.7) but it is not a designated Virginia scenic resource.

The 2030 Caroline County Comprehensive Plan identifies the important rural character of the county and describes the County's many scenic areas (Caroline County 2023a). There are no county-designated scenic areas in the study area, nor does the Comprehensive Plan provide direction (e.g., goals and objectives) regarding the preservation of important scenic resources. The Ordinance also does not identify scenic resource objectives and/or thresholds (or criteria) for what constitutes a significant impact to scenic resources (Caroline County 2023b).

In the absence of a local regulatory framework for assessing visual resources, ERM's assessment of the Project's impacts on visual resources reflects the commonly used federal systems and best practices described above (Section 4.3.1.1).

4.3.1.3 VSRS

The Project study area includes portions of western Caroline County, as well as northern Hanover County. This largely rural landscape is within the transition area between the Coastal Plain and Piedmont physiographic provinces to the east and west, respectively. The Coastal Plain province is relatively flat with a mix of wetland and forest ecosystems. The Piedmont province has more topographic relief and is dominated by forest ecosystems (VDCR 2021b). Overall, the study area is characterized by slight rolling hills and forested areas. Some of the forested areas have been cleared for lower density development (e.g., residential, agricultural, commercial, and industrial uses) that is found primarily along the major transportation corridors and local roadways through the area (Section 4.1.2). The combination of low-density development and large tracts of forest defines the rural character of the portions of the study area away from major roads. The forested areas and lack of substantial topographic relief limits panoramic views in the study area and generally constrains most viewsheds to the foreground and middle ground (i.e., within approximately 1 mile of the viewer).

Table 4.3-1 lists the VSRs in the study area, including locations or features where views contain resources with unique scenic qualities, sensitive viewsheds, and/or areas where the Project's components and any associated vegetation clearing would likely contrast with the surrounding landscape. Common examples of VSRs include designated scenic resources (e.g., scenic byways, overlooks), residential areas, parks and other recreational sites, historic sites, conservation areas and other open spaces, natural features, cultural destinations, road corridors, and areas of high public concentration. Figure 4.3-1 depicts the location of each VSR relative to the proposed Project components.

TABLE 4.3-1 VSRS AND USER GROUPS

VSR #	VSR Name	VSR Description [a]	Primary Viewer Group(s)
Recreational Resources (Parks, Trails, Open Space and other Recreation Areas)			
1	East Coast Greenway	Biking and walking route that runs from Maine and Florida with a mixture of trail and roadway segments. Within the study area, the greenway runs along Telegraph Road and US 1.	Recreationists/ tourists (bicyclists and pedestrians)
Places of Worship and Cemeteries			
2	Carmel Baptist Church	Faith gathering site at the southwest corner of the US 1/Jericho Road intersection, approximately 0.7 mile from the proposed Carmel Church Switching Station.	Residents and workers (church staff)
3	Oxford Mount Zion Baptist Church	Faith gathering site west of US 1 on Zion Road approximately 1 mile from the proposed Carmel Church Switching Station.	Residents and workers (church staff)
4	Saint Margaret Episcopal Church and Cemetery	Inactive faith gathering site and associated cemetery on Ruther Glen Road approximately 0.5 mile south of the CSX railroad.	Residents and workers (church staff)
5	Cardinal Baptist Church	Faith gathering site on Ruther Glen Road located approximately 0.5 mile south of the CSX railroad.	Residents and workers (church staff)
6	Hunter Family Cemetery	Cemetery on Hunter Lane about 0.6 mile north of Ruther Glen Road.	Residents
Primary Road/Travel Corridors			
7	I-95	Six-lane, controlled access, interstate highway that is the east coast's major thoroughfare. I-95 runs north-south through the study area and carries an AADT volume of 100,000 vpd (total, both directions) in the study area.	Motorists (commuters and through-travelers), residents, workers
9	Ruther Glen Road	Two-lane, paved, local road that runs north-south through the study area and carries an AADT of 2,300 vpd between Rt. 207 and Signboard Road.	Motorists, residents, workers
10	Dry Bridge Road	Two-lane, paved, local road that runs generally east-west through the northeastern part of the study area. The road carries an AADT of 500 to 1,300 vpd east of Rt. 207.	Motorists, residents, workers
11	Old CC Road	Two-lane, gravel, local road that runs north-south along the eastern edge of the study area and carries an AADT volume of 40 vpd.	Motorists, residents, workers

VSR #	VSR Name	VSR Description [a]	Primary Viewer Group(s)
Areas of High Public Concentration			
12	Ruther Glen Road Residences	There are residences on both sides of Ruther Glen Road and along connected local roads.	Residents
13	Dry Ridge Road Residences	There are several residences along Dry Dridge Road and along connected local roads.	Residents
14	US 1 Residences	There are residences on both side of US 1 and connected local roads.	Residents

Sources: VDOT 2024 (AADT data).

AADT = annual average daily traffic; vpd = vehicles per day; VSR = visually sensitive resource.
[a] There are no designated scenic resources, educational resources (schools), or Census-designated Places in the study area.

4.3.1.4 VIEWER GROUPS

The perception of visual resources by the primary viewer groups in a study area provides additional context in assessing a project's potential impacts on the visual elements and features of a landscape. Viewer groups identified for the study area (and included in Table 4.3-1) are described below. Individuals may fall into one or more viewer group categories depending on the context of the view. For example, a local resident may also be considered a commuter as they travel to their job.

- Local/area residents: These viewers live in the area and are more likely to be highly sensitive to potential changes in landscape characteristics because they tend to value the scenic integrity of the landscape and may have more frequent and longer duration views from their residences. In addition, area residents tend to be most familiar with the area landscape and are therefore more perceptive of changes over time.
- Workers: These viewers work in the area and thus have a higher degree of awareness of the landscape compared to some other viewing groups (e.g., motorists). While more aware (based on time spent in the project region), the sensitivity of workers is variable depending on the type and location of work being done (e.g., office workers may be less sensitive to landscape change than employees who primarily work outdoors).
- Motorists, commuters, and other travelers: These viewers primarily travel through the study area and have multiple opportunities to view the area landscape as they travel along the primary travel corridors. This means that their potential exposure to views of a proposed project changes based on speed, direction of travel, and length of trip, as well as viewing angles and screening, among other factors. Due to this variability, these viewers are typically less sensitive to changes in scenic conditions.
- Recreationists and tourists: These viewers select area parks, recreation areas, and other tourist attractions in part based on the scenic setting and quality of these areas. As such, they also tend to be more sensitive to changes in the landscape.

Sensitivity and potential impacts tend to vary by setting and viewer group. Many factors influence viewer sensitivity and the perception of impacts. In general, users with static, direct, frequent, or longer duration views (e.g., area residents, some workers, etc.), as well as those viewers engaged in setting-dependent activities (e.g., some types of recreation, tourism, etc.) tend to have higher levels of sensitivity to change compared to others.

4.3.1.5 KOPS

In addition to considering the existing landscape characteristics across broader geographic areas through the lens of VSRs, ERM identified eight specific KOPs to document location-specific existing conditions and anticipated changes due to Project construction and operation. These KOPs are described in Table 4.3-2 and shown on Figure 4.3-2. The KOPs for the Project were selected because they:

- Illustrate visibility from specific VSRs (not every VSR has a corresponding KOP);
- Illustrate representative views that would be available to identified user groups;

- Illustrate the route alternatives and switching stations; and
- Provide views of Project structures and vegetative clearing.

Descriptions of the existing visual conditions and the anticipated changes to these conditions are provided below for each KOP. Photographs of existing conditions, as well as visual simulations of the proposed Project infrastructure from each KOP are provided in Appendix F. Not every VSR has a corresponding KOP; rather, the KOPs represent typical viewpoints in the study area from which Project infrastructure would be visible.

TABLE 4.3-2 KOPS

KOP # [a]	Location	Reason for Inclusion	Viewer Groups Represented	Project Component Represented
001	At the Flying J Travel Center parking lot west of I-95. View is oriented south toward the proposed Carmel Church Switching Station.	Example of proposed right-of-way (with clearing) across I-95 and through a currently forested area. Representative of VSR 7 (I-95).	Local residents Workers Motorists	Route 1 Route 2 Switching Station
002	On the entrance ramp from eastbound Rt. 207 to southbound I-95. View is oriented southeast toward both route alternatives.	Example of proposed right-of-way (with clearing) through and crossing a major transportation corridor. Representative of VSR (I-95).	Local residents Workers Motorists	Route 1 Route 2
005	On Ruther Glen Road under the existing cleared transmission line right-of-way. View is oriented north toward the Route 1 cut-in with the existing transmission line.	Example of proposed right-of-way (with clearing) through a forested area, as well as the cut-in point. Representative of VSRs 9 (Ruther Glen Road) and 12 (Ruther Glen Road residences, including Caroline Pine residential community).	Local residents Workers Motorists	Route 1
006	On Ruther Glen Road north of Route 1. View is oriented south toward Route 1.	Example of proposed right-of-way (with clearing) and road crossing through a forested and residential area. Representative of VSR 9 (Ruther Glen Road).	Local residents Workers Motorists	Route 2
008B	On Old CC Road under the exiting cleared transmission line right-of-way. View is oriented southwest toward the Route 1 cut-in with the existing transmission line.	Example of proposed right-of-way (with clearing) through a forested area, as well as the cut-in point. Representative of VSRs 10 (Dry Ridge Road), 11 (Old CC Road), and 13 (Dry Ridge Road Residences).	Local residents Motorists	Route 2

KOP # [a]	Location	Reason for Inclusion	Viewer Groups Represented	Project Component Represented
009	On Chesterfield Road near Ruther Glen Road. View is oriented north toward Route 1.	Example of proposed right-of-way (with clearing) through a rural residential area surrounded by forested areas. Representative of VSRs 4 (Saint Margaret Episcopal Church and Cemetery), 5 (Cardinal Baptist Church), 9 (Ruther Glen Road), and 12 (Ruther Glen Road Residences).	Local residents Motorists	Route 2
010	On Old CC Road. View is oriented southwest toward the Route 2 cut-in with the existing transmission line.	Example of proposed right-of-way (with clearing) through a forested area, as well as the cut-in point. Representative of VSR 11 (Old CC Road).	Motorists	Route 2
111	On Ruther Glen Road. View is oriented south toward Route 2	Example of proposed right-of-way (with clearing) through a rural residential area with a mix of agricultural fields and forested areas. Representative of VSRs 9 (Ruther Glen Road) and 12 (Ruther Glen Road Residences).	Local residents Motorists	Route 2
112	On Ruther Glen Road. View is oriented north toward Route 2.	Example of proposed right-of-way crossing an agricultural field in a rural residential area. Affected viewer groups include residents and motorists. Representative of VSRs Ruther Glen Road and Ruther Glen Residences.	Local residents Motorists	Route 2

KOP = key observation point; VSR = visually sensitive resource.

[a] The KOPs above are for the visual resource area; the full list of KOPs is used across multiple resources and therefore is not sequential.

4.3.1.6 KOP 001

Existing Conditions

KOP 001 is located in the truck parking area of the Flying J Travel Center to the west of I-95. The KOP is approximately 0.3 mile from the western terminus of both route alternatives at the Carmel Church Switching Station. The KOP generally faces south. From this location, the view is generally enclosed, with tall, vertical walls of coniferous and deciduous trees surrounding the parking lot. These trees focus views on the foreground (parking lot) and limit views into the middle and background to the south. A light-gray curb creates a strong horizontal line that delineates the transition from the parking lot to the adjacent vegetation. A second horizontal line along the treetops creates an irregular, undulating break between the trees and the sky. The smooth, flat, faded black asphalt parking lot has light yellow parking lines and a geometric form (rectangular) that contrasts with the mix of canonical and amorphous forms of the trees. The lightly textured vegetation and trees along the southern border of the parking lot add various shades of green, tan, and brown to the view from this location. In addition to the trees, a single, tall light pole adds a strong vertical element to the landscape. There is also a single, vertical distribution pole visible at the southeastern end (lefthand side of the view) of the parking lot.

The primary viewer group at KOP 001 is motorists who stop at the Flying J Travel Center. Because most of these viewers are through travelers, they likely have low sensitivity to visual changes at this KOP. Other viewer groups may include workers and area residents. These groups may be more sensitive to visual changes compared to motorists, but at this location their sensitivity is also likely low due to the current level of development and visual intrusions (e.g., large travel center, major transportation corridor intersection). Views from this location are both static and dynamic; therefore, the duration of potential views is variable.

Visual Simulation

Both Routes 1 and 2 would terminate at the Carmel Church Switching Station approximately 0.3 mile to the south of KOP 001. The dense, forested vegetation between this KOP and the switching station would obscure all views of Project infrastructure. Assuming a dense, vegetated buffer remains along the southern portion of the Flying J Travel Center parking lot, no changes in existing visual conditions are anticipated for views from KOP 001; therefore, the Project would have no impact on existing visual conditions.

4.3.1.7 KOP 002

Existing Conditions

KOP 002 is located on the on-ramp from eastbound Rt. 207 to southbound I-95, approximately 0.2 mile north of the western terminus of both route alternatives at the Carmel Church Switching Station. The view from this location is generally oriented to the southeast along I-95. The highway in this area cuts through a densely forested area that encloses the road corridor. The strong diagonal lines created by the highway and the top of the tree line against the horizon start in the foreground and converge at a focal point in the distance. The forested areas on both sides of the highway consist of a mix of ground vegetation, shrubs, and trees that contribute to a medium

texture and rich palette of greens and other earth tones (browns and tans). The trees add vertical elements to the view and are the tallest features on the landscape in this area. The wide south-bound lanes of I-95 add a dominant, flat, linear feature to the landscape that contrasts with the naturally vegetated areas along the highway. The view is accented by striped, white lines on the pavement and a small segment of light gray guardrail with yellow and black end signage along the western (righthand) side of the highway.

The primary viewer group at KOP 002 is motorists on I-95. Motorists on major transportation corridors, such as I-95, tend to have lower sensitivity to visual changes. The view from KOP 002 is dynamic; therefore, motorists traveling at high speeds have short-duration views from this location.

Visual Simulation

Route 1

Route 1 crosses I-95 approximately 0.2 mile to the south of KOP 002. The dense vegetation along both side of the highway would screen most of the transmission line structures and conductors. A single pole would be partially visible through the vegetation on the right side of the highway. The color and vertical form of this structure would be similar to nearby tree trunks, thereby minimizing its impact on the scenic elements of the landscape at this location. Some vegetation clearing on each side of the highway that would result in marginally visible changes in vegetation patterns but would not substantially change the visual characteristics of the overall landscape. The Route 1 conductors would be visible as thin, horizontal lines across the highway. They would be most visible against the open sky above the highway and less noticeable against the forested backdrop on either side of the highway. The conductors would add weak horizontal lines to the landscape as viewed from KOP 002.

Project construction would be highly visible to motorists on I-95 and would result in a noticeable decrease in vegetation density along the route's cleared right-of-way on both sides of I-95's southbound lanes. This clearing would only be noticeable for a brief time as drivers and passengers approach the crossing point. Otherwise, the remaining vegetation would minimize the visual impact of the cleared right-of-way and would also screen views of most of the route's structures. Due to the amount of remaining vegetation and dense forest cover, as well as the limited number of visible features, Route 1 would have a minor impact on the overall visual conditions at KOP 002.

Route 2

Route 2 crosses I-95 more than 1 mile to the south of KOP 002 and then parallels the western side of the southbound lanes for approximately 0.9 mile. The route crossing is not visible from this location due to distance and the alignment of the highway, which generally runs to the southeast from this KOP then curves to the south.

Route 2 would be highly visible to motorists on I-95 approximately 0.2 to 1.2 miles south of the KOP where existing dense vegetation on the west side of the highway would be cleared and replaced with multiple transmission line poles and conductors. The tall, vertical poles would be

similar in shape and color to nearby tree trunks, but would introduce prominent, repeating forms that contrast with the more natural forested areas. The conductors would also add elevated, thin, horizontal lines to the more natural-appearing landscape in this area.

Overall, Route 2 would result in a negligible change in overall visual conditions at KOP 002 but would result in substantial changes in visual conditions along I-95 south of KOP 002. Therefore, the overall visual impact at KOP 002 would be moderate.

4.3.1.8 KOP 005

Existing Conditions

This KOP is located on Ruther Glen Road within the right-of-way of Dominion's existing Line #256, approximately 0.4-mile south of the proposed Route 2 cut-in location and nearly 2-miles south of the Route 1 cut-in location. The open view from this location focuses on the flat-to-rolling terrain within the right-of-way, which is bounded on both sides by taller trees. Finely textured ground vegetation blankets the open field within the right-of-way. The lighter colors of the ground vegetation complement the deeper greens of the adjacent forested areas. The trees provide some vertical context, but the existing H-frame transmission structures dominate and are highly visible in the cleared right-of-way. The conductors add slightly undulating, elevated horizontal lines between the H-frame structures and are most perceptible in the foreground. Other vertical elements of the view include a distribution line along the western edge (lefthand side) of the right-of-way. More distant views are limited due to the rolling topography and trees.

The primary viewer group at KOP 005 is motorists, although nearby residents may also have views at or near this location. For motorists on Ruther Glen Road, the view toward Routes 1 and 2 is perpendicular to their direction of travel; therefore, direct views of the Project would be unlikely and of short duration, due to the speed of travel on Ruther Glen Road and the assumption that drivers would focus on the road. As such, the sensitivity of motorists to visual change is low. While residents may have more direct and static (longer duration) views and tend to be more sensitive to changes in the landscape, their sensitivity would be lower in this location due to the existing right-of-way and transmission line infrastructure that dominates the landscape. As a result, residents would have moderate sensitivity to new visual intrusions on the landscape.

Visual Simulation

Route 1

Route 1 ties into Dominion's existing Line #256 slightly nearly 2 miles north of KOP 005 and would not be visible from this KOP. As such, Route 1 would have no impacts on overall visual conditions at KOP 005.

Route 2

Route 2 ties into Dominion's existing Line #256 approximately 0.4 mile north of KOP 005. The new transmission structures at the cut-in location would appear as tall, thin, vertical poles, similar in appearance to the existing transmission and distribution poles in the right-of-way. The new conductors would also be visible as horizontal lines. While the Route 2 infrastructure would be

visible, they would not introduce new or contrasting elements in the landscape and would not be dominant features in the view.

Project construction associated with Route 2 would be visible in the right-of-way but would be temporary and would not result in noticeable changes to the vegetation or other features of the landscape in this area. Due to the lack of substantial changes to the landscape, Route 2 would have negligible impacts on overall visual conditions at KOP 005.

4.3.1.9 KOP 006

Existing Conditions

KOP 006 is on Ruther Glen Road near the entrance to a distribution warehouse about 0.1 mile north of Route 1. This KOP faces south and features an enclosed view along Ruther Glen Road. Tall, densely spaced trees and other roadside vegetation dominate the view. The mix of conical and amorphous trees creates a prominent, solid, vertical wall that is characterized by medium textures and a palette of deep green colors. The shorter vegetation within the maintained road right-of-way area complements the trees with lighter greens and softer textures. Ruther Glen Road appears as a flat ribbon of asphalt that gently curves through the forested areas before disappearing behind trees. Yellow striping and other white road markings add bold, flat, linear elements to the view. A distribution line parallels and then crosses Ruther Glen Road near this location. The distribution line adds repetitive, brown, vertical poles and directional, horizontal lines to the view. A low, partially transparent, geometric chain-link fence with horizontal and vertical silver lines is visible along the entrance road to the adjacent warehouse. Multiple rectangular signs add color (bright white, green, black, and red) and geometric symbols to the view.

The primary viewer groups at KOP 006 include area residents, workers, and motorists. Residents are likely moderately to highly sensitivity to visual changes in this area, while workers and motorists have low to moderate sensitivity. This variability in sensitivity is due in part to familiarity and the value placed on the local landscape by these different viewer groups (generally higher among residents).

Visual Simulation

Route 1 crosses Ruther Glen Road about 0.1 mile to the south of KOP 006. While the dense vegetation in this area will screen the transmission line structures, the conductors would be visible as thin, black, horizontal lines where they cross the road. The conductors would be new features on the landscape but would be similar to the existing distribution lines in the view and thus would not add new or contrasting elements to the landscape.

Project construction would result in a noticeable decrease in vegetation density along the route's cleared right-of-way, especially on the eastern (left) side of Ruther Glen Road. Multiple tall trees and other vegetation would be removed. The remaining dense vegetation would help to reduce the visual impact of the cleared right-of-way and would also screen views of most of the route's structures from this location. Due to the amount of remaining vegetation and dense forest cover, as well as the limited changes to the landscape's existing elements, Route 1 would have a minor impact on the overall visual conditions at KOP 006.

4.3.1.10 KOP 008B

Existing Conditions

KOP 008B is located on Old CC Road within the right-of-way of Dominion's existing Line #256 less than 0.1 mile from the Route 1 cut-in location. The KOP faces south-southwest and includes a flat-to-slightly-rolling landscape, features a wide, open field that is traversed by two transmission lines and an adjacent distribution line on the west (right) side of the view. Clusters of trees mark the edges of the right-of-way, while a denser forested area forms the horizon. A combination of grasses, wildflowers, and other short vegetation provides a softly textured surface in the foreground and middle ground, with complementary greens, tans, whites, purple, dark red, and browns. The adjacent trees create vertical delineations between the right-of-way and adjacent areas and add darker green and brown colors to the view. Parallel sets of tall, H-frame structures in the right-of-way are dominant features. The transmission and distribution lines add repetitive vertical forms to the landscape, while the elevated conductors add horizontal lines that are most perceptible in the foreground.

The primary viewer groups at KOP 008B include area residents and motorists. While residents may have more direct and static (longer duration) views and tend to be more sensitive to changes in the landscape, their sensitivity may be lowered in this location due to the existing right-of-way and transmission line infrastructure that dominates the landscape. As a result, residents would have moderate sensitivity to new visual intrusions on the landscape. Motorists traveling along Old CC Road would have dynamic, shorter-duration views as they drive across the cleared right-of-way. Because Old CC Road is perpendicular to the existing right-of-way, motorists would not have direct views (out the front windshield) of new utility development in the right-of-way. Their sensitivity to visual changes in the area is low.

Visual Simulation

Route 1 ties into existing Line #256 less than 0.1 mile south of KOP 008B. One of the existing H--frame structures would be removed and replaced with two monopoles at the cut-in location. The new monopoles would add tall, vertical, tapered forms to the right-of-way. While the new monopoles would be similar in form to the vertical components of the existing transmission line and adjacent distribution line structures, the new monopoles would be wider and taller than these existing features. The thin, elevated, horizontal conductors would be visible but would have similar forms, lines, and colors compared to existing transmission and distribution lines.

Construction of Route 1 would result in some tree and other vegetation clearing in the new right-of-way. In particular, several tall trees along the western (right) side of the existing right-of-way would be cleared for the new route, partially opening views to the southwest. The clearing would provide views of the conductors between the cut-in location and the first transmission structure on Route 1. That first structure would be partially visible through the remaining vegetation but would largely blend into the landscape. While Route 1 would be highly visible from KOP 008B, its features would generally be similar to the existing landscape elements in the area; therefore, Route 1 would have minor impacts on existing visual conditions at KOP 008B.

4.3.1.11 KOP 009

Existing Conditions

KOP 009 is located on Chesterfield Road about 0.2 mile to the south of Route 1. This KOP faces north and includes a landscape characterized by a large, open, subtly undulating, grassy field bordered by dense trees. The smooth, vibrant green field with slight color variations is highlighted by the darker greens and browns in the surrounding trees. In addition to the color change, prominent, straight lines differentiate the field from the base of the tree line, while the tops of the tree line provide an irregular horizon line. The trees also create a low, vertical element that contrasts with the horizontal expanse of the field. Several large trees border a narrow driveway to a house that is partially screened by the trees and other vegetation. The geometric forms of the house are perceptible through the vegetation, while bright white paint helps to delineate the house and make it more noticeable.

The primary view group at KOP 009 is area residents. These viewers tend to have moderate to high sensitivity to visual changes in landscape conditions.

Visual Simulation

Route 1 is approximately 0.2-mile north of KOP 009. The top of a single transmission pole and short segments of several conductors would be visible above the tree line. The thin pole and its crossarms add a small, new form to the landscape. The thin, horizontal conductors also add new lines to the landscape. All other features of Route 1 would be hidden behind the existing vegetation. Construction of Route 1 would add several, small changes to the existing landscape elements, resulting in minor impacts on visual conditions at KOP 009.

4.3.1.12 KOP 010

Existing Conditions

KOP 010 is located on Old CC Road less than 0.2-mile northeast of the Route 2 cut-in location on existing Line #256. The KOP faces west-southwest and includes a dense forested area in the middle ground that generally limits more distant views of the surrounding landscape. The foreground appears to have been recently timbered and features gray and light brown woody debris covering the ground, with dry grasses and clumped shrubs adding texture to the landscape. The existing cleared right-of-way, transmission and distribution structures, and conductors for Line #256 are prominent elements running left-to-right across the view. These structures add vertical elements and multiple thin, horizontal lines to the landscape. The forested area helps to partially absorb the visual presence of the existing transmission and distribution lines.

The primary visitor group at KOP 010 is motorists. People driving along Old CC Road have dynamic, extended, direct views of existing Line #256 at this location. Motorists are likely to have low sensitivity to visual changes in the landscape at this location.

Visual Simulation

The Route 2 cut-in location on existing Line #256 would be visible from KOP 010. Two new tall, vertical monopoles, as well as two other transmission structures associated with Route 2 would be

visible from this location and would add additional vertical structures to the landscape. The new elevated, linear conductors between the vertical poles would be slightly perceptible. Route 2 would require noticeable tree clearing, including a visible notch in the tree line where the route leaves the existing right-of-way and heads to the west. Construction of Route 2 would add several additional features to the landscape; however, these new features (vertical poles, linear conductors) would be similar to features that are already present in the existing landscape. As such, Route 2 would have minor impacts on existing visual conditions at KOP 010.

4.3.1.13 KOP 111

Existing Conditions

KOP 111 is located on Ruther Glen Road south of Hunter Lane, about 0.1 mile north of Route 2. This KOP faces south-southeast along Ruther Glen Road. Walls of tall trees create an axial view along the road and limit the extent of the view, although large lawns and the road provide some openness in the landscape. Ruther Glen Road gently curves through the relatively flat to slightly undulating terrain. The dark gray, two-lane road has a prominent double-yellow line that is visible in the foreground. Trees and other vegetation of varying heights and textures frames the right-side of the road. The left side of the road has a mix of landscaped lawns, shrubs, and trees that contrasts with the denser vegetation on the right side of the road. The geometric forms of nearby houses are partially visible through the shrubs and trees on the left side of the road. The bright white color of the closest house helps it stand out against the lush, green colors of the surrounding vegetation. A distribution line parallels the left-hand side of the road. Its poles mimic the tall, vertical forms of nearby tree trunks, but its multiple conductors add elevated horizontal lines that contrast with the background and especially against the open sky in the foreground.

The primary viewer groups at KOP 111 include area residents and motorists. Residents have moderate to high sensitivity to visual changes in this largely rural area. Due to the speed of travel and shorter duration views, motorists would have low to moderate sensitivity.

Visual Simulation

Route 2 is approximately 0.1 mile to the south of KOP 111. From this location, the top of a single transmission pole would be partially visible above the tree line on the eastern (left) side of the road. Conductors for Route 2 would be visible where the transmission line crosses Ruther Glen Road, extending from the visible pole on the eastern side to another pole that screened by the roadside vegetation on the western side of the road. The partially visible pole and its crossarms are similar in form to the existing distribution line structures that parallel the eastern side of the road. However, the size (taller and wider) and color (brown) of the new transmission line pole is different than the distribution line poles (shorter, thinner, gray). Three sets of paired conductors add elevated, horizontal lines across Ruther Glen Road. These conductors are similar to the existing distribution lines, but would be slightly less prominent, due to viewing distance. Construction of Route 2 would result in several, small changes to the existing landscape elements and would therefore have minor impacts on visual conditions at KOP 111.

4.3.1.14 KOP 112

Existing Conditions

KOP 112 is located on Ruther Glen Road about 0.1 mile south of Route 2. This KOP faces north-northeast and the view is dominated by a large, low, lightly textured agricultural field. A dense forested area parallels the left side of the road and also borders the far end of the field. The deep green colors of the trees complement the lighter, more vibrant greens of the crops in the agricultural field. The base of the tree line creates a strong horizontal line in the middle of the view, while the tops of the trees create an irregular horizon line. A narrow, asphalt strip adds another strong, diagonal linear feature to the landscape. The geometric forms of several nearby houses are partially visible through the shrubs and trees on the right side of the road. The white color of some of these buildings helps them stand out in a landscape that is otherwise dominated by various shades of green in the surrounding vegetation. The distribution line that parallels Ruther Glen Road is also visible from this location. Its tall, thin, vertical poles are similar in color and height to nearby tree trunks, but the elevated, horizontal, black lines of the conductors contrast with and are highly visible against the sky. The conductors are slightly less noticeable when they pass in front of forested areas.

The primary viewer groups at KOP 112 are area residents and motorists. Residents likely have moderate-to-high sensitivity while motorists have low-to-moderate sensitivity to visual changes in the landscape at this location, due to the speed of travel.

Visual Simulation

Route 2 is about 0.1 mile north of KOP 112. Two new transmission poles and associated conductors would be visible along the northern edge of the agricultural field. The tall, thin, vertical poles with short, horizontal crossarms would be similar in form to the existing distribution poles along Ruther Glen Road; however, the new transmission line structures would be taller, wider, and a different color (brown instead of gray). The thin, horizontal conductors would be similar in form and line to the existing distribution lines and would add curved lines to the view (whereas the distribution lines appear straighter). The large agricultural field facilitates a wider view of the transmission line in this area. The new poles and conductors would be most perceptible where they are skylined above the tree line and tend to be partially absorbed into the forested background in areas where they are visible in front of trees and other vegetation. Construction of Route 2 would add several noticeable elements to the landscape that are similar to but more prominent than existing features; therefore, Route 2 would have a moderate impact on overall visual conditions at KOP 112.

4.3.2 IMPACT ASSESSMENT

4.3.2.1 VISUAL IMPACT ASSESSMENT FOR VISUALLY SENSITIVE RESOURCES

The degree to which overhead transmission lines influence and are visible on a landscape depends on a number of factors, including (but not limited to) structure height and color, existing landscape features (e.g., topography, vegetation, human-made development, etc.), duration of the view, and distances from the viewer. The specific combination of these factors changes from

location to location, contributing to a range of potential influences and impacts across the study area. Table 4.3-3 describes the Project's impacts on existing visual resource conditions at each VSR and indicates a potential impact rating (major, moderate, minor, or negligible), based on the anticipated magnitude of change to landscape features and elements for each VSR.

TABLE 4.3-3 SUMMARY OF ANTICIPATED IMPACTS BY VSR AND KOP

VSR #	VSR Name	KOP #	Relevant Route(s)	Description of Impact	Potential Impact Rating/Visual Sensitivity
Scenic Resources (Designated Scenic Views/Resources)					
There are no designated scenic resources in the project study area.					
Educational Resources (Schools)					
There are no educational resources in the project study area.					
Recreational Resources (Parks, Trails, Open Space and other Recreation Areas)					
1	East Coast Greenway	NA	Route 1 Route 2	This VSR is located more than 0.5-mile from the proposed Carmel Church Switching Station (the western terminus of both route alternatives). The area along the East Coast Greenway (co-located along Telegraph Road and US 1 in the study area) is a mixture of low density residential and commercial uses, interspersed by tracts of forested land. The existing, dense vegetation along the eastern side of US 1 screens all views of the Project.	Impact: Negligible Viewer Sensitivity: Medium. Recreational visitors (i.e., users of the East Coast Greenway) tend to have higher levels of sensitivity, due in part to the role scenery plays in their recreational experience.
Places of Worship and Cemeteries					
2	Carmel Baptist Church	NA	Route 1 Route 2	This church is located approximately 0.7 mile west-northwest of the proposed Carmel Church Switching Station (the western terminus of both route alternatives). The dense vegetation between this church and the switching station would limit views of the Project.	Impact: Negligible Viewer Sensitivity: Low to medium. Most activities occur indoors.
3	Oxford Mount Zion Baptist Church	NA	Route 1 Route 2	This church is located approximately 1 mile southwest of the proposed Carmel Church Switching Station (the western terminus of both route alternatives). The dense vegetation between this church and the switching station would limit views of the Project.	Impact: Negligible Viewer Sensitivity: Low to medium. Most activities occur indoors.

VSR #	VSR Name	KOP #	Relevant Route(s)	Description of Impact	Potential Impact Rating/Visual Sensitivity
4	Saint Margaret's Episcopal Church and Cemetery	NA	Route 1 Route 2	This inactive church and cemetery on Ruther Glen Road are located approximately 0.7-mile southeast of Route 1 and 0.7-mile northwest of Route 2. Due to distance and forest cover between this VSR and the route alternatives, neither of the proposed transmission lines would be visible from this VSR.	Impact: Negligible Viewer Sensitivity: Low, due to inactive status of the church.
5	Cardinal Baptist Church	NA	Route 1 Route 2	This church is located on Ruther Glen Road approximately 0.7-mile southeast of Route 1 and 0.7-mile northwest of Route 2. Due to distance and forest cover between this VSR and the route alternatives, neither of the proposed transmission lines would be visible from this VSR.	Impact: Negligible Viewer Sensitivity: Low to medium. Most activities occur indoors.
6	Hunter Family Cemetery	NA	Route 1 Route 2	Similar to VSR 4, this cemetery is about 0.7-mile south of Route 1 and 0.6-mile north of Route 2. It is surrounded by dense forest that limits more extensive views of the surrounding landscape.	Impact: Negligible Viewer Sensitivity: Low to medium. Most activities occur in the immediate vicinity of the cemetery
Primary Road/Travel Corridors					
7	Interstate 95 (I-95)	KOP 002	Route 1 Route 2	This major north-south travel corridor is characterized by areas of roadside vegetation that partially obscure more distant landscape views to the east and west. Route 1 crosses this VSR less than 0.5-mile south of northbound Exit 104. Route 2 crosses this VSR about 1.4-miles south of northbound Exit 104 and then parallels the southbound lanes for about 0.9 mile. In both cases, the proposed routes would be highly visible to motorists on I-95.	Impact: Minor to moderate Viewer Sensitivity: Low to medium. Most viewers would be in vehicles traveling at high speeds with short-duration views and lower expectations of visual cohesiveness on a major highway.
8	US 1	NA	Route 1 Route 2	US 1 runs north-south through the western portion of the study area. The closest Project feature is the proposed Carmel Church Switching Station (the western terminus of both route alternatives), approximately 0.6-mile east of US 1. The segment of US 1 near the Project is a mixture of low density residential and commercial uses interspersed by tracts of forested land. The existing, dense vegetation along the eastern side of US 1 screens all views of the Project.	Impact: Negligible Viewer Sensitivity: Low to Medium overall. Medium for residents, low for motorists.

VSR #	VSR Name	KOP #	Relevant Route(s)	Description of Impact	Potential Impact Rating/Visual Sensitivity
9	Ruther Glen Road	KOP 006 KOP 111 KOP 112 KOP 005	Route 1 Route 2	Ruther Glen Road runs generally north-south through the study area. This VSR is characterized by low density residential development, agricultural fields, forested areas, and commercial/industrial development centered primarily near the intersection with Rt. 207. Route 1 crosses the VSR about 0.6-mile south of Rt. 207, while Route 2 crosses about 2 miles south of Rt. 207. At both crossings, the Project would be highly visible to viewers.	Impact: Minor Viewer Sensitivity: Medium overall, including high sensitivity for residents, low to medium for motorists and workers.
10	Dry Bridge Road	NA	Route 1	Dry Bridge Road runs east-west about 0.4-to-0.6-mile north of the eastern portion of Route 1. This VSR is characterized by a mix of residential and agricultural development bounded by areas of trees and vegetation. Existing trees generally block more extensive views from Dry Bridge Road toward the Project.	Impact: Negligible Viewer Sensitivity: Medium overall. High sensitivity for residents, low to medium for motorists and workers.
11	Old CC Road	KOP 008B KOP 010	Route 1 Route 2	Old CC Road generally parallels the existing Line #256 right-of-way along the eastern edge of the study area. The unpaved road connects Ruther Glen Road to Dry Bridge Road. The Route 1 and Route 2 tie-ins with existing Line #256 are less than 0.2-mile west of the road. Due to the existing cleared right-of-way, the proposed Project would be highly visible to motorists.	Impact: Minor Viewer Sensitivity: Medium overall. High sensitivity for residents, low sensitivity for motorists.
Areas of High Public Concentration					
12	Ruther Glen Road Residences	KOP 006 KOP 111 KOP 112 KOP 005	Route 1 Route 2	Private residences exist along the length of Ruther Glen Road in the study area. Some of these residences are less than 0.1 mile from Route 1 or Route 2, generally near where each route crosses the road. Views from more distant residences may also exist.	Impact: Minor Viewer Sensitivity: Medium to High. Residents tend to be more sensitive to visual changes.
13	Dry Ridge Road Residences	NA	Route 1	Clusters of private residences exist along Dry Ridge Road. Route 1 is about 0.4-to-0.6-mile south of this road. Tall trees generally block more extensive views from Dry Bridge Road toward the proposed Project.	Impact: Negligible Viewer Sensitivity: Medium to High. Residents tend to be more sensitive to visual changes.

VSR #	VSR Name	KOP #	Relevant Route(s)	Description of Impact	Potential Impact Rating/Visual Sensitivity
14	US 1 Residences	NA	Route 1 Route 2	Individual private residences and residential neighborhoods exist along US 1 throughout the study area. The homes along the eastern side of the road are generally 0.6-to-0.8-mile west of either the proposed Carmel Church Switching Station or one of the proposed route alternatives. Dense vegetation currently limits views from these areas toward the proposed Project.	Impact: Negligible Viewer Sensitivity: Medium to High. Residents tend to be more sensitive to visual changes.

I-95 = Interstate 95; KOP = key observation point; NA = not applicable; Rt. = Virginia state route; US = U.S. Route; VSR = visually sensitive resource.

4.3.2.2 IMPACTS BY ROUTE ALTERNATIVE

Table 4.3-3 summarizes the anticipated impacts on visual conditions from the route alternatives. This table also provides a potential impact rating (major, moderate, minor, or negligible) for each route.

Route 1

Route 1 would be most visible at the tie-in location with Dominion's existing Line #256 and at the crossings of Ruther Glen Road and I-95. Views would primarily be from public roadways, although residences near the Ruther Glen Road crossing may also have partially obstructed views of Route 1. Visible transmission line infrastructure would include tall, vertical poles and elevated, horizontal conductors. The transmission infrastructure would generally be similar in appearance to existing transmission and distribution lines in and near the study area. While the weatherized steel material of the poles would blend in with existing tree trunks in forested landscapes, these structures would attract the eye in more open areas. Where required, vegetation clearing would reduce the screening effects of vegetation and may create new or expanded opportunities to view the surrounding landscape, including the Route 1 infrastructure. The height of the transmission poles would make them more prominent than existing infrastructure, especially when viewed at close range.

Route 2

Route 2 would be most visible at the tie-in location with Dominion's existing Line #256, the crossings of Ruther Glen Road and I-95, and the 0.9-mile segment of Route 2 that would run parallel and adjacent to the southbound (west) side of I-95. Views would primarily be from public roadways. Residences near the Ruther Glen Road crossing would also have views of Route 2 where it crosses a large field before crossing the road. The field makes this portion of the transmission line more visible to nearby residents, as well as motorists traveling north on Ruther Glen Road. Visible transmission line infrastructure would include tall, vertical poles and elevated, horizontal conductors. The transmission infrastructure would generally be similar in appearance to existing transmission and distribution lines in and near the study area. While the weatherized steel material of the poles would blend in with existing tree trunks in forested landscapes, these structures would attract the eye in more open areas. Where required, vegetation clearing would reduce the screening effects of vegetation and may create new or expanded opportunities to view the surrounding landscape, including the Route 1 infrastructure. The height of the transmission poles would make them more prominent than existing infrastructure, especially when viewed at close range.

TABLE 4.3-4 VISUAL RESOURCE IMPACT SUMMARY

Route Alternative	Potentially Impacted VSRs	Description of Impact	Potential Impact Rating
Carmel Church Route 1	1 through 14 **Total: 14**	Road crossings: • New right-of-way—2 crossings (Ruther Glen Road and I-95) Sensitive VSRs (impacts > negligible): • I-95 (VSR 7) • Ruther Glen Road (VSR 8) • Old CC Road (VSR 10) • Ruther Glen Residences (VSR 12) Impacted Viewer Groups: • Residents • Motorists—commuters/through-travelers • Recreationists/tourists • Workers	VSR Impact: Minor to Moderate Viewer Group Impact: Moderate **Overall Rating: Minor**
Carmel Church Route 2	1 through 8, 10 through 12, and 14 **Total: 12**	Road crossings: • New right-of-way—2 crossings (Ruther Glen Road and I-95) Sensitive VSRs (impacts > negligible): • I-95 (VSR 7) • Ruther Glen Road (VSR 8) • Old CC Road (VSR 10) • Ruther Glen Residences (VSR 12) Impacted Viewer Groups: • Residents • Motorists—commuters/through-travelers • Recreationists/tourists • Workers	VSR Impact: Minor to Moderate Viewer Group Impact: Moderate **Overall Rating: Moderate**
Carmel Church Switching Station	7 **Total: 1**	Sensitive VSRs (impacts > negligible): • I-95 (VSR 7) Impacted Viewer Groups:	VSR Impact: Minor Viewer Group Impact: Minor

Route Alternative	Potentially Impacted VSRs	Description of Impact	Potential Impact Rating
		• Motorists—commuters/through-travelers • Workers	**Overall Rating: Minor**

VSR = visually sensitive resource.

Carmel Church Switching Station

The proposed Carmel Church Switching Station would potentially be visible from I-95 and from nearby areas of the Washington DC South development, once completed. Otherwise, dense forest would screen views of the switching station. Where visible, switching station infrastructure would include tall, vertical, and horizontal structures and conductors. These features would be somewhat compatible with future industrial development on the Washington DC South site but would contrast with remaining forest. Viewers in vehicles traveling at high speeds on I-95 may notice this contrast but would have only brief glimpses of the switching station. Viewers from some areas of the Washington DC South site may have more extended views but would see the switching station within other industrial and commercial development.

Summary

Throughout the study area, opportunities to view either route alternative are typically limited to foreground views. Dense vegetation, tall trees, and the lack of substantial topographical variation generally block sightlines and landscape views from overlooks and more distant locations. Most of the foreground views occur along travel corridors where there is already a higher level of visual disturbance and where most viewers are in moving vehicles. The segments of the route alternatives east of Ruther Glen Road would generally be less noticeable due to the distance from heavily traveled road corridors and existing tree cover that would wholly or partially block views of the proposed transmission infrastructure. Upper portions of structures and associated conductors would potentially be visible above existing tree lines in certain locations. The portion of the route alternatives west of Ruther Glen Road would be more visible due to crossings of Ruther Glen Road, I-95, and other roads, although existing trees would also help obscure portions of the route alternatives in this area. Additionally, most of the foreground views occur along travel corridors where there is already a higher level of visual disturbance and where most viewers are in moving vehicles.

Overall, Route 2 would have a slightly larger visual impact than Route 1, primarily because of the location of the Ruther Glen Road crossing (at an open field that facilitates greater visibility) and the cleared right-of-way along western side of I-95. Both route alternatives would have minor-to-moderate impacts on existing visual conditions for the following reasons:

- Human influences and built structures (modifications to the landscape), including transmission and distribution line infrastructure, are common in the area.
- While Caroline County values and enforces policies to preserve rural character, the I-95 corridor has and continues to grow with a mix of commercial, industrial, and residential development and related infrastructure (e.g., travel corridors, distribution lines, lights, signs, cell towers).
- Opportunities for foreground views (where the transmission route structures are most noticeable) are limited due to dense forested areas and topography that block more distant sightlines throughout the Project study area. Foreground views of the proposed Project would occur most frequently along travel corridors, including I-95 and Ruther Glen Road, where there is already a higher level of visual disturbance and where most viewers are in moving vehicles (shorter duration views).

4.4 CULTURAL RESOURCES

4.4.1 EXISTING CONDITIONS

4.4.1.1 METHODOLOGY

ERM conducted a pre-application analysis (the analysis) of potential impacts on known cultural resources along and near the route alternatives (inclusive of the Carmel Church Switching Station) under consideration for the Project in accordance with The Virginia Department of Historic Resources' (VDHR's) *Guidelines for Assessing Impacts of Proposed Electric Transmission Lines and Associated Facilities on Historic Resources in the Commonwealth of Virginia* (Guidelines) (VDHR 2008). For each route alternative, the analysis identified and considered previously recorded resources within the following study tiers as specified in the Guidelines:

- National Historic Landmarks (NHLs) within a 1.5-mile radius of each route centerline;
- National Register of Historic Places (NRHP)–listed properties, NHLs, battlefields, and historic landscapes within a 1.0-mile radius of each route centerline;
- NRHP-eligible and NRHP-listed properties, NHLs, battlefields, and historic landscapes within a 0.5-mile radius of each route centerline; and
- Each of the above qualifying resource types and archaeological sites within the rights-of-way for each route alternative.

ERM obtained data on previously recorded cultural resources within each study tier from the VCRIS. No previously recorded resources met the study tier criteria listed above. As a result, ERM also collected information from possibly interested parties to find locally significant resources within a 1.0-mile radius of each proposed route centerline. These parties included Caroline County, the Caroline Historical Society, Hanover County, the Hanover County Historical Society, the Hanover County Black Heritage Society, VDOT, VDHR, the Northern Virgnia Conservation Trust, Preservation Virginia, the Virginia Genealogical Society, the Virginia Museum of History and Culture, Woodfork Genealogy, and the American Battlefield Trust.

Many of the previously recorded aboveground cultural resources in the vicinity of the route alternatives have not been assessed for NRHP eligibility and therefore are not included in the analysis, per the Guidelines. These resources should be considered potentially eligible for listing in the NRHP until they are assessed, and a determination of eligibility is made by the VDHR. Additionally, there may be unreported historic and archaeological resources that could be affected by construction or operation of the Project. Any such resources would be addressed during an intensive cultural resources survey to be conducted along the route certificated by the SCC in a subsequent phase of investigation to support permitting of the Project.

Along with the records review, ERM conducted field assessments of the considered architectural resources and historic districts for the Project, in accordance with the Guidelines. ERM captured digital photographs of each architectural resource with views toward the applicable route alternatives and/or other Project facilities. ERM then prepared visual simulations depicting the proposed Project infrastructure as it would appear in views from the considered resources to assess potential visual effects on those resources. ERM examined aerial photographs to assess the current land condition and spatial relationship between the sites and any existing or planned

transmission lines. The results of these assessments are presented in Sections 4.4.1 and 4.4.2, as appropriate.

As discussed in more detail below, ERM did not identify any previously recorded archaeological sites within the right-of-way for either route alternative. ERM identified two NRHP-eligible resources, one potentially eligible battlefield, and two locally significant resources for architectural/historic resources within the study tiers described above.

4.4.1.2 ARCHAEOLOGICAL SITES

ERM considered crossings of archaeological sites to be a routing constraint, due to the potential for an electric transmission line project to impact archaeological deposits in these areas (e.g., due to transmission structure placement, tree clearing, or heavy equipment usage within a site). No known archaeological sites were identified within the right-of-way for either route alternative.

4.4.2 ABOVEGROUND HISTORIC RESOURCES AND ARCHITECTURAL SITES AND FINDINGS

Each route alternative reviewed in this study has the potential to affect historic architectural sites and districts. This section of the report presents information on known aboveground cultural resources in the vicinity of each route alternative, using VDHR's tiered study area model described above. Figure 4.4-1 depicts the locations of resources relevant to the route alternatives. Appendix G, the Stage 1 Pre-application Report, provides a description and location of each resource. These resources could be affected regardless of the route selected by the SCC for the Project.

Table 4.4-1 provides a comparison of the number of resources that would be impacted and the degree of impact on these resources for each route alternative. Based on desktop analysis and visual simulations prepared for the routes (see Appendix G), Route 1 passes near two NRHP-eligible resources, one potentially eligible battlefield, and one locally significant architectural resource that meets the VDHR criteria for inclusion in the study. Route 2 passes near the four above-mentioned resources and one additional locally significant resource.

As discussed in more detail below, ERM recommends the following:

- Route 1 would have no impact on two resources, a minimal impact on one resource, and a moderate impact on one resource.
- Route 2 would have no impact on three resources, a minimal impact on one resource, and a moderate impact on one resource.
- The Carmel Church Switching Station would have no impact on any resources. The switching station is not further discussed, except as the western terminus of both route alternatives.

Routes 1 and 2 would result in the same moderate impact on the Richmond, Fredericksburg, and Potomac Railroad Historic District and no impact to certain other resources. Route 1 would have a minimal impact on one resource, the Ruther Glen Rosenwald School. Route 2 would have a minimal impact on the AISDC Parcel. The subsections below provide more information about each resource and the nature of potential impacts associated with the route alternatives.

TABLE 4.4-1 COMPARISON OF PROJECT IMPACTS ON ABOVE GROUND HISTORIC RESOURCES IN THE STUDY TIERS FOR EACH ROUTE

Route	Number of Considered Resources in Each Impact Category				
	No Impact	Minimal Impact	Moderate Impact	Severe Impact	Total
Route 1	2	1	1	-	4
Route 2	3	1	1	-	5

4.4.2.1 ROUTE 1

Table 4.4-2 provides information on the considered resources within the VDHR study tiers for Route 1. ERM conducted field reconnaissance to assess conditions at these resources and take photographs to support the preparation of simulations. Construction and operation of Route 1 would have no impact on resources 016-5165 and 042-0123, a minimal impact on 016-5097, and a moderate impact on 500-0001.

TABLE 4.4-2 HISTORIC RESOURCES IN THE STUDY TIERS FOR ROUTE 1

Buffer (miles)	Resource Category	Resource Number	Description	Impact
1.0 to 1.5	NHLs	NA	None Identified	NA
0.5 to 1.0	National Register—Listed	NA	None Identified	NA
0.0 to 0.5	National Register—Eligible	016-5165	Excelsior Mills	None
	National Register—Potentially Eligible Battlefield	042-0123	Battle of North Anna River	None
	Locally Significant	016-5097	Rosenwald School	Minimal
0.0 (within the right-of-way)	National Register—Eligible	500-0001	Richmond, Fredericksburg and Potomac Railroad	Moderate

NA = not applicable; NHL = National Historic Landmark.

4.4.2.2 ROUTE 2

Table 4.4-3 provides information on the on the considered resources within the VDHR study tiers for Route 2. ERM conducted field reconnaissance to assess conditions at these resources and take photographs to support the preparation of simulations. Construction and operation of Route 2 would have no impact on 016-5097, 016-5165, and 042-0123, a minimal impact on the American Indian Society Parcel, and a moderate impact on 500-0001.

TABLE 4.4-3 HISTORIC RESOURCES IN THE STUDY TIERS FOR ROUTE 2

Buffer (miles)	Resource Category	Resource Number	Description	Impact
1.0 to 1.5	NHLs	NA	None Identified	NA
0.5 to 1.0	National Register—Listed	NA	None Identified	NA
0.0 to 0.5	National Register—Eligible	016-5165	Excelsior Mills	None
	National Register—Potentially Eligible Battlefield	042-0123	Battle of North Anna River	None
	Locally Significant	016-5097	Rosenwald School	None
		Not Applicable	American Indian Society	Minimal
0.0 (within the right-of-way)	National Register—Eligible	500-0001	Richmond, Fredericksburg and Potomac Railroad	Moderate

NA = not applicable; NHL = National Historic Landmark.

4.4.3 SUMMARY OF EXISTING SURVEY DATA COLLECTED UNDER SECTION 106 OR SECTION 110 OF THE NATIONAL HISTORIC PRESERVATION ACT

Table 4.4-4 provides information on the previous surveys within 1.0 mile of the route alternatives. One previous cultural resource survey covered Route 1 (CE-206). None of the remaining six prior surveys intersect either Route 1 or 2. As a result, ERM collected information from the possibly interested parties listed in the introduction to Section 4.4.1.

TABLE 4.4-4 CULTURAL RESOURCE SURVEYS OVERLAPPING PORTIONS OF THE PROJECT ROUTE ALTERNATIVES

VDHR Survey #	Title	Author	Date
CE-027	Phase I Archaeological Investigations of Spratt Recycling, Inc. Property, (Schwab Tract), Swans Corner, Caroline County, Virginia	Alain C. Outlaw, Martha W. McCartney, Carol D. Tyrer	1992
CE-042	Archaeological Survey, Interstate 95/Route 207 Interchange, Caroline County, Virginia	Lee Tippett, Megan Rupnik	2005
CE-163	Phase I Cultural Resource Identification Survey of the Footprint of Development for the Proposed Coolwater Drive Warehouse, Caroline County, Virginia	Darby O'Donnell	2015
CE-181	M.C. Dean—Caroline County Center for Innovation and Industry, Caroline County, Virginia: Phase I Cultural Resources Investigation	David Carroll, Jeremy Smith	2018

VDHR Survey #	Title	Author	Date
CE-206	Phase I Cultural Resource Identification Survey of the 70-acre Flint Tract, Caroline County, Virginia	Darby O'Donnell, Charles Strang Selden	2021
CE-210	Phase I Cultural Resource Survey of the M.C. Dean Southern Water Line Route, Caroline County, Virginia	Patrick L. Johnson, Jonathan Valalik	2022
CF-202	Phase II Archaeological Evaluation of the DeSear Farmstead Site (44CF594), Chesterfield County, Virginia	Donald G. Jones, Matthew R. Laird, Kimberly S. Zawacki, David M. Givens	2000

4.5 ENVIRONMENTAL JUSTICE

4.5.1 EXISTING CONDITIONS

4.5.1.1 IDENTIFICATION OF ENVIRONMENTAL JUSTICE POPULATIONS

Federal guidelines for environmental justice (EJ) studies define potential EJ communities based on the share of minority and low-income populations of a given area, compared to the minority or low-income population in the state or county that contains the community.[6]

The guidelines established in the Virginia Environmental Justice Act (VEJA) of 2021 (Va. Code §§ 2.2-234 through 235) are more stringent than federal guidelines. As such, this report uses the Commonwealth's guidelines. VEJA defines "Environmental Justice" and "Environmental Justice Community" as follows (Va. Code § 2.2-234):

- "Environmental Justice" means the fair treatment and meaningful involvement of every person, regardless of race, color, national origin, income, faith, or disability, regarding the development, implementation, or enforcement of any environmental law, regulation, or policy.
- "Fair treatment" means the equitable consideration of all people whereby no group of people bears a disproportionate share of any negative environmental consequence resulting from an industrial, governmental, or commercial operation, program, or policy.
- "Meaningful involvement" means the requirements that (i) affected and vulnerable community residents have access and opportunities to participate in the full cycle of the decision-making process about a proposed activity that will affect their environment or health and (ii) decision makers will seek out and consider such participation, allowing the views and perspectives of community residents to shape and influence the decision.
- "Environmental Justice Community" means any low-income community, population of color, or community of color.

[6] For more information on the federal guidelines for EJ analysis, please see the March 2016 report from the Federal Interagency Working Group on Environmental Justice and NEPA Committee "Promising Practices for EJ Methodologies in NEPA Reviews" accessible at: https://www.epa.gov/sites/default/files/2016-08/documents/nepa_promising_practices_document_2016.pdf.

Based on the VEJA guidelines, EJ communities are identified in this report using the criteria described below:

Racial/Ethnic Composition:

- The percent of individuals in an EJ analysis area who identify as a race and ethnicity other than "white alone, not Hispanic or Latino" is greater than 40% of the total population (the Commonwealth average) (i.e., a "community of color"); OR
- The percent of any racial or ethnic group that is not "white alone, not Hispanic or Latino" in the population for the analysis area is greater than the Commonwealth average for that racial or ethnic group (i.e., "population of color"); OR
- The percent of the population in the analysis area considered linguistically isolated (individuals in households where nobody speaks English at least "very well") is greater than the Commonwealth average of 3%.

Low-Income:

- The share of households with total earnings less than 200% of the Federal Poverty level and less than or equal to 80% of the median household income of the analysis area is greater than 30% (Virginia Law 2024).

ERM used the census block group (CBG) as the analysis area for this study because the CBG is the smallest unit for which U.S. Census Bureau demographic data are available. Based on the EJ criteria thresholds identified above, all four CBGs within 1 mile of the route alternatives contain EJ communities (Figure 4.5-1). Route 1 crosses two of these CBGs, while Route 2 crosses three. Table 4.5-1 provides population and demographic information for each of the CBGs crossed and within 1 mile of the route alternatives. CBGs are identified first according to the census tract that contains them.

Two CBGs, both crossed by or containing Project facilities contain a population of low-income residents greater than 30% of the total population.

All four CBGs in the study area have populations or communities of color and both route alternatives cross CBGs where communities of color—and specifically Black or African American residents—comprise a larger percentage of total population than the state average. The CBG that would contain the proposed Carmel Church Switching Station does not contain a community of color, but does contain a substantial low-income population, as well as a larger share of limited English-speaking residents than the state average.

4.5.1.1 OTHER SENSITIVE POPULATIONS

ERM used three other indicators to identify populations with additional socioeconomic burdens in study area communities: education attainment (the percent of people over age 25 in a CBG with less than a high school education) and age-based vulnerabilities (i.e., the percent of people in a CBG under age 5 or over age 64). There is no equivalent VEJA definition for these groups; therefore, ERM used the federal threshold guidance of a "meaningfully greater" percentage of

population than the reference (state) population. Specifically, a CBG is considered to contain a potential age-based vulnerable community, or community with low education attainment, when the percentage of the population either below age 5 or above age 64 (with less than a high school education) exceeds twice the corresponding state averages.

The educational attainment of one CBG meets these criteria for identifying a sensitive population. None of the CBGs meet age-based criteria (Table 4.5-1).

TABLE 4.5-1 DEMOGRAPHC AND SOCIOECONOMIC INDICATORS IN THE PROJECT STUDY AREA

Geography	Population	Total Populations of Color (%) [a]	White, non-Hispanic (%)	Black or African American (%)	American Indian and Alaska Native (%)	Asian (%)	Native Hawaiian and Other Pacific Islander (%)	Some Other Race Alone (%)	Two or More Races (%)	Hispanic or Latino (%)	Low-Income Population (%) [b]	Limited English Speaking Household (%) [c]	Population with Less than High School Education (%) [d]	Population Under Age 5 (%) [e]	Population Over Age 64 (%) [e]	Route or Site Crossing CBG
Virginia	8,624,511	40	60	19	0.1	7	0.1	0.5	4	10	24	3	9	6	16	-
Caroline County	31,181	37	63	24	0.4	1	0.0	0.8	5	6	23	0	11	6	16	-
CT 302.01 BG 1	**3,451**	**63**	**37**	**50**	**0**	**1**	**0**	**4.3**	**2**	**6**	**14**	**0**	**7**	**7**	**10**	**1,2**
CT 305.03 BG 1	1,441	62	38	49	0	0	0	0	1	12	21	0	21	0	32	
CT 305.03 BG 2	**885**	**20**	**80**	**15**	**0**	**1**	**0**	**0**	**2**	**3**	**80**	**10**	**13**	**10**	**17**	**1, 2, SS**
CT 306 BG 2	2,573	48	52	33	0	0	0	0	14	1	31	0	10	8	15	2

Source: U.S. Census Bureau 2023.
CBG = Census block group; CT = Census tract; SS = Carmel Church Switching Station.
[a] U.S. Census Bureau American Community Survey 5 Year Estimates (2018–2022), Table B03002.
[b] U.S. Census Bureau American Community Survey 5 Year Estimates (2018–2022), Table C17002.
[c] U.S. Census Bureau American Community Survey 5 Year Estimates (2018–2022), Table C16002.
[d] U.S. Census Bureau American Community Survey 5 Year Estimates (2018–2022), Table B15002.
[e] U.S. Census Bureau American Community Survey 5 Year Estimates (2018–2022), Table B01001.
Gray shaded cells include reference population.
Blue shaded cells indicate populations of color including community of color is composed primarily of one of the groups listed in the VEJA definition of "population of color" or the analysis area has a greater percentage of a community of color than the state.
Green shaded cells indicate low-income populations.
Yellow shaded cells indicate linguistically isolated communities.
Orange shaded cells indicate an "other sensitive population."

4.5.2 IMPACT ASSESSMENT

Project route alternatives were identified through a systematic process that examined a variety of factors to identify constraints and opportunities, including avoidance of residential areas and sensitive environmental and cultural resources, identification of compatible land uses, and collocation with existing roads, utility rights-of-way, or other linear corridors, where feasible.

Both routes cross (and the proposed Carmel Church Switching Station is within) CBGs that meet criteria for consideration as potential EJ communities (Figure 4.5-1, Table 4.5-1). Both routes largely cross through wooded areas devoid of structures and residences. Neither route alternative has more than 9 residences within 500 feet of its centerline.

To ensure that stakeholder concerns regarding the potential direct and indirect impacts of the Project are understood and considered in routing decisions, Dominion designed and implemented a comprehensive outreach program early in the Project's development phase to identify and engage with all community stakeholders regardless of EJ community status, including federally recognized tribes. As part of the outreach program, the Company shared Project materials through written and in-person methods (e.g., letters and open houses), to document comments provided by stakeholders, and to respond to feedback by seeking ways to mitigate or avoid identified impacts, including any potential disproportionate impacts on vulnerable communities. As part of outreach, Dominion held community meetings on July 23, 2024, and September 17, 2024, at the Caroline County YMCA and Caroline High School, respectively.

In assessing whether a community would bear a disproportionately adverse impact from the Project, ERM considered construction impacts (specifically, noise and ground disturbance), visual impacts, property devaluation, and health impacts related to electric and magnetic fields discussed in the sections below. The two route alternatives share many similarities; therefore, the impacts discussed below are general to both project routes, except where one of the route alternatives would have different impacts; these are called out and discussed separately.

Overall, while all of the communities within the 1-mile radius of the site are potential EJ communities, the Project would not have adverse or significant impacts, primarily due to the limited number of homes and businesses near the route alternatives.

4.5.2.1 CONSTRUCTION ACTIVITIES

Impacts associated with Project construction would be temporary, lasting less than a year. Regardless of the route selected, construction activity and crews would be present at a particular location during daytime hours for a few to several days at a time, on multiple occasions throughout the construction period between initial right-of-way clearing and final restoration.

Various regulations, industry standards, and BMPs would guide construction and restoration of the right-of-way. The short-term impacts of construction could include equipment noise, dust, potential changes in traffic patterns, and ground disturbance. All these impacts would be short term and temporary.

Noise is generally defined as unwanted sound. The primary noise receptors in the study area would be the single-family homes that are within 500-feet of the centerline of the routes

(See Section 4.1.5). There are no schools within 1 mile of any of the route alternatives or the switching station. Section 4.1 (Land Use) provides additional details on distances and locations of potentially sensitive resources from route alternative. Exceedances of daytime noise limits are not expected; if they occur, they would be temporary.

During construction, Dominion would minimize ground-disturbing activities to the extent practicable. Following construction, Dominion would remove construction-related equipment and debris from the right-of-way and restore the land within the right-of-way as closely as possible to preconstruction contours and maintain the right-of-way during operations with an herbaceous cover.

4.5.2.2 VISUAL IMPACTS

Section 4.3 (Visual Resources) assesses the Project's visual impacts. Because all of the CBGs in the study area contain sensitive populations, many of the KOPs used in the analysis of visual impacts are representative of views in potential EJ communities. KOPs 11 and 12 (Route 2 from Ruther Glen Road), KOP 6 (Route 1 from Ruther Glen Road), and KOP 2 (Carmel Church Switching Station) illustrate how the proposed routes would look from residential areas and major transportation corridors in potential EJ communities. Overall, views from these areas would be minor to negligible.

4.5.2.3 PROPERTY VALUES

Affected communities and landowners often express concern that the presence of transmission lines in the viewshed of homes could adversely affect aesthetics, resulting in the reduction of property values and deterring potential buyers. Indirect impacts on property values caused by direct visual impacts from high-voltage transmission lines depend on proximity, visibility, size, and type of transmission structures; easement landscaping; and surrounding topography. Peer-reviewed articles and industry research published in peer-reviewed journals and trade journals find that residential property values and sales prices are primarily affected by factors unrelated to the presence of a transmission line. Specifically, this research found that factors such as location, type, and condition of improvements to the property; neighborhood characteristics; and broader local real estate market conditions have a greater influence on the value of residential property than the presence of a transmission line (Jackson and Pitts 2010; Anderson et al. 2017).

Each route alternative has fewer than 10 homes that are within 500 feet of its centerline. The landscapes that the routes pass through are predominantly rural and wooded, except for some industrial development near the I-95/Rt. 207 interchange. The route alternatives do not cross any major centers of population, urban or suburban.

4.5.2.4 HEALTH IMPACTS

The conclusions of multidisciplinary scientific review panels assembled by national and international scientific agencies during the past three decades are the foundation of Dominion's opinion that no adverse health impacts are anticipated to result from the operation of transmission infrastructure, including the Project. The general scientific consensus of agencies that have reviewed this research, relying on generally accepted scientific methods, is that common

sources of electromagnetic fields (EMFs) in the environment, including from transmission lines and other parts of the electric system, appliances, etc., are not a cause of any adverse health impacts.

Research on EMF and human health varies widely in approach. Some studies evaluate the impacts of high, short-term EMF exposures not typically found in people's day-to-day lives on biological responses, while others evaluate the impacts of common, lower EMF exposures found throughout communities. Studies also have evaluated the possibility of impacts (e.g., cancer, neurodegenerative diseases, and reproductive impacts) of long-term exposure. Altogether, this research includes well over 100 epidemiologic studies of people in their natural environment, and many more laboratory studies of animals (in vivo) and isolated cells and tissues (in vitro). Standard scientific procedures, such as weight-of-evidence methods, were used by the expert panels assembled by agencies to identify, review, and summarize the results of this large and diverse research.

The reviews of EMF-related biological and health research have been conducted by numerous scientific and health agencies, including, for example, the European Health Risk Assessment Network on Electromagnetic Fields Exposure, the International Commission on Non-Ionizing Radiation Protection, the World Health Organization, the Institute of Electrical and Electronics Engineers International Committee on Electromagnetic Safety, the Scientific Committee on Emerging and Newly Identified Health Risks of the European Commission, and the Swedish Radiation Safety Authority (formerly the Swedish Radiation Protection Authority; WHO 2007; SCENIHR 2009, 2015; ICNIRP 2010; SSM 2015, 2016, 2018, 2019, 2020, 2021, 2022; ICES 2019). The general scientific consensus of the agencies that have reviewed this research, relying on generally accepted scientific methods, is that the scientific evidence does not confirm that common sources of EMF in the environment, including electric transmission lines and other parts of the electric system, appliances, etc., are a cause of any adverse health impacts.

The route alternatives were designed to be as far from dwellings and other sensitive receptors as practicable both within and outside of EJ communities. While the desktop review suggests that EJ populations live within 1 mile of the route alternatives, there are few homes in the immediate vicinity of the Project study area; therefore, impacts on EJ communities from EMF associated with the Project are not anticipated.

4.6 GEOLOGICAL CONSTRAINTS

The study area is within the transitional zone of the Piedmont and Coastal Plain geologic provinces. The Piedmont geologic province is characterized by strongly weathered bedrock due to the humid climate, thick soils overlying saprolite (weathered bedrock), and rolling topography that becomes more rugged to the west near the Blue Ridge mountains. The Coastal Plain province, located between the Piedmont province and the Atlantic Ocean, is defined by a terraced landscape consisting of unconsolidated sediment material deposited from fluctuating sea levels and the repetitive growth and retreat of large continental glaciers (William and Mary Department of Geology 2023).

Based on review of the Geologic Map of Virginia, each of the Carmel Church route alternatives are located within sections of unconsolidated, undifferentiated sediments deposited within the Tertiary

Period (2.6 to 66.0 million years ago). Each sediment unit encountered by the routes is mainly composed of sand and gravel.

4.6.1 MINERAL RESOURCES

ERM reviewed publicly available Virginia Department of Energy datasets (2023), U.S. Geological Survey topographic quadrangles, and recent (2023) digital aerial photographs to identify mineral resources in the study area. Based on this review, no active, or inactive, mineral resource sites were identified within 0.25 mile of the Carmel Church route alternatives. The closest active mineral resource site is located approximately 1.5 miles southwest of the Carmel Church Route 2 centerline (MP 1.2).

4.6.2 IMPACT ASSESSMENT

Because the closest active mineral resource site is located more than 0.25 mile from the Carmel Church project area, construction and operation of the Project's transmission infrastructure would not impact operations of any active mineral resource sites.

5. COMPARISON OF ALTERNATIVES

ERM identified the route alternatives discussed in this report based on the geography of major constraints and routing opportunities in the study area. In accordance with the *Guidelines for Transmission Line Applications* filed under Title 56 of the Va. Code (specifically the provision that existing rights-of-way should be given priority for routing new transmission infrastructure), ERM assessed opportunities for routing along existing rights-of-way. Collocation opportunities in the study area include existing roadways, in particular Rogers Clark Boulevard and I-95, and the CSX Railroad and the collocated natural gas pipeline right-of-way adjacent to it. Collocation with Rogers Clark Boulevard was limited by industrial and commercial development east of I-95. There were no collocation opportunities with existing transmission line rights-of-way, because there are no existing east-west transmission lines in the study area. No other public utilities were available for collocation opportunities.

Route alternatives were constrained in the southern portion of the study area by North Anna River, publicly owned and protected lands (Richmond National Battlefield Park, North Anna Battlefield Park, and an American Battlefield Trust Holding), the Martin Marietta Doswell Quarry, and commercial/industrial development between US 1 and I-95. Route alternatives in the eastern half of the study area were constrained by city-owned land, residential, in addition to commercial, and industrial development surrounding the Rogers Clark Boulevard and the I-95 interchange. There is also a parcel of land used by AISDC on Reservation Lane. Routes were further constrained throughout the study area by residential developments.

The Project would require the construction of the proposed Carmel Church Switching Station and one of the Carmel Church route alternatives. ERM evaluated two different cut-in points on existing Line#256 that would minimize impacts on people and natural, historic, and cultural resources. The remainder of this report provides a comparative analysis of the route alternatives to identify a preferred alignment. The Features Crossing Table (Appendix C) lists the resources crossed by or within the footprint of each route alternative and the switching station, while the sections below describe the comparison of each route alternative’s impacts on resources. Resources that would not be directly or indirectly impacted by the Project (publicly owned lands, schools, cemeteries, and places of worship, conservation easements, recreational resources, airports and heliports, and geological and mineral resources) are not discussed in this section.

5.1 LAND USE

Impacts on land use from the Project would include the placement of transmission structures on private property, clearing of trees within the right-of-way, visual impacts on resources (such as residences and recreational resources) within proximity of the transmission facilities, and temporary road closures associated with construction at road crossings. Potential impacts on land use from the proposed Carmel Church Switching Station and each route alternative are compared below.

5.1.1 CARMEL CHURCH SWITCHING STATION

In addition to the impacts of the route alternative selected, the proposed Carmel Church Switching Station footprint would encompass 10.0 acres of forested located within the Washington DC South property, all of which would be cleared and graded by the developer prior to Project construction.

5.1.2 CARMEL CHURCH ROUTE ALTERNATIVES

5.1.2.1 LENGTHS, FOOTPRINTS, PARCELS, AND COLLOCATION

Table 5.1-1shows the lengths and right-of-way footprints of each route, as well as the number of parcels crossed and collocation lengths for those routes.

TABLE 5.1-1 LENGTH, ACREAGE, PARCELS CROSSED, AND COLLOCATION LENGTHS OF THE ROUTE ALTERNATIVES

Route Feature	Unit	Carmel Church Route 1	Carmel Church Route 2
Total Route Length	Miles	2.5	2.8
Construction Footprint	Acres	29.8	33.1
Parcels Crossed	Acres	14	12
Collocation Length	Miles	0.0	1.5

Route 1 would be the shortest route and would have the smallest footprint. Route 2 would collocate with I-95 for 1.5 miles, whereas Route 1 would not collocate at all.

5.1.2.2 LAND OWNERSHIP AND PLANNING AND ZONING

The Project would not cross any public lands except for VDOT-administered road rights-of-way. All parcels within the Project footprint (including both route alternatives) are privately owned. Route 1 would cross two more total parcels than Route 2; however, 13 of the 14 parcels crossed by Route 1 are designated for industrial use by the Caroline County Comprehensive Plan (Caroline County 2023). Route 1 therefore passes through only one residential (zoned RP) parcel. Route 2 crosses nine residential (zoned RP) parcels and four commercial parcels (zoned PMUD), all of which are associated with the Washington DC South development.

Route 2 minimizes the impacts on commercial parcels by collocating with I-95 along the eastern edge of these parcels. Most landowners who attended the open houses expressed disapproval of Route 2 (outside of the commercial parcels) due to its proximity to rural residential land use areas that the Comprehensive Plan designates for rural preservation.

Approximately 1.0 mile (60%) of Route 1 crosses through the PIRT area, which is designated to encourage technology development. Route 2 does not cross through the PIRT area.

5.1.2.3 LAND USE AND LAND COVER

Except for the placement of transmission structures, the Project would have no direct impacts on open space, developed land, or open water land use types. The primary impact on land use would

be the conversion of forested land to herbaceous land in the maintained right-of-way. Both route alternatives predominantly cross forested lands. Route 2 would require clearing of 28.7 acres of forested land, compared to 25.6 acres for Route 1. Impacts on forests are discussed further in Section 5.2.

5.1.2.4 RESOURCE PROTECTION AREAS AND RESOURCE MANAGEMENT AREAS

Both route alternatives would cross forested RPA and RMA buffers, which would require their permanent conversion from forested vegetation to herbaceous vegetation. Route 1 would cross the most RPA/RMA (0.5 mile), while Route 2 would cross 0.2 mile less (0.3 mile).

5.1.2.5 RESIDENTIAL AND NON-RESIDENTIAL BUILDINGS

Project construction would generate indirect impacts from noise. Project operations would result in indirect visual impacts from the transmission infrastructure. There are no residential dwellings within 60 feet of the right-of-way or within 100 feet of the centerlines of any of the route alternatives.

Route 1 has no residential dwellings within 250 feet and four residential dwellings within 500 feet of its centerline. Route 2 has six dwellings within 250 feet and three additional (nine total) within 500 feet of its centerline. Route 1 has the fewest residential dwellings within 500 feet of its centerline.

Route 1 has four non-residential buildings within 500 feet of its centerline, including three outbuildings and one manufacturing warehouse. Route 2 has three non-residential outbuildings within 500 feet of its centerline. Route 2 has the fewest non-residential buildings within 500 feet of its centerline.

5.1.2.6 TRANSPORTATION INFRASTRUCTURE

Project construction would require temporary road or lane closures and/or detours, regardless of the route selected for the Project. Route 1 would cross four roads, while Route 2 would cross three. Both routes would cross I-95, Ruther Glen Road, and the CSX railroad. VDOT prefers perpendicular road crossings, which reduce the distance spanned and the visual impacts of a crossing. None of the route alternatives would impact planned future road projects. The Route 1 crossing of the railroad would be an acute crossing, while the Route 2 crossing would be perpendicular.

5.2 NATURAL RESOURCES

Direct impacts to natural resources would result from construction activities, which would be temporary, and placement of structures and required tree clearing within the right-of-way of the selected route, which would be permanent. Except for structure placement locations, areas of non-forested vegetation would return to normal function after Project construction. Tree-clearing within the maintained right-of-way would result in the conversion of PFO/PSS wetlands to PSS/PEM type wetlands, reducing or eliminating functions such as peak flow reduction, water filtration, and habitat diversity, eliminating riparian buffer and riparian buffer functions at waterbody crossings, eliminating forested habitat, and bisecting ecological cores. Forested land

provides habitat for many species, such as the federally and state threatened NLEB and the federally potentially endangered and state endangered TCB, bald eagles, and other non-protected species.

5.2.1 CARMEL CHURCH SWITCHING STATION

The footprint of the Carmel Church Switching Station is entirely forested, containing no aquatic resources and about 6.7 acres of C5-ranked ecological core. The 10.0 acres of forested land (and 6.7 acres of ecological core) would be cleared and graded by the developer prior to Project construction. No other natural resources would be impacted by the proposed Carmel Church Switching Station.

5.2.2 CARMEL CHURCH ROUTE ALTERNATIVES

Each route alternative crosses natural resources, including wetlands, waterbodies, and habitat with natural vegetation (mainly forest), including areas ranked as ecological cores by the VDCR and the Reedy Creek Seeps Conservation Site. Table 5.2-1 summarizes the natural resources potentially impacted by each route.

TABLE 5.2-1 NATURAL RESOURCES CROSSED BY THE CARMEL CHURCH ROUTE ALTERNATIVES

Natural Resource	Unit	Carmel Church Route 1	Carmel Church Route 2
Wetlands Total	Acres	2.5	1.7
PFO Wetlands	Acres	0.8	1.6
Waterbodies Total	Number	6	4
Forested Lands	Acres	25.6	28.7
Reedy Creek Seeps Conservation Site	Acres	10.9	2.4
Ecological Cores	Acres	18.3	14.2

PFO = palustrine forested.

5.2.2.1 WETLANDS

Route 1 would affect the most total wetlands (2.5 acres), 0.8 acre more than Route 2 (1.7 acres). Of the 2.5 acres crossed by Route 1, 0.8 acre is PFO wetland, while 1.6 of the 1.7 wetland acres crossed by Route 2 are PFO wetlands.

Impacts on non-PFO/PSS–type wetlands would be temporary. Therefore, while Route 1 crosses more total wetlands, it would have the smallest extent permanent impacts to wetlands because its footprint includes less PFO wetlands.

5.2.2.2 WATERBODIES

Route 1 would cross more NHD-mapped waterbodies (6) than Route 2 (4).

5.2.2.3 REEDY SEEPS CONSERVATION SITE

The Route 1 footprint includes 10.9 acres of the Reedy Creek Conservation Site, about half of which appear to comprise of managed or recently cleared managed timber and half of which is regenerated forested cleared sometime between 2006 and 2007. The Route 2 footprint includes 2.4 acres of the Conservation Site, all of which is regenerating forest cleared sometime between 2012 and 2014.

Route 2 would require less tree clearing and habitat conversion within the Reedy Creek Conservation Site than Route 1.

5.2.2.4 ECOLOGICAL CORES

The Route 2 footprint includes 18.3 acres of ecological cores, compared to 14.2 acres for Route 1. Neither route would cross C1- or C2-ranked ecological cores. Route 1 would affect the largest extent of C3-ranked cores (10.5 acres), while Route 2 would primarily affect C4-ranked cores (13.3 acres). Most (9.7 acres) of the C3-ranked cores within the Route 1 footprint are cleared land or areas of managed timber. All the ecological cores within the Route 1 footprint appear to be managed timber, with tree clearing observed in historic aerial imagery.

The Route 1 footprint includes the smallest area ecological cores; however, new impacts from either route are expected to be minimal as both routes appear to cross mainly through managed timberland.

5.2.2.5 FOREST

The right-of-way for Route 2 encompasses more acres of forested land than Route 1. The FCV data for the study area appear to be outdated based on recent (2023) aerial imagery, which categorizes some cleared land and managed timber as FCV. This discrepancy notwithstanding, the Route 1 footprint includes the largest extent of FCV-ranked forest (28.0 acres) and the largest extent ranked 3 or higher (10.6 acres). By comparison, the Route 2 footprint includes 27.1 acres of FCV-ranked forest, of which 6.0 acres are ranked 3 or higher. Based on aerial imagery, about 2.0 miles of Route 1 would result in forest fragmentation, while about 1.6 miles of Route 2 would result in forest fragmentation.

Route 1 would impact the smallest amount of forest but would result in more fragmentation than Route 2.

5.3 VISUAL RESOURCES

5.3.1 CARMEL CHURCH SWITCHING STATION

The potential visibility of the Carmel Switching Station from I-95 and near the Washington DC South development, would be screened by dense forest once completed. The switching station would introduce some new visual elements to the landscape but would have an overall minor visual impact.

5.3.2 CARMEL CHURCH ROUTE ALTERNATIVES

The route alternatives would be most visible at their cut-in locations on existing Line #256 and at their crossings of Ruther Glen Road and I-95. Route 2 would have more visibility from nearby residences and motorists along Ruther Glen Road.

Route 1 would result in minor visual impacts, while Route 2 would result in moderate visual impacts.

5.4 CULTURAL RESOURCES

5.4.1 CARMEL CHURCH SWITCHING STATION

No archaeological sites were identified within or near the Carmel Church Switching Station. There are four aboveground historic sites within 1 mile of the Switching Station. The switching station is expected to have no impact on all four resources.

5.4.2 CARMEL CHURCH ROUTE ALTERNATIVES

No previously recorded archaeological sites were identified within 1 mile of either route alternative.

Four aboveground historic sites were identified within VDHR study tiers for both Route 1 and Route 2. A fifth site was identified for Route 2. Routes 1 and 2 would both have a minimal impact on one (locally significant) site and a moderate impact on another (National Register eligible) site.

Overall, Routes 1 and 2 are expected to have similar impacts on cultural resources.

5.5 EJ

5.5.1 CARMEL CHURCH SWITCHING STATION

The Carmel Church Switching Station would be located within a potential EJ CBG; however, the facility would be in a forested area with no residences within 0.2 mile of the proposed switching station. As such, the switching station would not result in a disproportionate, adverse, or significant impact on EJ communities.

5.5.2 CARMEL CHURCH ROUTE ALTERNATIVES

Both routes would cross potential EJ communities. Potential impacts on EJ communities crossed by the routes would be limited to temporary construction impacts (noise, dust, traffic impacts, and ground disturbance) and visual impacts. These impacts are anticipated to be minimal, because both routes largely pass through wooded areas devoid of structures and residences. Neither route alternative has more than 9 residences within 500 feet of its centerline.

ERM's EJ assessment found that neither route alternative would result in a disproportionate, adverse, or significant impact on EJ communities.

6. CONCLUSIONS AND RECOMMENDATIONS

Based on the evaluation of each route alternative and the potential associated impacts on the human and natural environment within Caroline County, ERM and the Company recommend Route 1 as the preferred alternative.

Route 1 would have the smallest impact on land use resources, because it is the shortest route alternative and it would therefore have the smallest footprint. Route 1 also crosses areas designated by Caroline County for industrial and commercial use. Specifically, most of Route 1 crosses parcels within the PIRT area, as well as parcels designated for industrial parks in Caroline's Comprehensive Plan. Route 1 also has the smallest impacts on forested land and has the fewest residential structures within 250 and 500 feet of its centerline. Route 1 would cross one additional roadway, as compared to Route 2; however, both routes would cross the same major thoroughfares, including I-95 and Ruther Glen Road. Both routes span the CSX rail line.

From a natural resources perspective, while Route 1 would cross two more waterbodies than Route 2, Route 1 would result in the smallest impacts on PFO wetlands and forested habitat. Impacts from Route 1 on the Reedy Creek Seeps Conservation Site are specific to its cut-in location along existing Line #256, where the New Jersey rush is notably present throughout the existing transmission corridor.

Route 1 would be within 1 mile of four historic properties, compared to five for Route 2. Both route alternatives would directly impact the Richmond, Fredericksburg, and Potomac Railroad Historic District (Resource Number 500-0001). During the open houses for the Project, members of the AISDC and other stakeholders provided negative feedback on Route 2. Although Route 2 does not directly impact the AISDC parcel in the study area, it is within a half mile of the property, which is noted as Locally Significant.

Route 1 is expected to have lower overall impacts on residents, motorists, and existing landscape conditions.

Neither route would result in a disproportionate, adverse, or significant impact on EJ communities.

In conclusion, after evaluating numerous routing constraints and opportunities identified through desktop study, stakeholder outreach, and fieldwork, ERM and the Company recommend Route 1 as the preferred alternative for this Project, as it avoids or reasonably minimizes adverse impacts to the greatest extent reasonably practicable on the scenic assets, historic and cultural resources, and environment of the area concerned.

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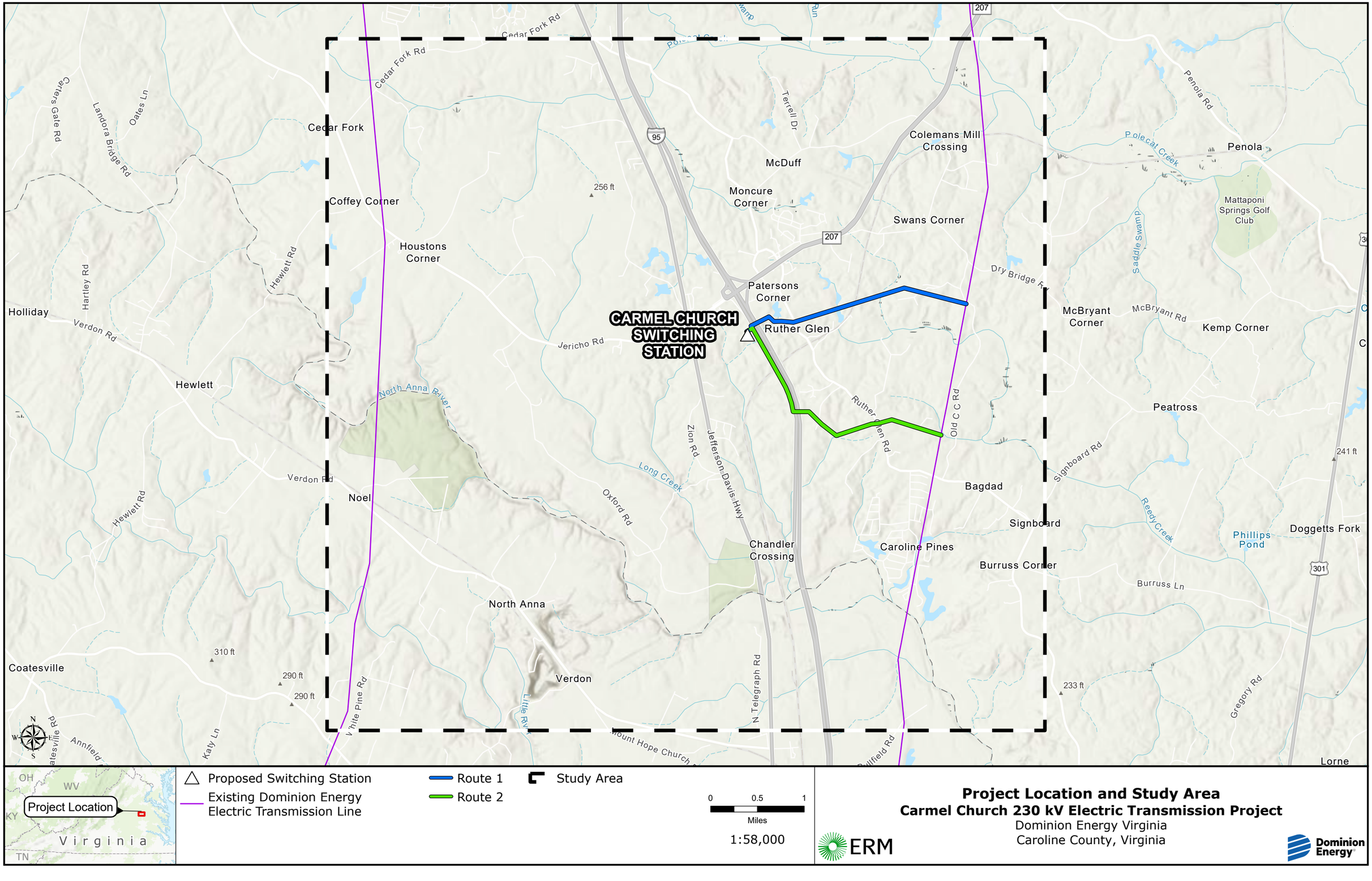
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APPENDIX A FIGURES

FIGURE 1.1-1 PROJECT LOCATION AND STUDY AREA

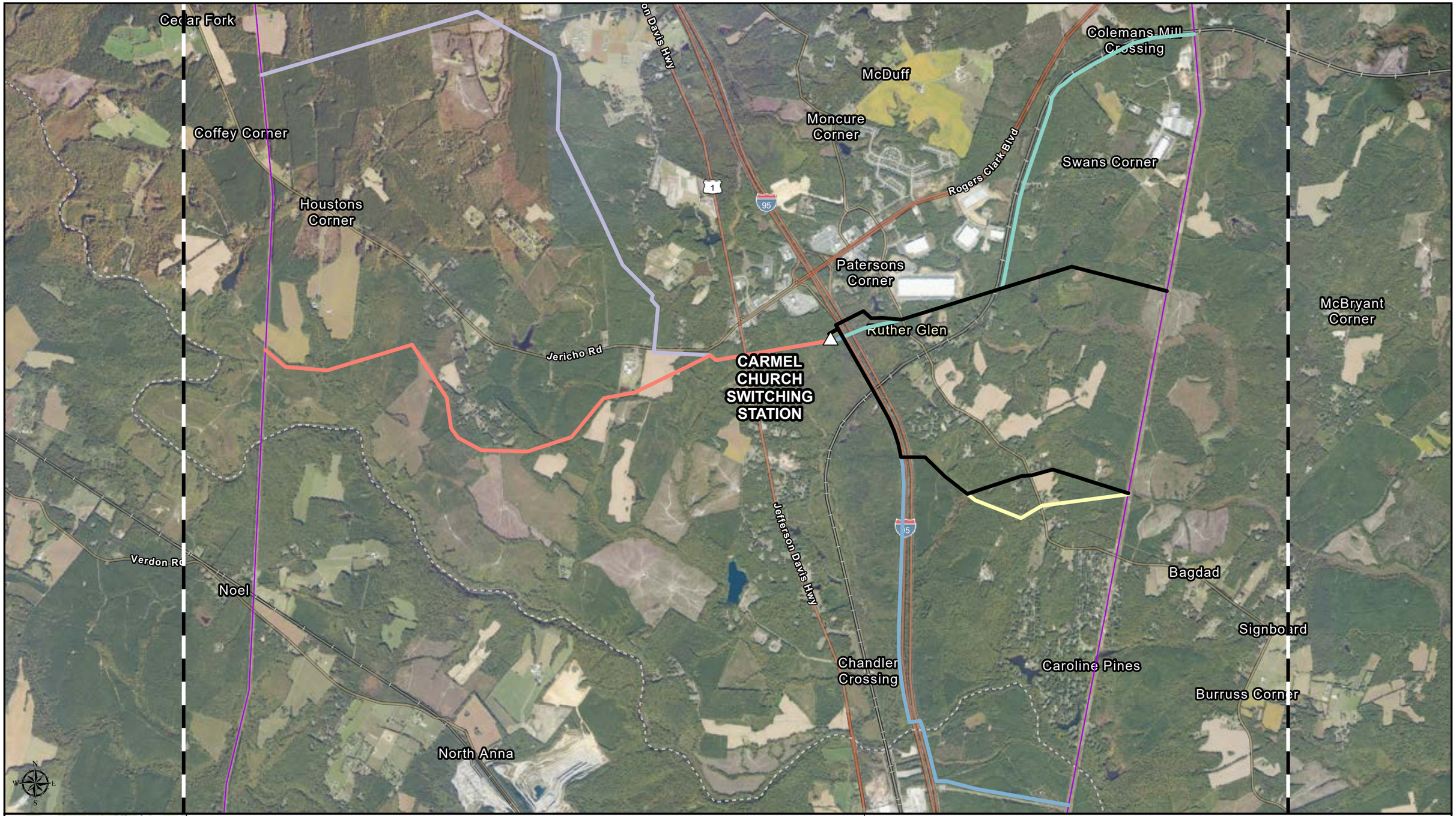


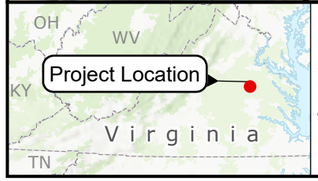
Project Location and Study Area
Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

FIGURE 3.4-1 DISMISSED ROUTE ALTERNATIVES





- Proposed Switching Station
- Existing Dominion Energy Electric Transmission Line
- Proposed Route Alternative

Eliminated Route

- Route 1
- Route 2
- Route 6
- Route 7
- Route 8
- Study Area

0 1,500 3,000
Feet

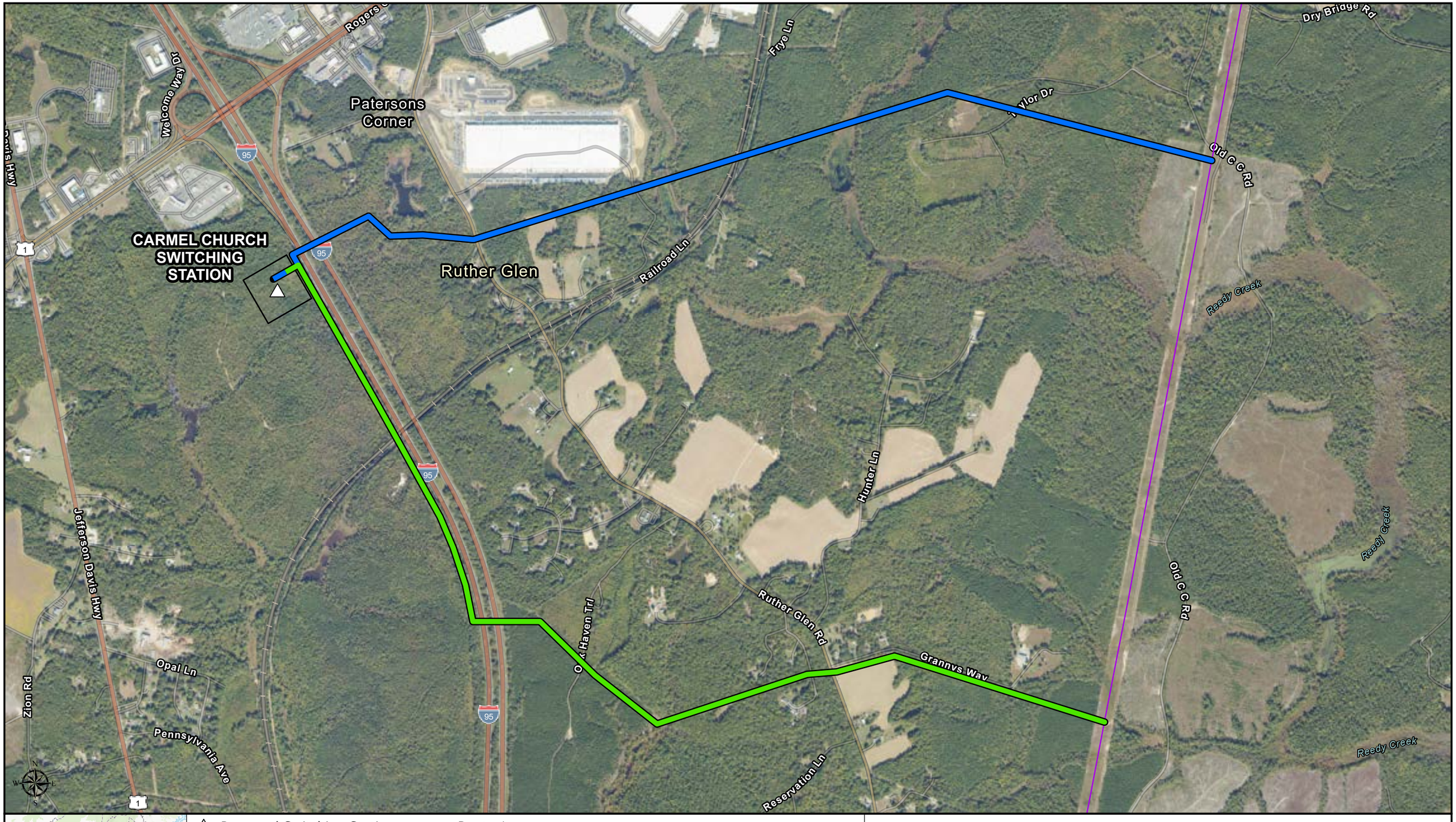
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Dismissed Route Alternatives
Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

FIGURE 3.4-2 CARMEL CHURCH ROUTE ALTERNATIVES

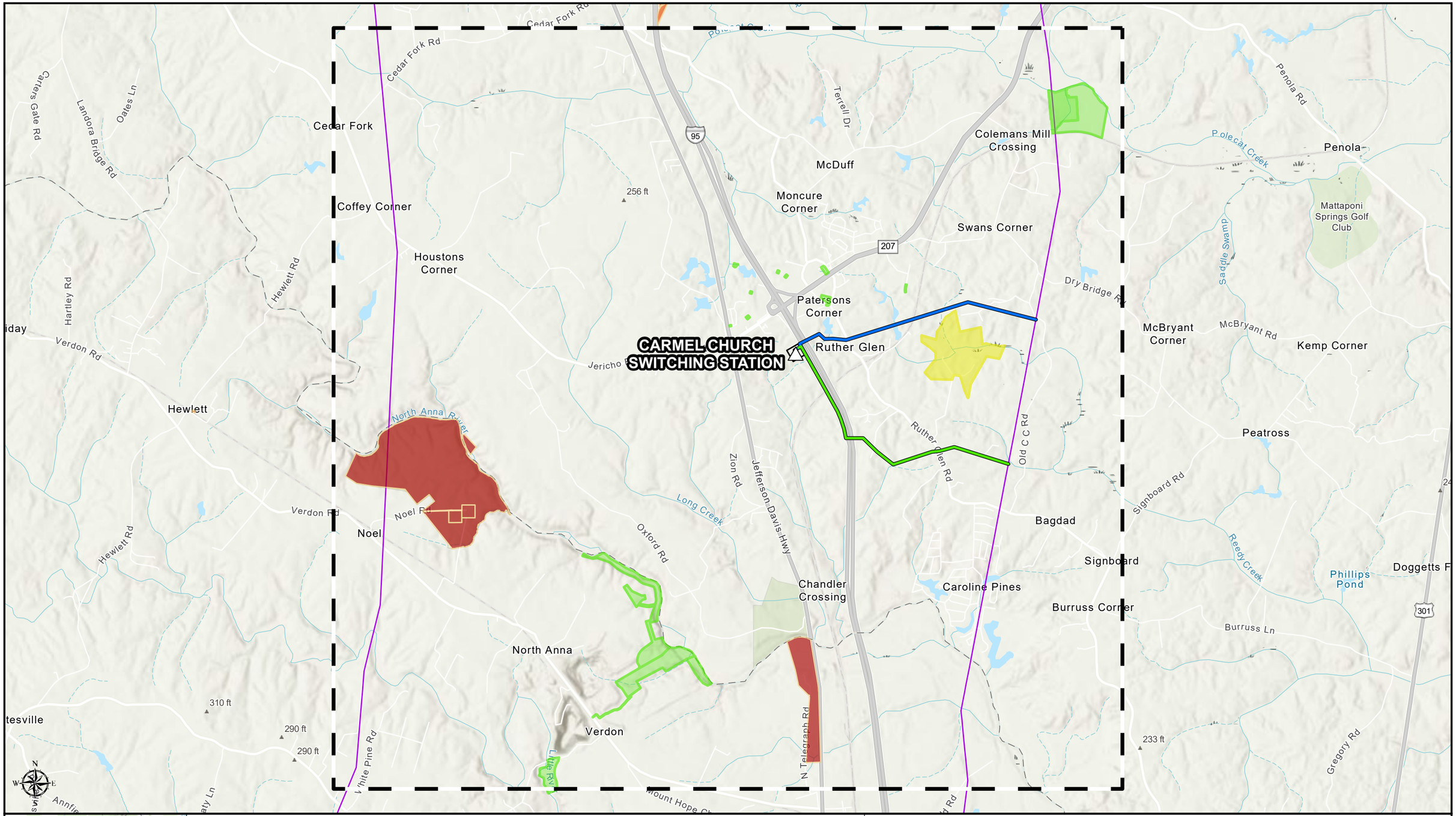


Route Alternatives
Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

FIGURE 4.1-1 LAND OWNERSHIP



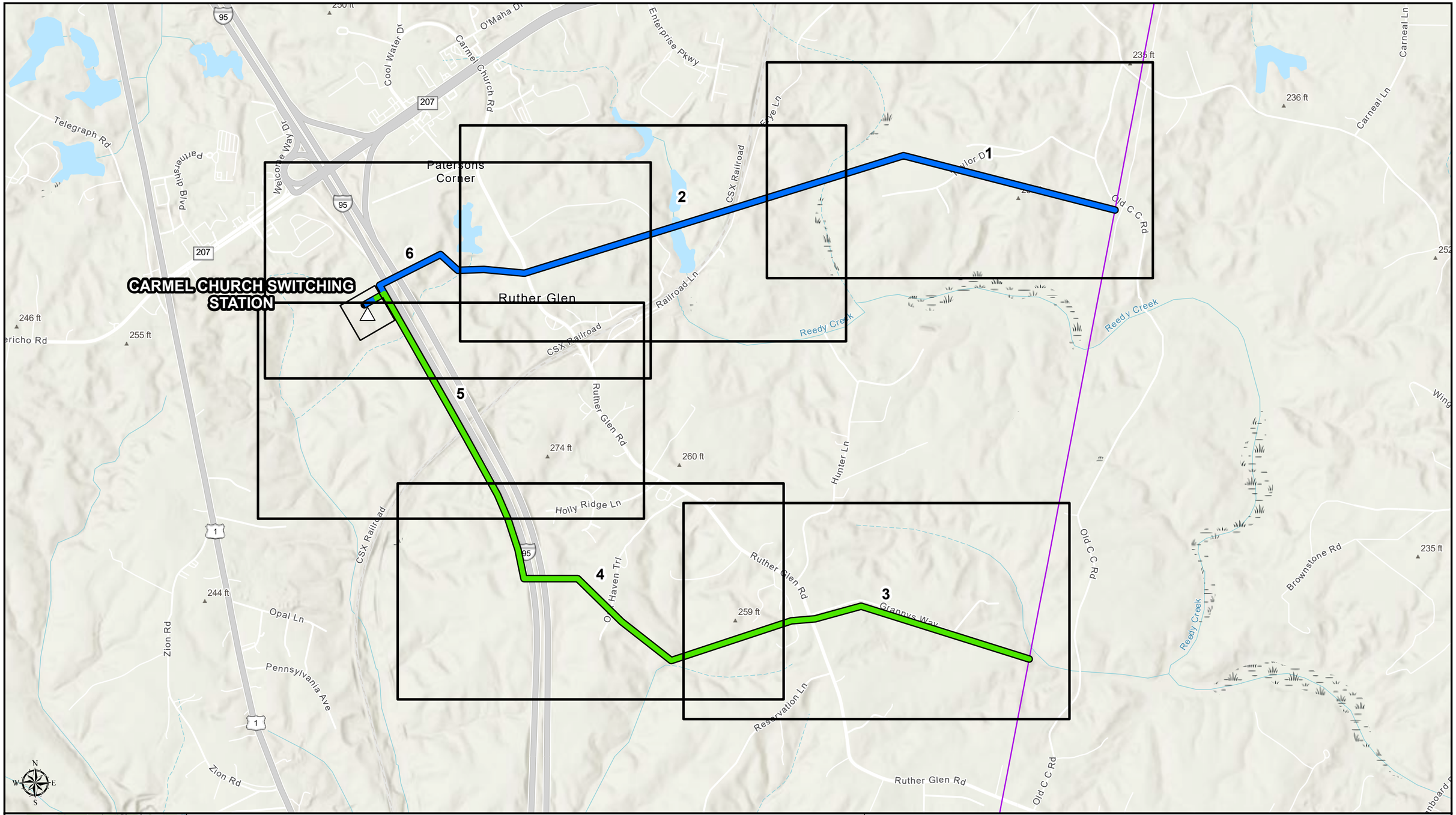
Land Ownership
Carmel Church 230 kV Electric Transmission Project

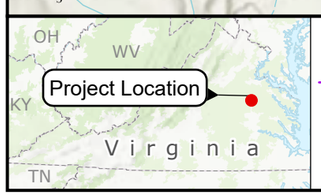
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

FIGURE 4.1-2 EXISTING LAND USE AND LAND COVER WITHIN 0.25 MILE OF THE ROUTES AND VARIATIONS





△ Proposed Swtiching Station

Existing Dominion Energy Electric Transmission Line

Route 1

Route 2

Index Page

0 600 1,200

Feet

1:18,000

Land Use/Land Cover Index

Carmel Church 230 kV Electric Transmission Project

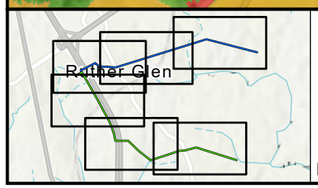
Dominion Energy Virginia

Caroline County, Virginia

ERM

Dominion Energy





Existing Dominion Energy Electric Transmission Line
Route 4 MP
Route 5 MP
Route 6 MP
Route 4
Route 5
Route 6

Note: All route Rights-of-Way are 100-foot wide

Land Use Classifications

- Agriculture
- Developed
- Forest
- Open Space
- Open Water
- Wetland

0 250 500
Feet

1:4,800

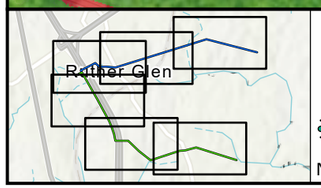
Land Use/Land Cover
Ruther Glen 230 kV Electric Transmission Project

Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy





Route 4 MP
Route 5 MP
Route 6 MP
Route 4
Route 5
Route 6

Land Use Classifications

Agriculture
Developed
Forest
Open Space
Open Water
Wetland

Note: All route Rights-of-Way are 100-foot wide

0 250 500
Feet

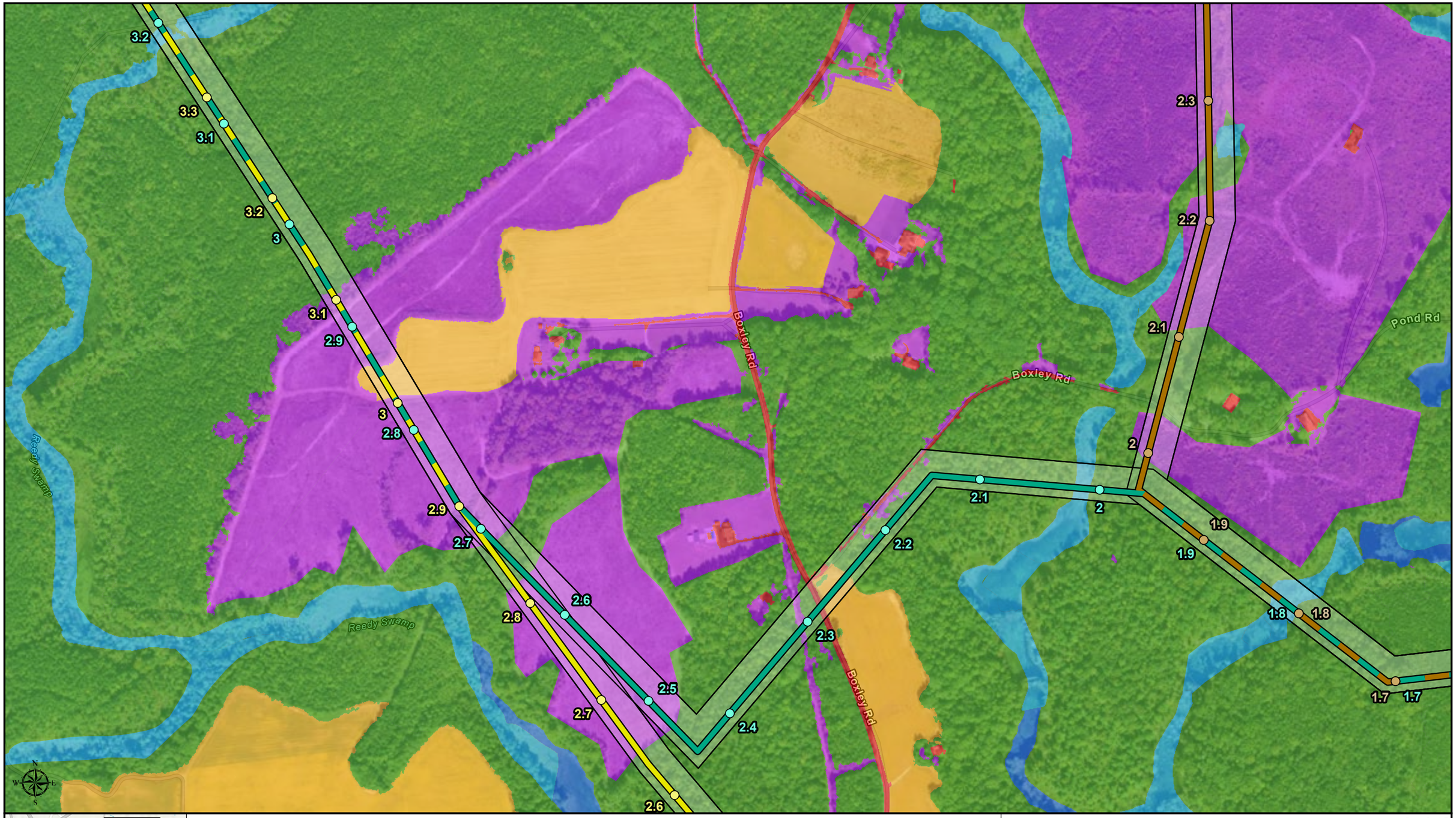
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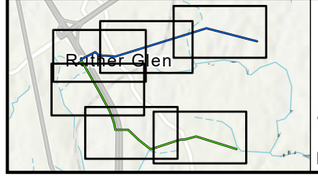
Land Use/Land Cover
Ruther Glen 230 kV Electric Transmission Project

Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy





Route 4 MP
Route 5 MP
Route 6 MP
Route 4
Route 5
Route 6

Land Use Classifications

Agriculture
Developed
Forest
Open Space
Open Water
Wetland

Note: All route Rights-of-Way are 100-foot wide

0 250 500
Feet

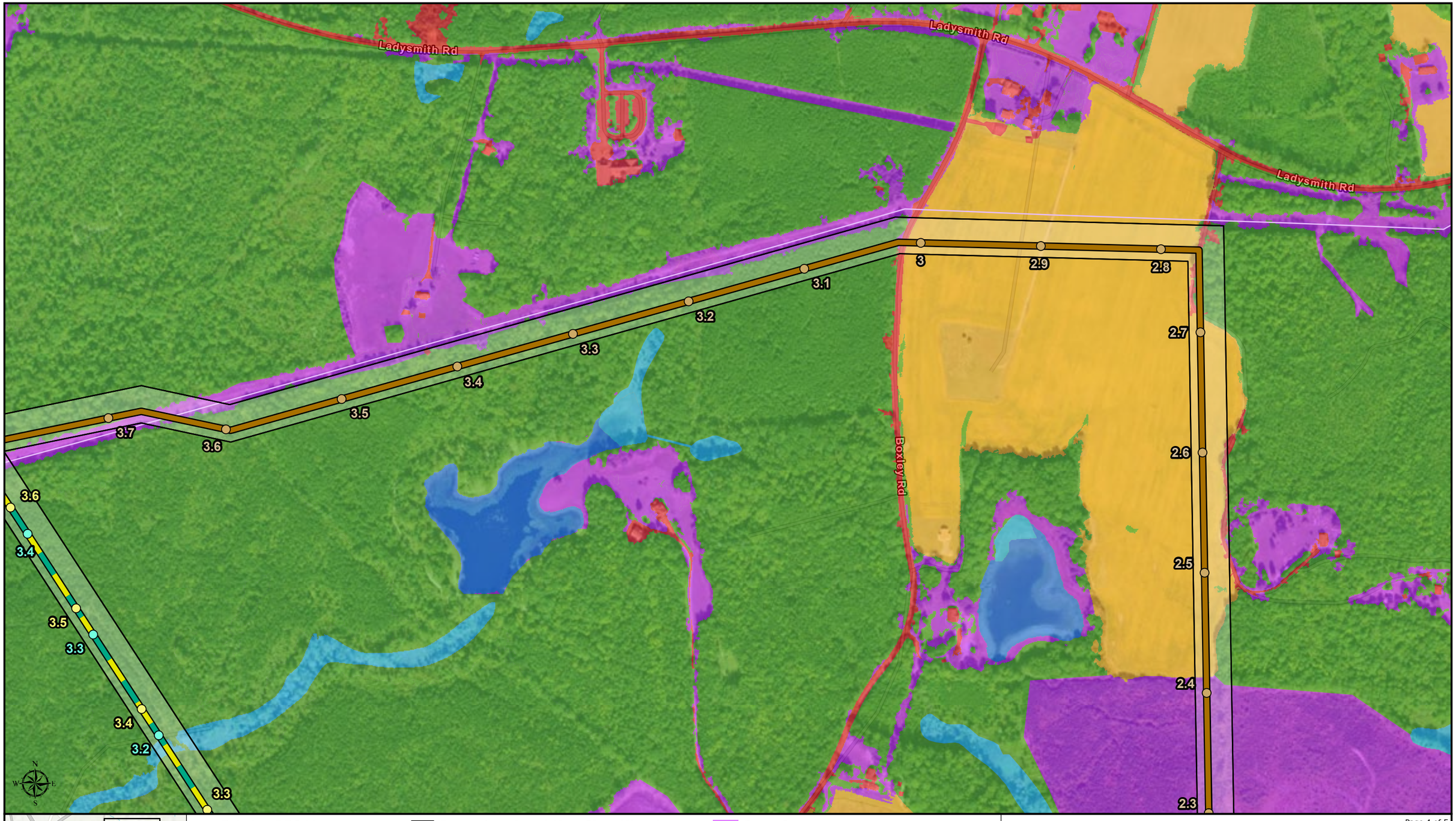
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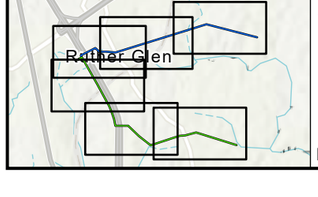
Land Use/Land Cover
Ruther Glen 230 kV Electric Transmission Project

Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy





Existing REC Line
Route 4 MP
Route 5 MP
Route 6 MP

Route 4
Route 5
Route 6

Land Use Classifications
Agriculture
Developed
Forest
Open Space
Open Water
Wetland

0 250 500
Feet
1:4,800

Note: All route Rights-of-Way are 100-foot wide

Land Use/Land Cover
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

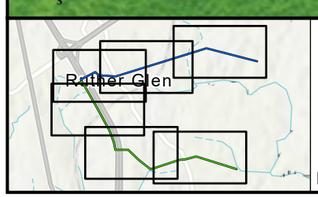
ERM

Dominion Energy

RUTHER
GLEN
SWITCHING STATION

4
3.8
3.6
3.9
3.7
3.5
3.7
3.8
3.6
3.5
3.6
3.4
3.5
3.3
3.4
3.2
3.3
3.1
3.2
3.4
3.5
3.6
3.7
3.3
3.1
3.2
3

N
W
E
S



△ Proposed Switching Station
Existing REC Line
Route 4 MP
Route 5 MP
Route 6 MP
Route 4
Route 5
Route 6

Land Use Classifications
Agriculture
Developed
Forest
Open Space
Open Water
Wetland

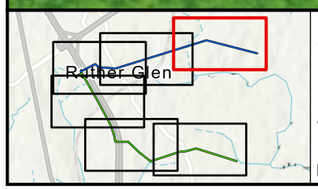
0 250 500
Feet
1:4,800

Note: All route Rights-of-Way are 100-foot wide

Land Use/Land Cover
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM
Dominion Energy





Existing Dominion Energy Electric Transmission Line
Route 1 MP
Route 1

Note: All route Rights-of-Way are 100-foot wide

Land Use Classifications

- Agriculture
- Developed
- Forest
- Open Space
- Open Water
- Wetland

0 250 500
Feet

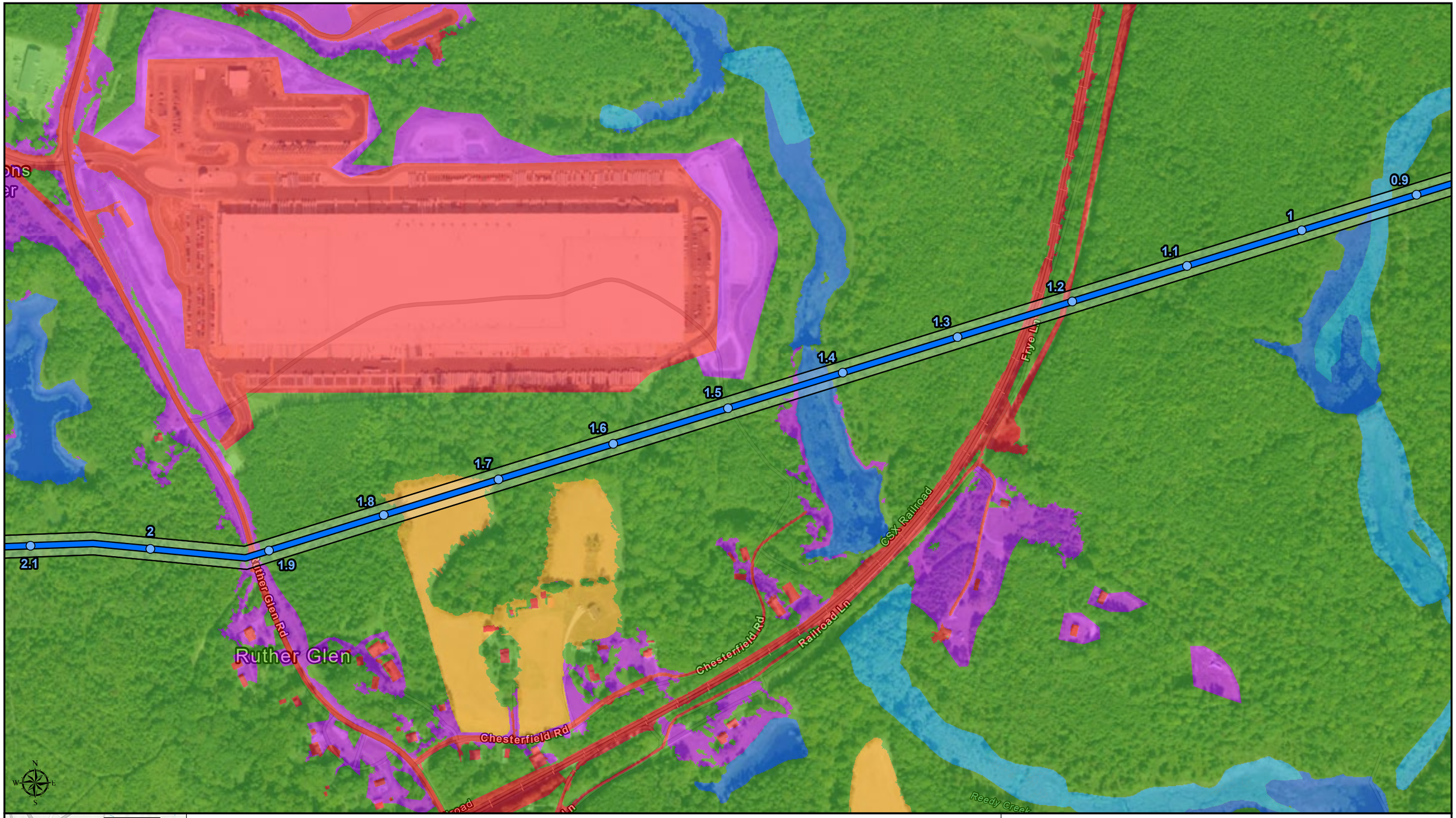
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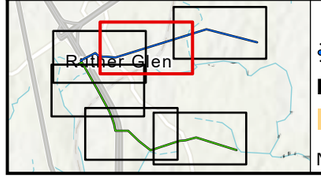
Land Use/Land Cover
Carmel Church 230 kV Electric Transmission Project

Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy





Route 1 MP

Route 1

Land Use Classifications

Agriculture

Developed

Forest

Open Space

Open Water

Wetland

Note: All route Rights-of-Way are 100-foot wide

0 250 500

Feet

1:4,800

Land Use/Land Cover

Carmel Church 230 kV Electric Transmission Project

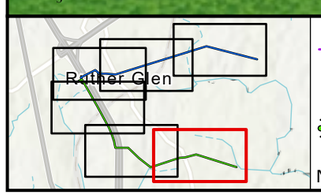
Dominion Energy Virginia

Caroline County, Virginia

ERM

Dominion Energy





Existing Dominion Energy Electric Transmission Line
Route 2 MP
Route 2

Note: All route Rights-of-Way are 100-foot wide

Land Use Classifications

- Agriculture
- Developed
- Forest
- Open Space
- Open Water
- Wetland

0 250 500
Feet

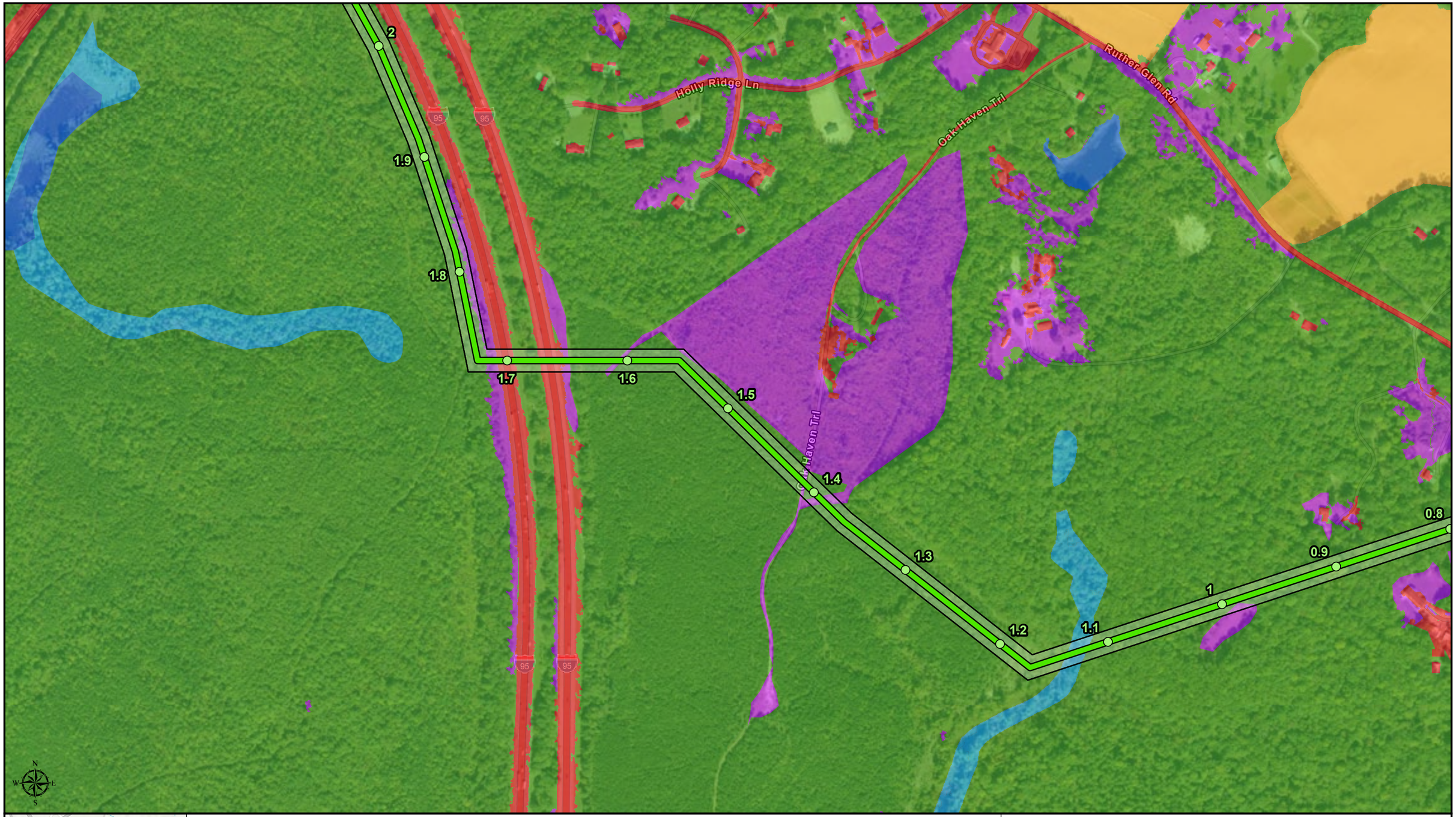
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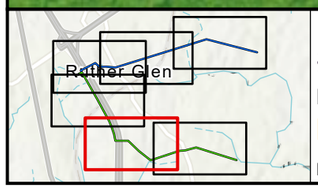
Land Use/Land Cover
Carmel Church 230 kV Electric Transmission Project

Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy





Route 2 MP
Route 2

Land Use Classifications

Agriculture
Developed
Forest
Open Space
Open Water
Wetland

Note: All route Rights-of-Way are 100-foot wide

0 250 500
Feet

1:4,800

Land Use/Land Cover
Carmel Church 230 kV Electric Transmission Project

Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

CARMEL
CHURCH SWITCHING STATION

2.6
2.5
2.4
2.3
2.2
2.1
2

Chesterfield Rd
CSX Railroad
Railroad Ln
Ruther Glen Rd
Holly Ridge Ln
CSX Railroad
95

N
W
E
S

Ruther Glen

Proposed Switching Station
Route 1 MP
Route 2 MP
Route 1
Route 2

Land Use Classifications
Agriculture
Developed
Forest
Open Space
Open Water
Wetland

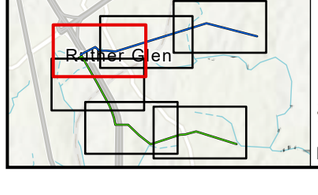
Note: All route Rights-of-Way are 100-foot wide

0 250 500
Feet
1:4,800

Land Use/Land Cover
Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM
Dominion Energy





Proposed Switching Station
Route 1 MP
Route 2 MP
Route 1
Route 2

Land Use Classifications

Agriculture
Developed
Forest
Open Space
Open Water

Note: All route Rights-of-Way are 100-foot wide

0 250 500
Feet

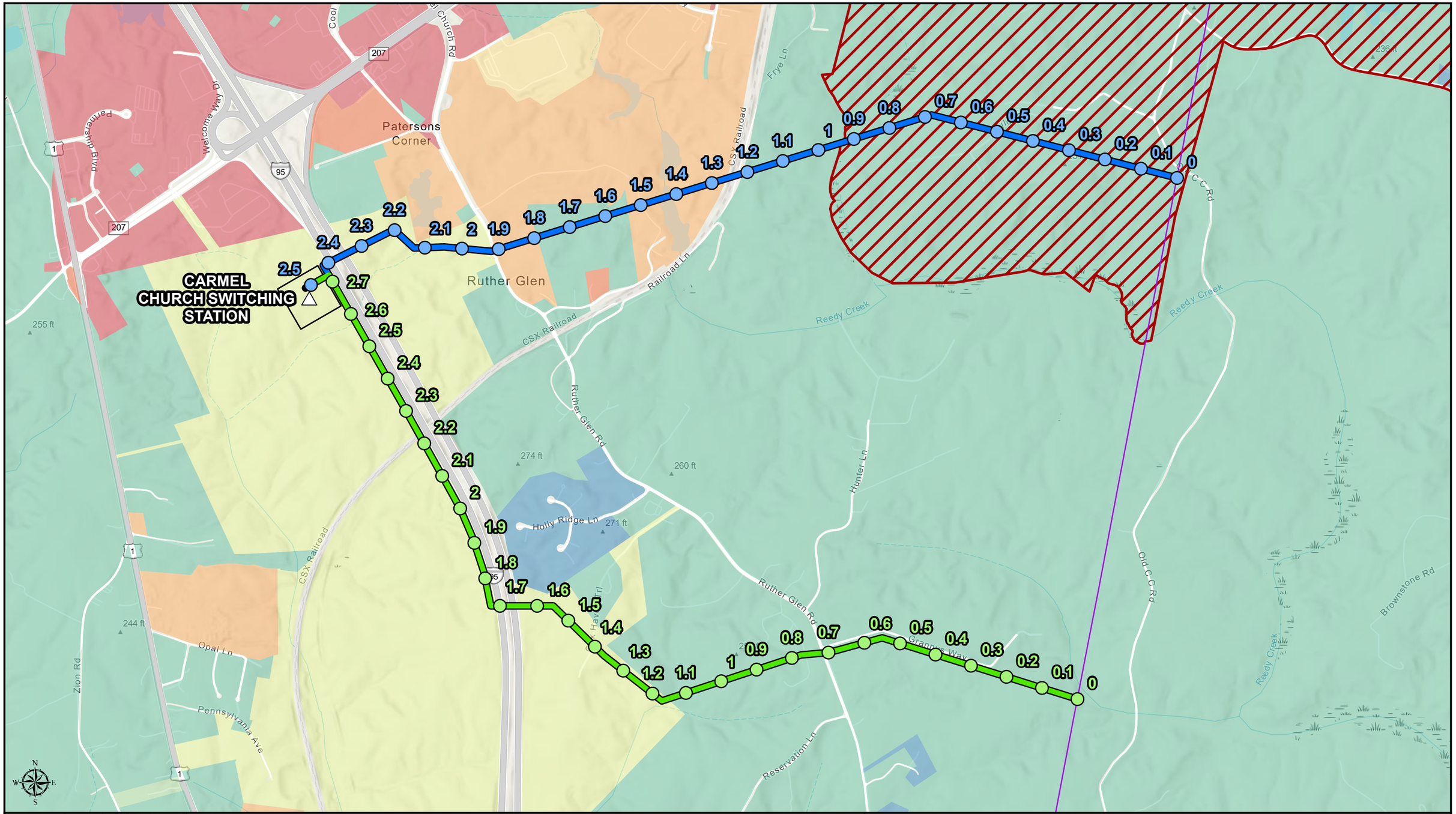
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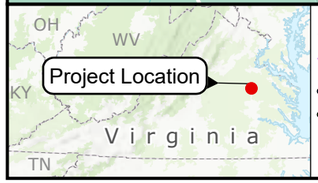
Land Use/Land Cover
Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

FIGURE 4.1-3 ZONING DISTRICTS WITHIN THE STUDY AREA





- Proposed Switching Station
- Existing Dominion Energy Electric Transmission Line
- Route 1
- Route 2

- Planned Innovation Research and Technology Area (PIRT)

Zoning Districts

- Business District
- Business District, Rural Preservation District
- Industrial District, Manufacturing
- Industrial District, Manufacturing, Rural Preservation District
- Planned Mixed Use Development
- Residential District, Low Density
- Rural Preservation District
- Rural Residential-2 District

0 600 1,200
Feet

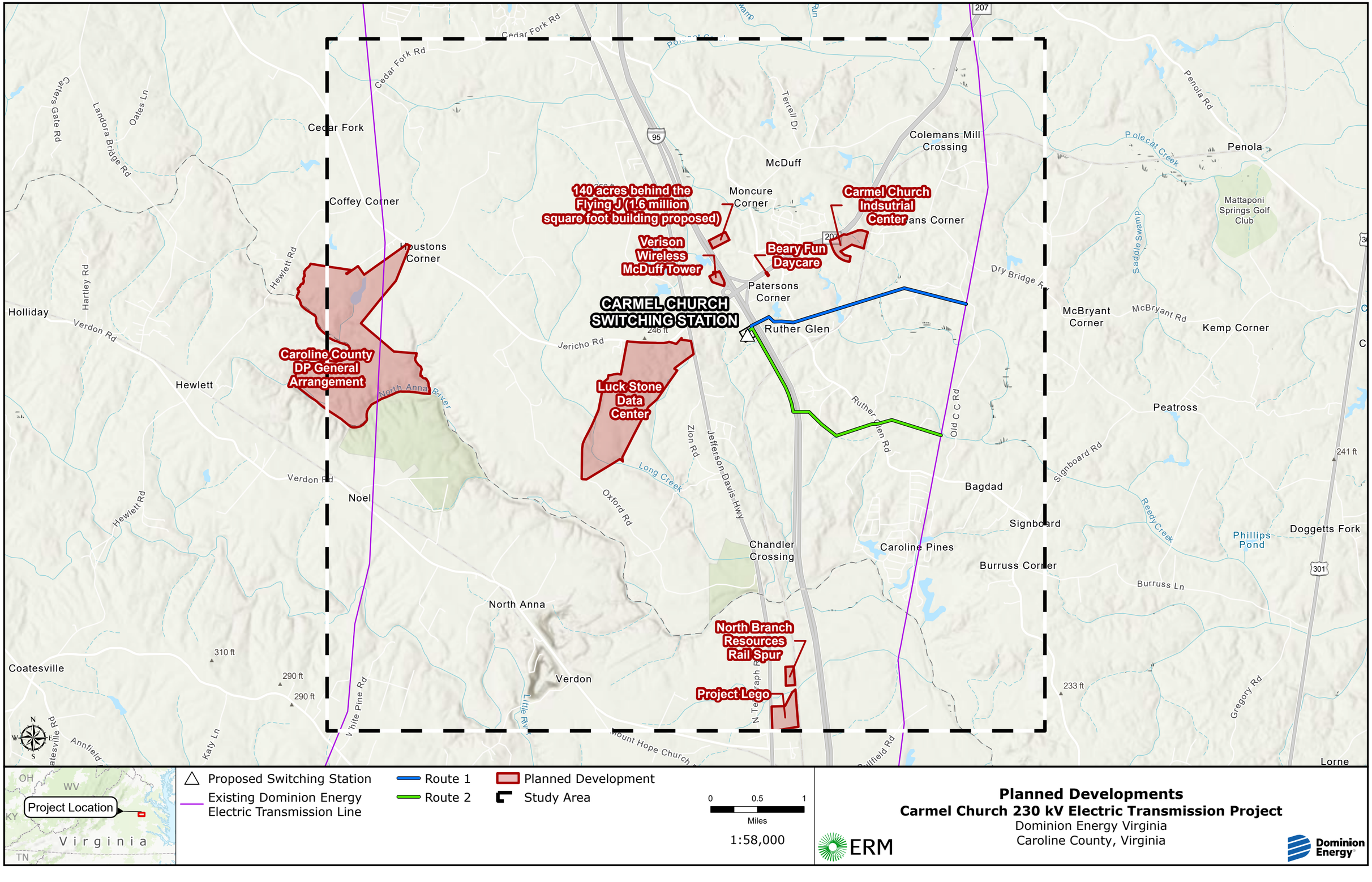
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Zoning Districts
Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

FIGURE 4.1-4 PLANNED DEVELOPMENTS



Planned Developments

Carmel Church 230 kV Electric Transmission Project

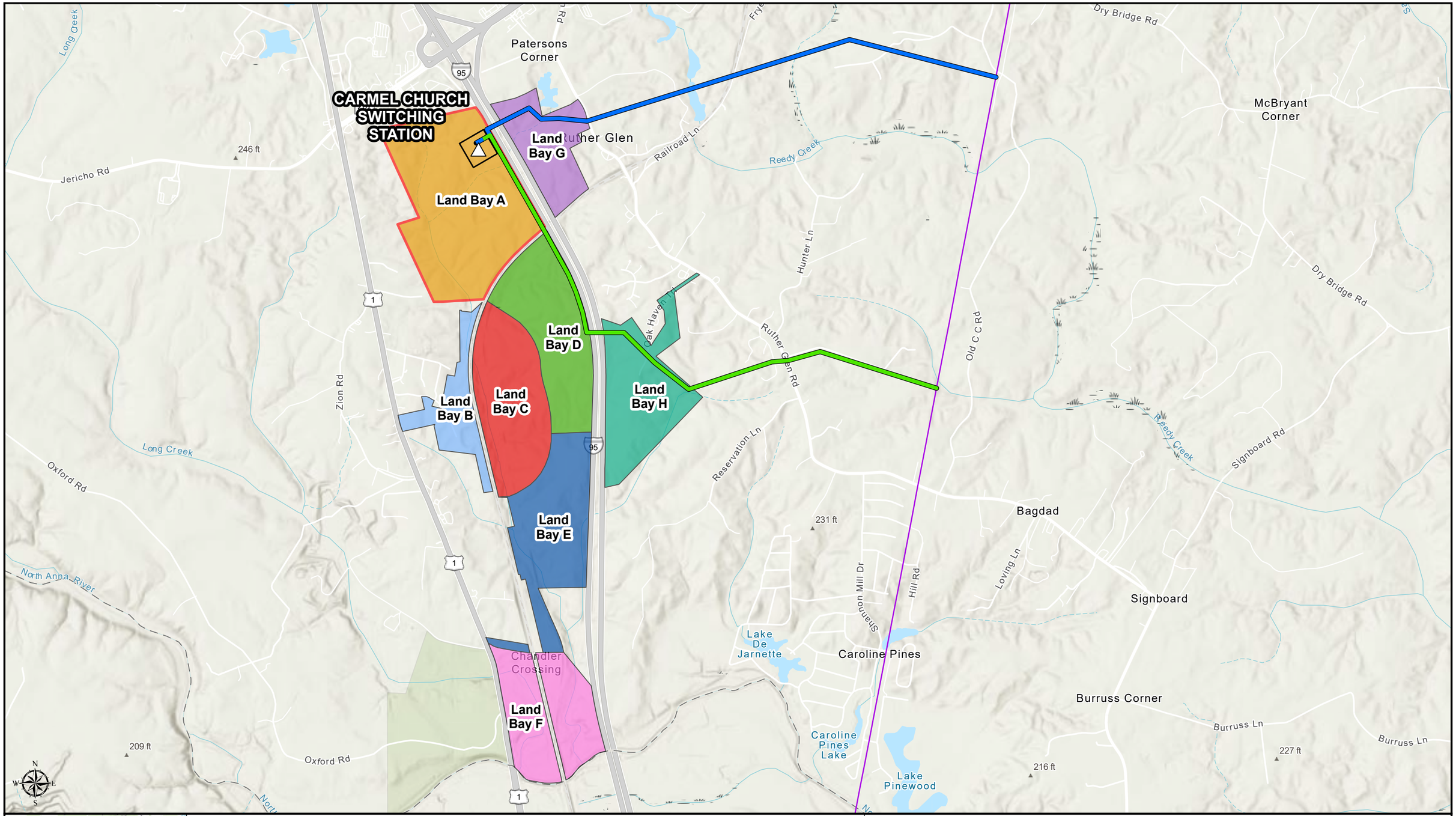
Dominion Energy Virginia

Caroline County, Virginia

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FIGURE 4.1-5 CARMEL CHURCH DATA HUB LAND BAYS

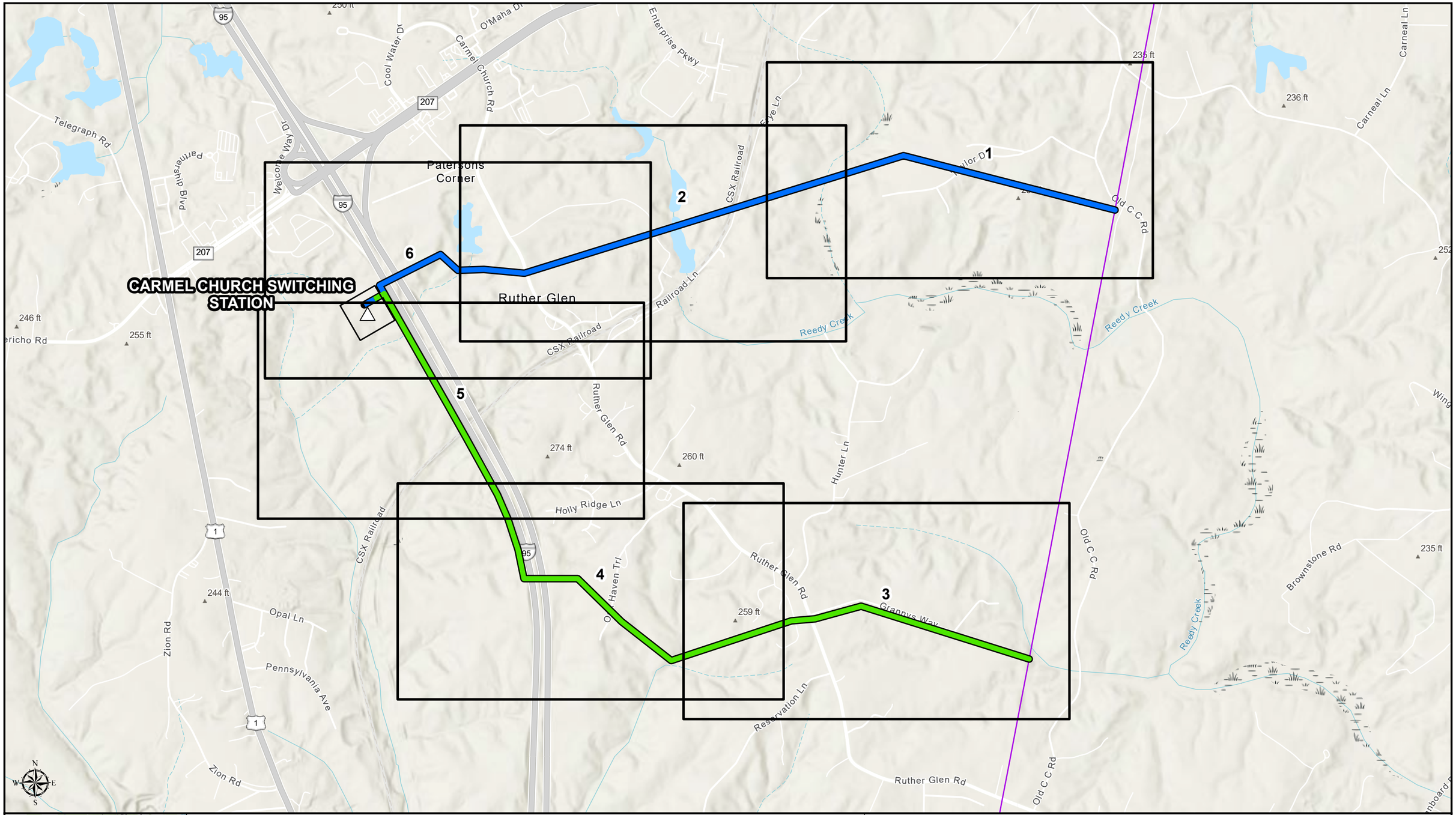


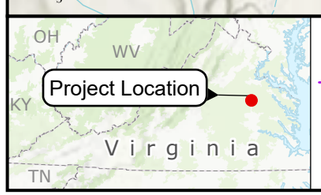
Carmel Church Data Hub Land Bays
Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

FIGURE 4.1-6 EXISTING RESIDENTIAL AND NON-RESIDENTIAL STRUCTURES WITHIN 500 FEET OF ROUTES





△ Proposed Swtiching Station

Existing Dominion Energy Electric Transmission Line

Route 1

Route 2

Index Page

0 600 1,200

Feet

1:18,000

Existing Residential and Non-Residential Structures within 500 feet of Routes Index

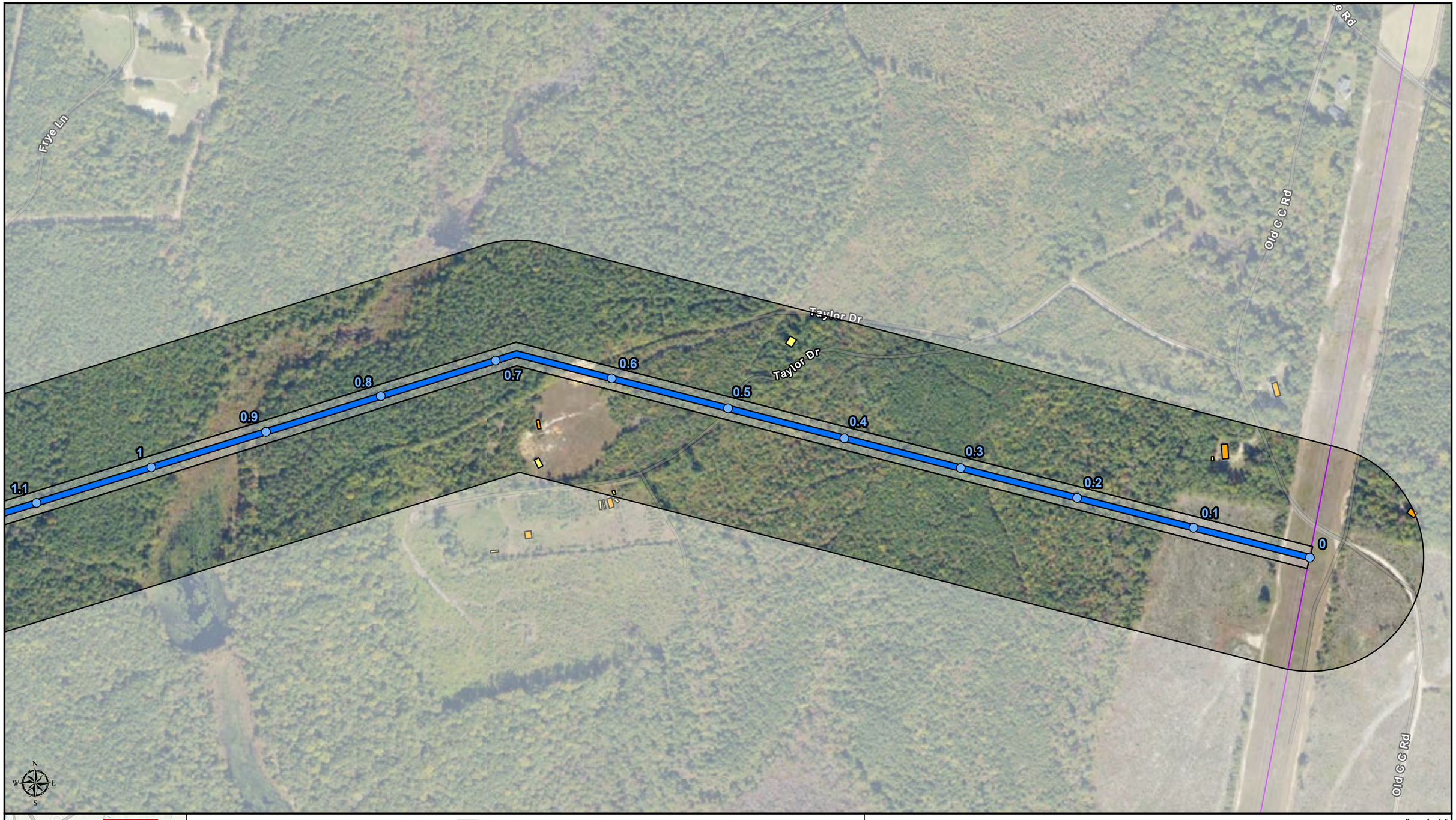
Carmel Church 230 kV Electric Transmission Project

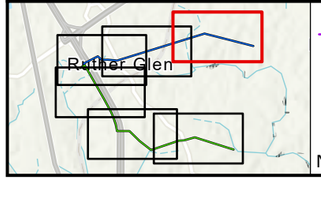
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Existing Dominion Energy Electric Transmission Line

Route 1 MP

Route 1

Outbuilding

Residential

Note: All route Rights-of-Way are 100-foot wide

0 250 500

Feet

1:4,800

Existing Residential and Non-Residential Structures within 500 feet of Routes

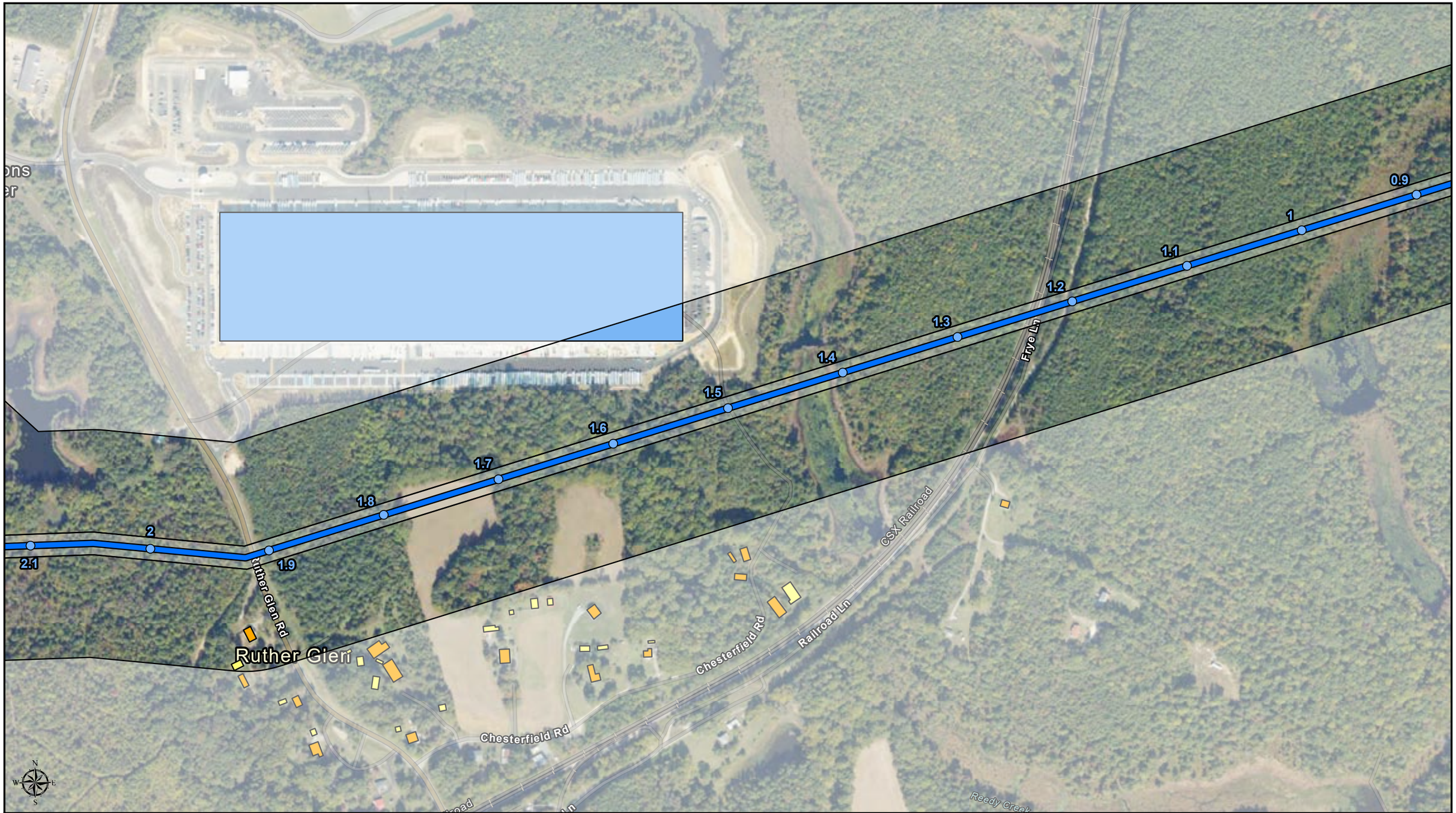
Carmel Church 230 kV Electric Transmission Project

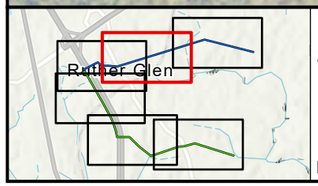
Dominion Energy Virginia

Caroline County, Virginia

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Route 1 MP
Route 1
Commercial
Outbuilding
Residential

Note: All route Rights-of-Way are 100-foot wide

0 250 500
Feet

1:4,800

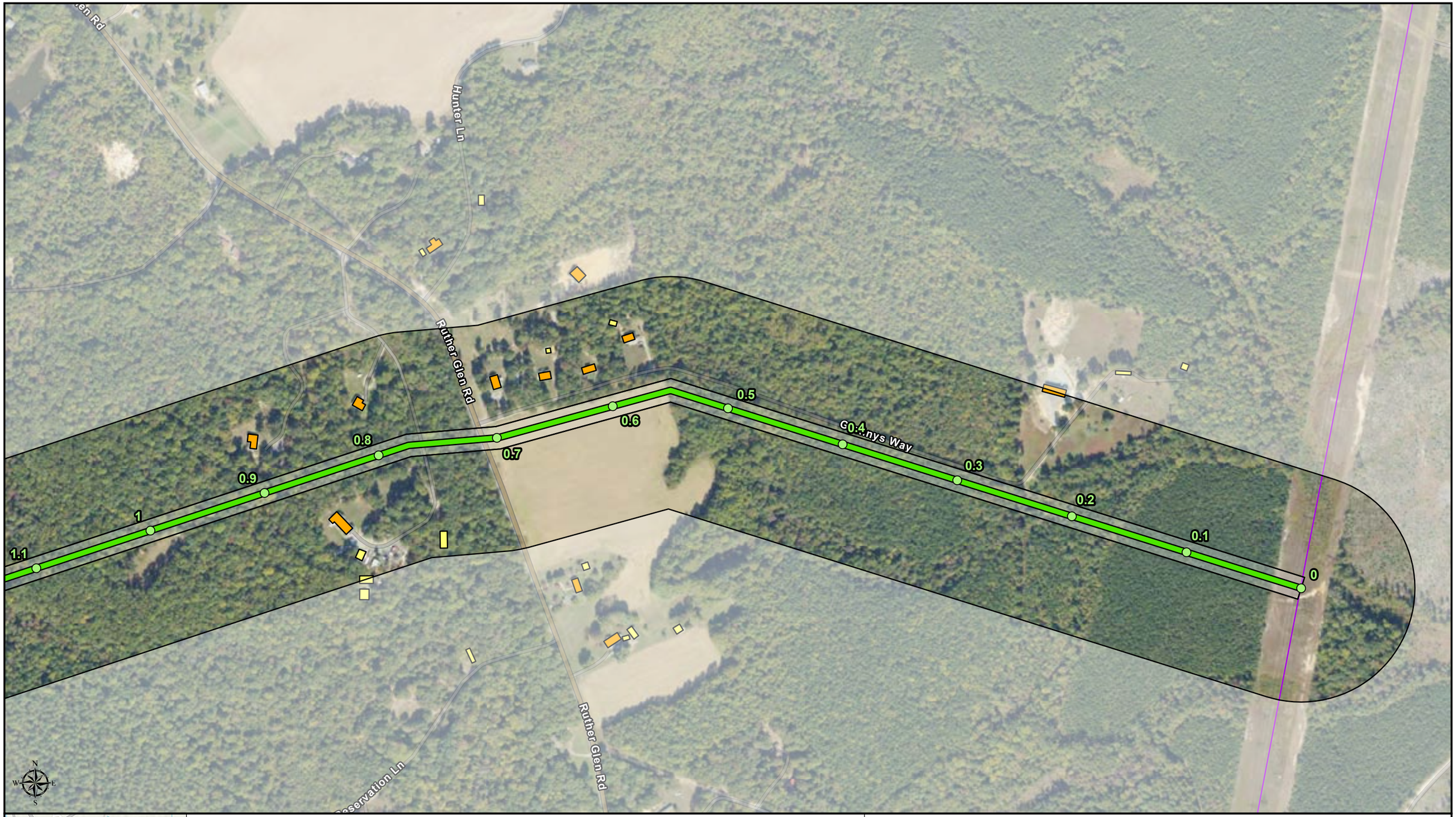
Existing Residential and Non-Residential Structures within 500 feet of Routes

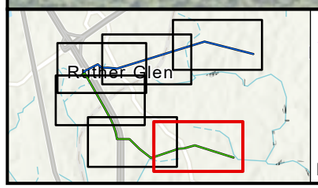
Carmel Church 230 kV Electric Transmission Project

Dominion Energy Virginia
Caroline County, Virginia

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Dominion Energy





Existing Dominion Energy Electric Transmission Line

Route 2 MP

Route 2

Outbuilding

Residential

Note: All route Rights-of-Way are 100-foot wide

0 250 500

Feet

1:4,800

Existing Residential and Non-Residential Structures within 500 feet of Routes

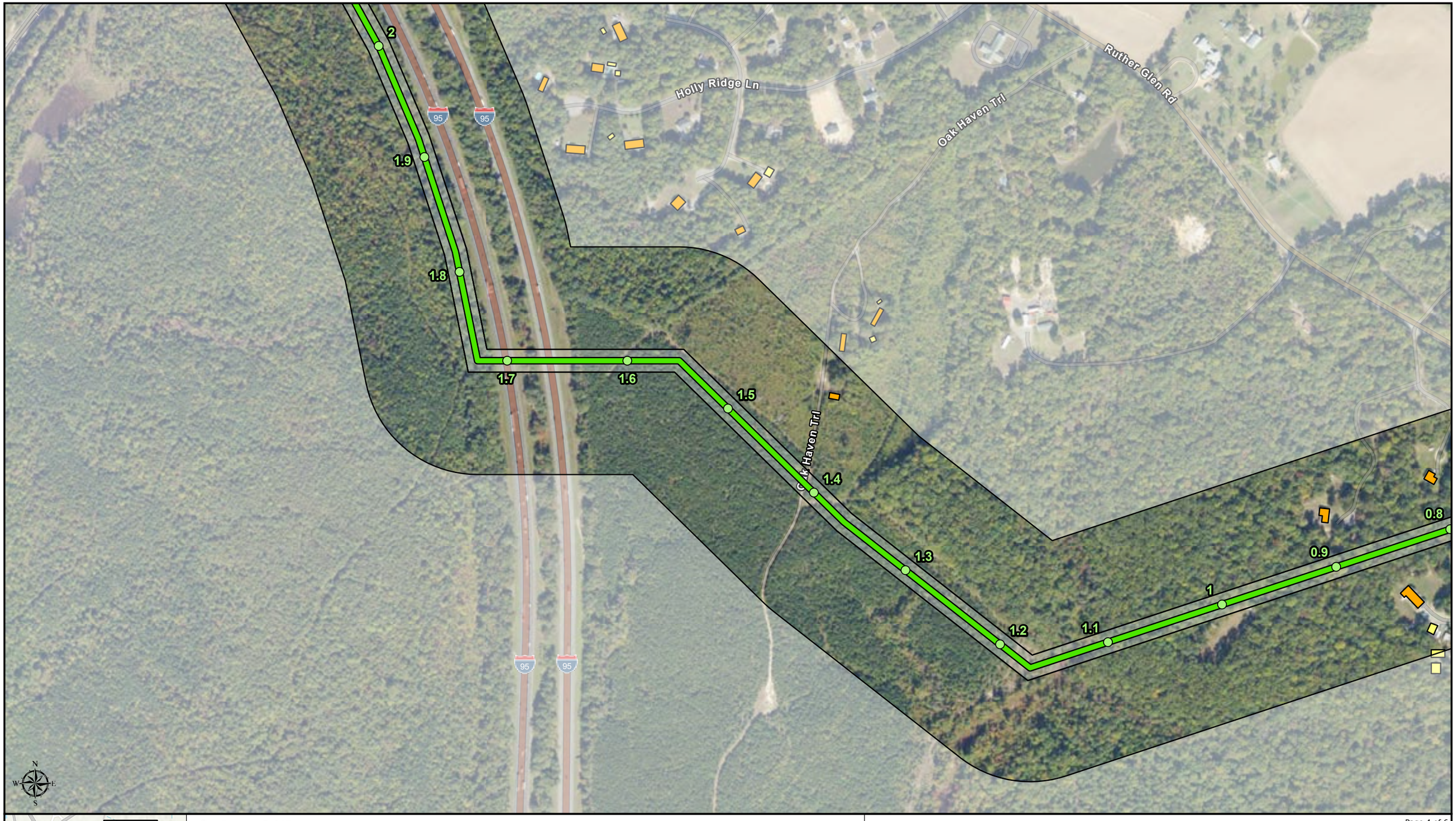
Carmel Church 230 kV Electric Transmission Project

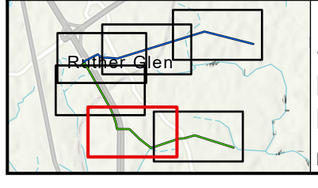
Dominion Energy Virginia

Caroline County, Virginia

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Dominion Energy





Route 2 MP
Route 2
Outbuilding
Residential

Note: All route Rights-of-Way are 100-foot wide

0 250 500
Feet

1:4,800

Existing Residential and Non-Residential Structures within 500 feet of Routes

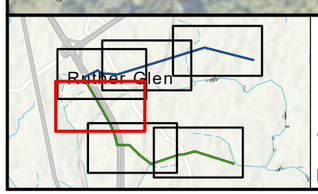
Carmel Church 230 kV Electric Transmission Project

Dominion Energy Virginia
Caroline County, Virginia

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Dominion Energy





Proposed Switching Station
Route 1 MP
Route 2 MP
Route 1
Route 2
Outbuilding
Residential

Note: All route Rights-of-Way are 100-foot wide

0 250 500
Feet

1:4,800

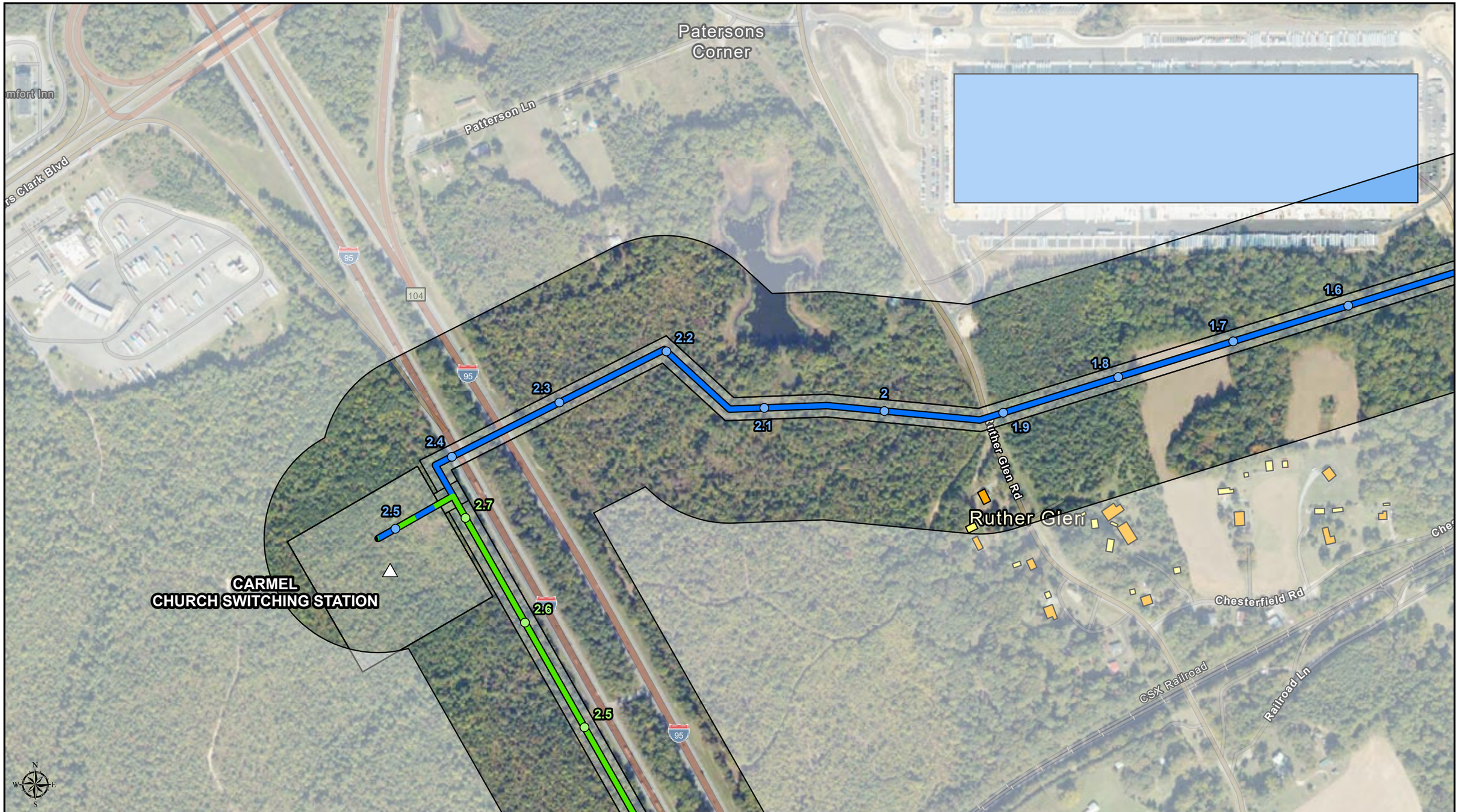
Existing Residential and Non-Residential Structures within 500 feet of Routes

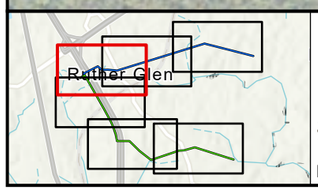
Carmel Church 230 kV Electric Transmission Project

Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy





- Proposed Switching Station
- Route 1 MP
- Route 2 MP
- Route 1
- Route 2
- Commercial
- Outbuilding
- Residential

Note: All route Rights-of-Way are 100-foot wide

0 250 500
Feet

1:4,800

Existing Residential and Non-Residential Structures within 500 feet of Routes

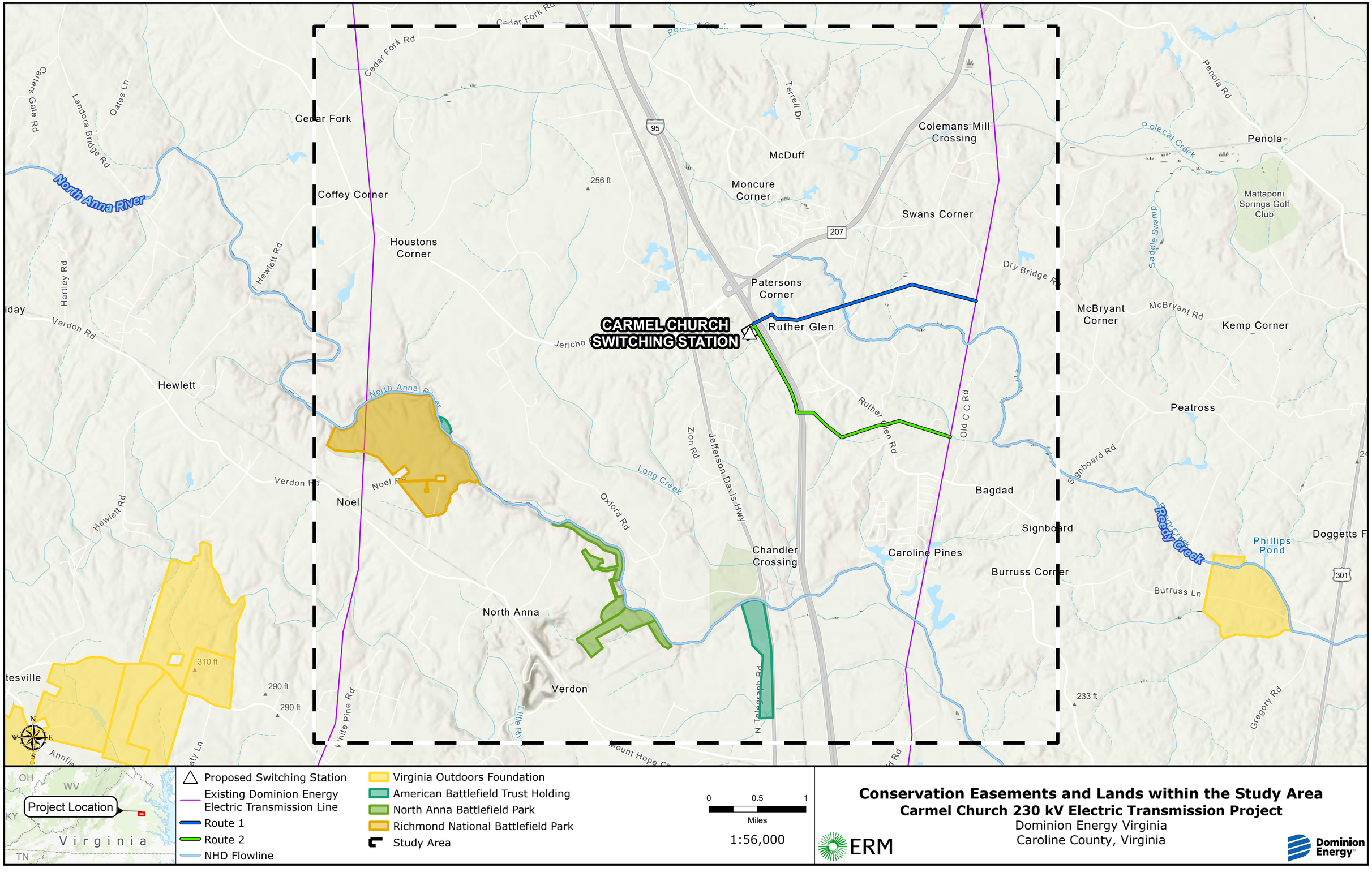
Carmel Church 230 kV Electric Transmission Project

Dominion Energy Virginia
Caroline County, Virginia

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Dominion Energy

FIGURE 4.1-7 CONSERVATION EASEMENTS AND LANDS WITHIN THE STUDY AREA



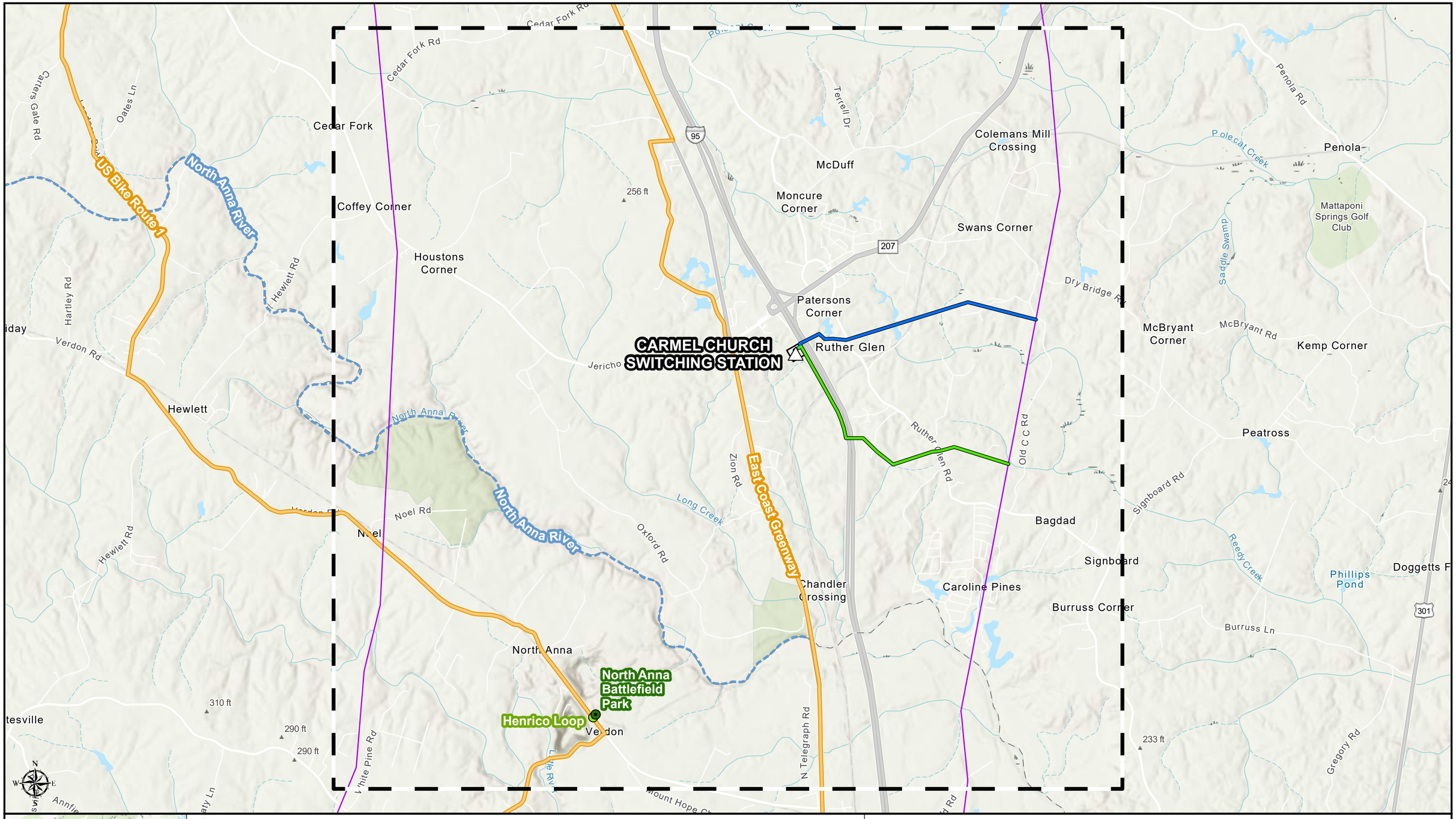
Conservation Easements and Lands within the Study Area
Carmel Church 230 kV Electric Transmission Project

Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

FIGURE 4.1-8 EXISTING AND PLANNED RECREATIONAL RESOURCES WITHIN THE STUDY AREA



Existing and Planned Recreational Resources within the Study Area

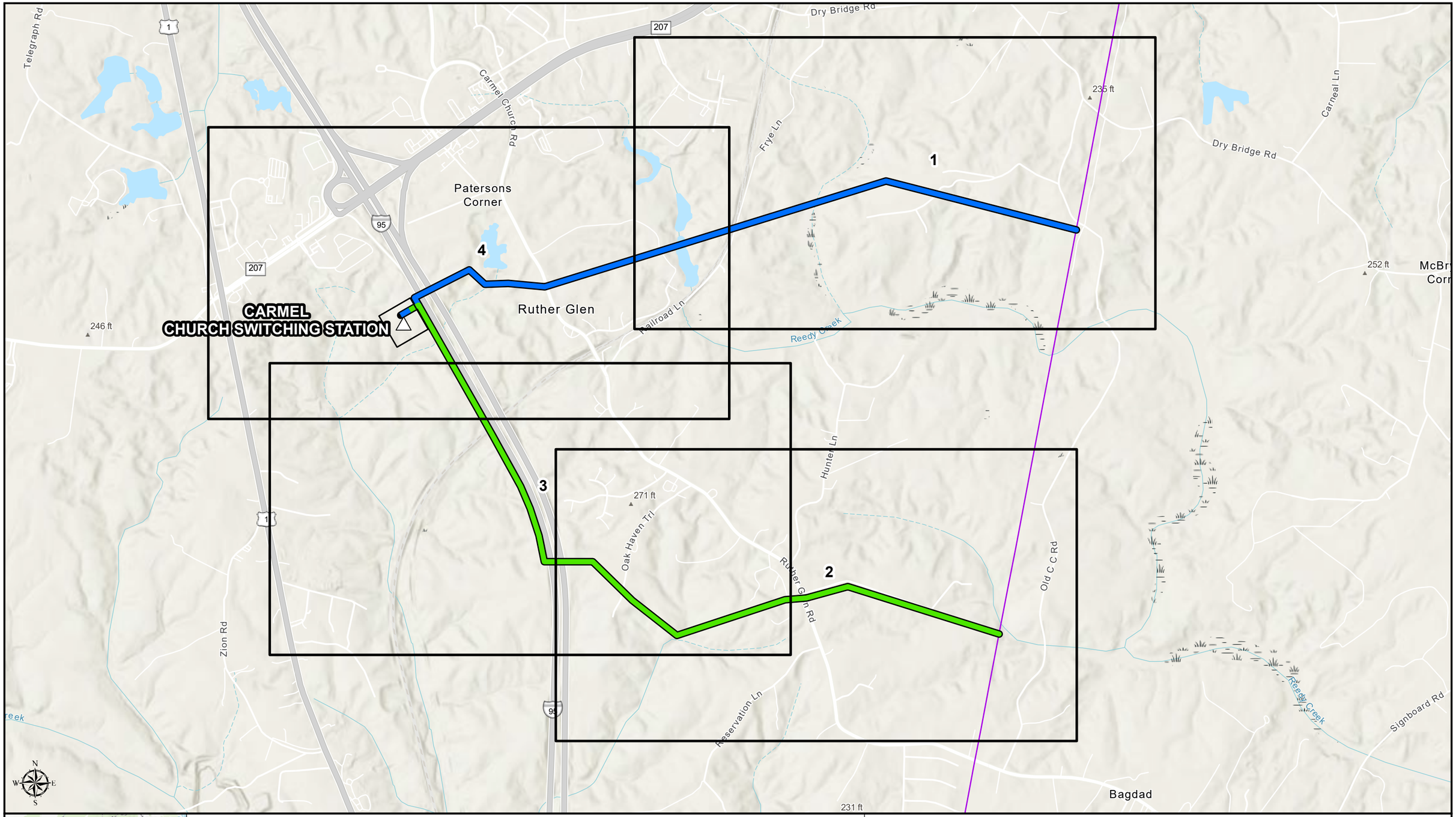
Carmel Church 230 kV Electric Transmission Project

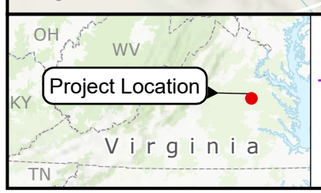
Dominion Energy Virginia
Caroline County, Virginia

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Dominion Energy

FIGURE 4.1-9 CEMETERIES, SCHOOLS, AND PLACES OF WORSHIP





△ Proposed Switching Station

Existing Dominion Energy Electric Transmission Line

Route 1

Route 2

Index Page

0 1,000 2,000

Feet

1:20,000

Cemeteries, Schools, and Places of Worship Index

Carmel Church 230 kV Electric Transmission Project

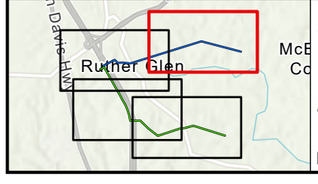
Dominion Energy Virginia

Caroline County, Virginia

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Dominion Energy





Existing Dominion Energy Electric Transmission Line
Route 1 MP
Route 1

Cemetery
500-ft Buffer
0.25-Mile Buffer

Note: All route Rights-of-Way are 100-foot wide

0 300 600
Feet

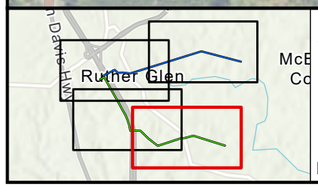
1:7,200

Cemeteries, Schools, and Places of Worship
Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy





Existing Dominion Energy Electric Transmission Line

Route 2 MP

Route 2

Cemetery

Place of Worship

500-ft Buffer

0.25-Mile Buffer

Note: All route Rights-of-Way are 100-foot wide

0 300 600

Feet

1:7,200

Cemeteries, Schools, and Places of Worship

Carmel Church 230 kV Electric Transmission Project

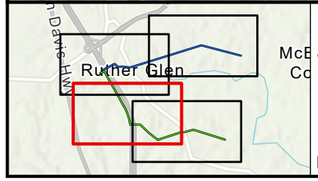
Dominion Energy Virginia

Caroline County, Virginia

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Route 2 MP
Route 2

Cemetery
Place of Worship

500-ft Buffer
0.25-Mile Buffer

0 300 600
Feet

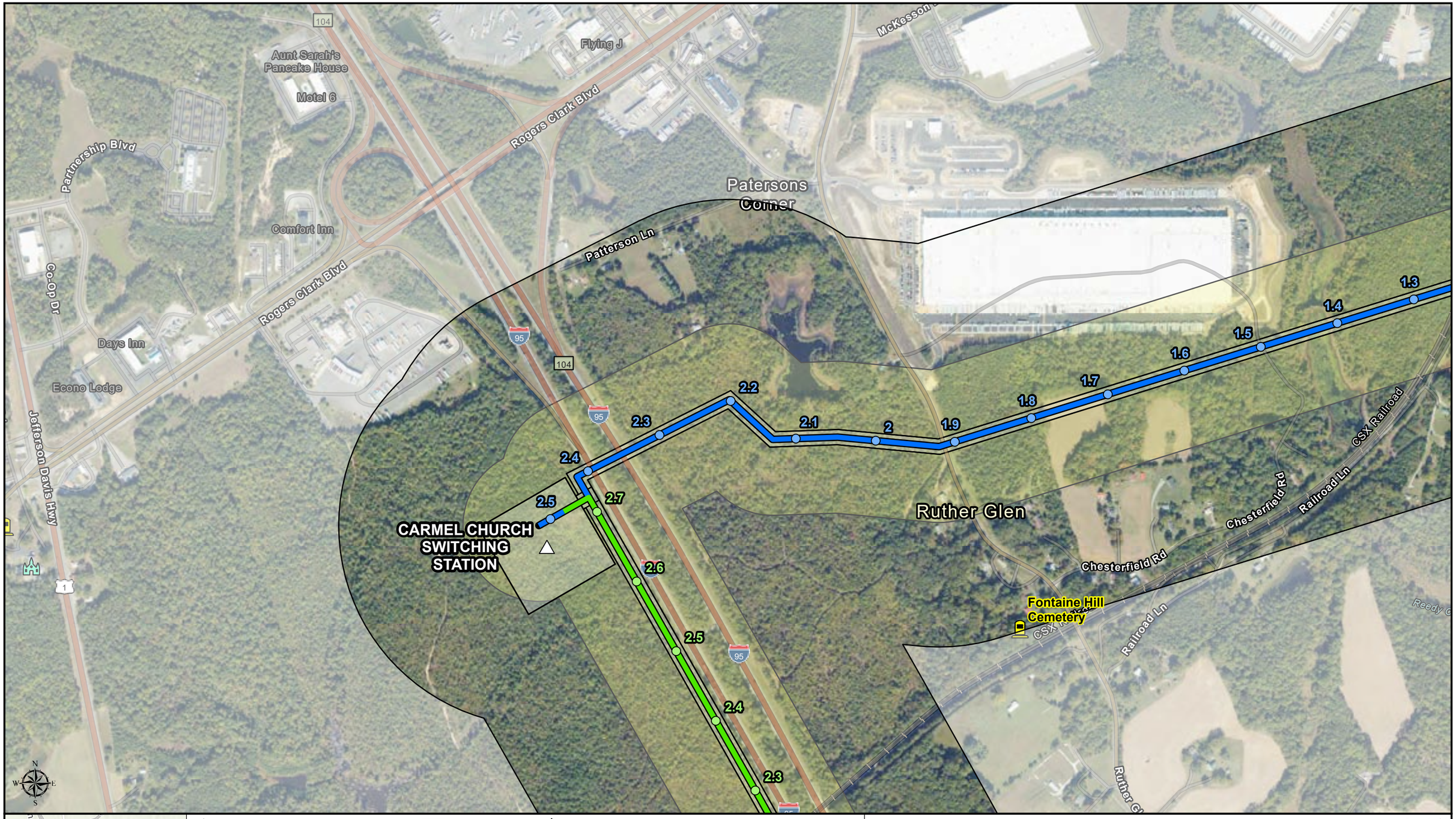
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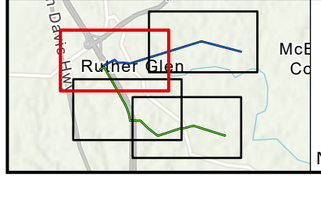
Note: All route Rights-of-Way are 100-foot wide

Cemeteries, Schools, and Places of Worship
Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy





- Proposed Switching Station
- Route 1 MP
- Route 2 MP
- Route 1
- Route 2
- Cemetery
- Place of Worship
- 500-ft Buffer
- 0.25-Mile Buffer

0 300 600
Feet

1:7,200

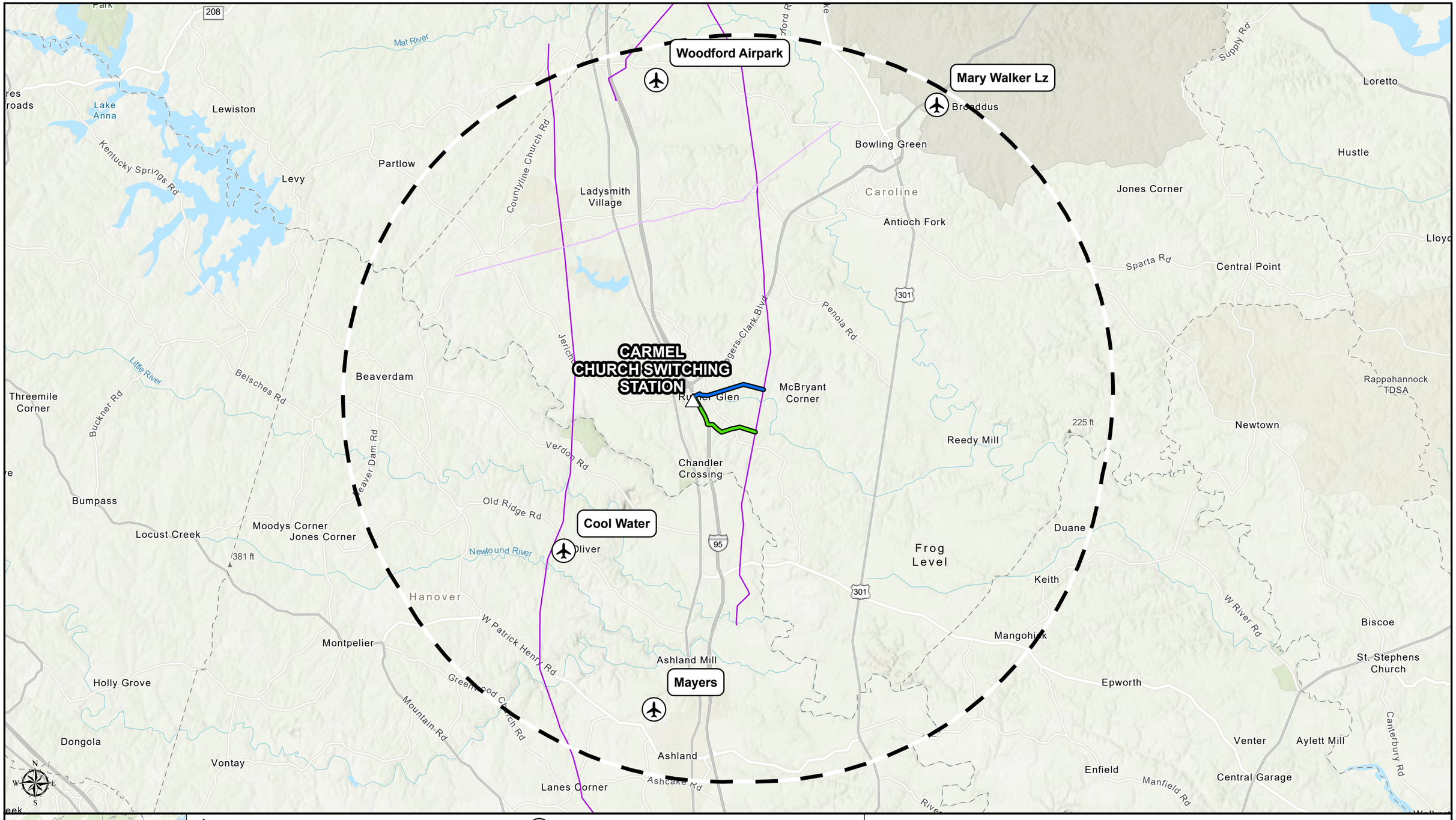
Note: All route Rights-of-Way are 100-foot wide

Cemeteries, Schools, and Places of Worship
Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

FIGURE 4.1-10 AVIATION FACILITIES WITHIN 10 NAUTICAL MILES OF THE PROJECT



Aviation Facilities Within 10 Nautical Miles of Project
Carmel Church 230 kV Electric Transmission Project

Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

FIGURE 4.2-1 NWI WETLANDS, NHD WATERBODIES, AND HUC 10 WATERSHEDS IN THE STUDY AREA

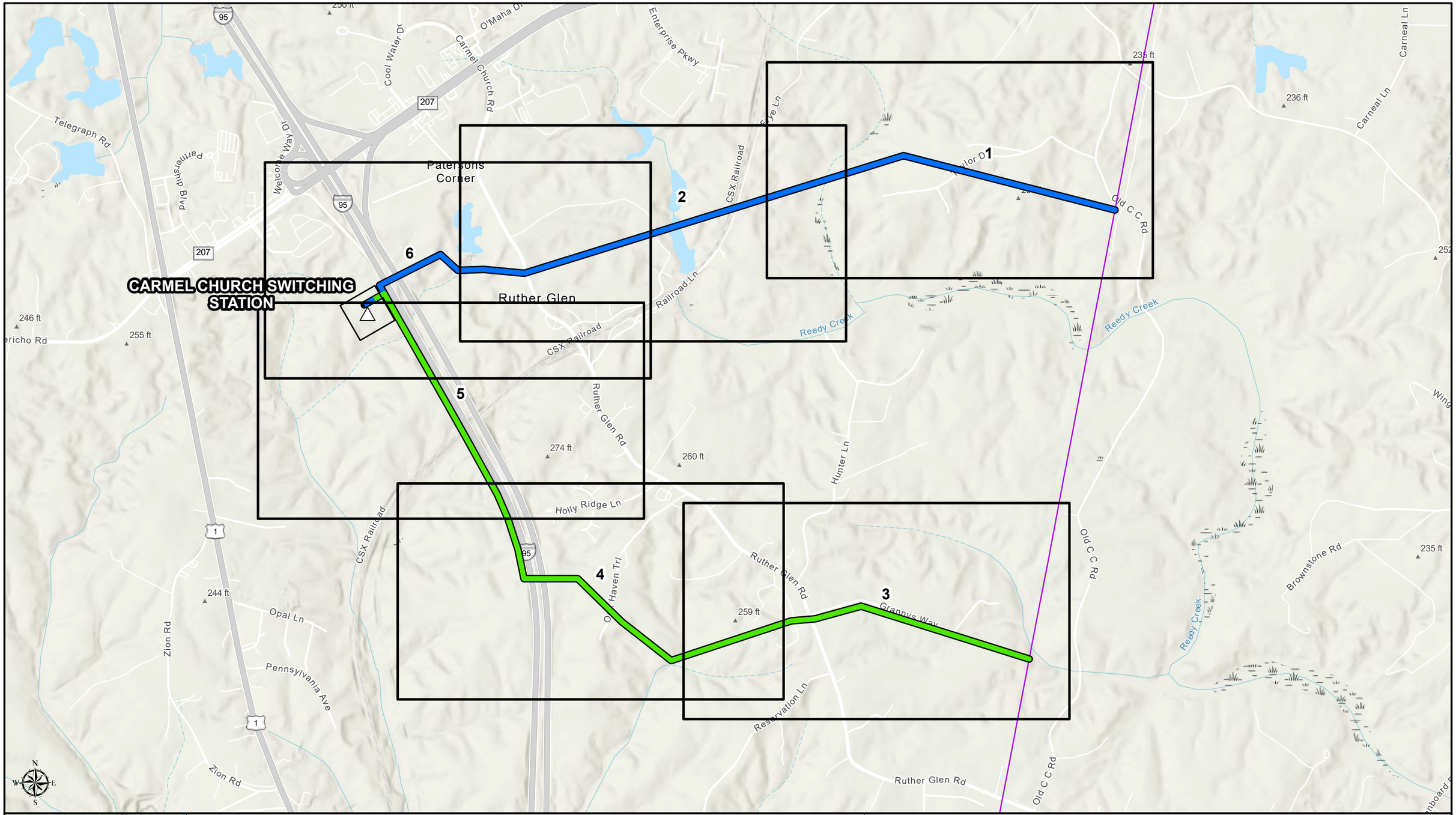


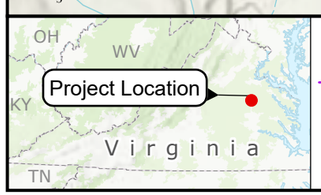
NWI Wetlands, NHD Waterbodies, and HUC 10 Watersheds in the Study Area
Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

FIGURE 4.2-2 NWI WETLANDS, NHD WATERBODIES, AND HUC 10 WATERSHEDS





△ Proposed Switching Station

Existing Dominion Energy Electric Transmission Line

Route 1

Route 2

Index Page

0 600 1,200

Feet

1:18,000

NWI Wetlands, NHD Waterbodies, and HUC 10 Watersheds Index

Carmel Church 230 kV Electric Transmission Project

Dominion Energy Virginia

Caroline County, Virginia

ERM

Dominion Energy

RUTHER GLEN SWITCHING STATION

1

2

3

4

5

Project Location

OH
WV
KY
Virginia
TN

△ Proposed Switching Station
Existing Dominion Energy Electric Transmission Line
Existing REC Line
Route 4
Route 5
Route 6
Index Page

0 600 1,200
Feet
1:18,000

NWI Wetlands, NHD Waterbodies, and HUC 10 Watersheds Index

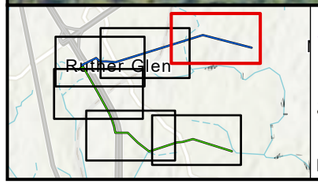
Ruther Glen 230 kV Electric Transmission Project

Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy





Existing Dominion Energy Electric Transmission Line
Route 1 MP
Route 1

Note: All route Rights-of-Way are 100-foot wide

NHD Flowline

NWI Wetland

Freshwater Emergent Wetland
Freshwater Forested/Shrub Wetland
Freshwater Pond
Riverine
HUC 10 Watershed

0 250 500
Feet

1:4,800

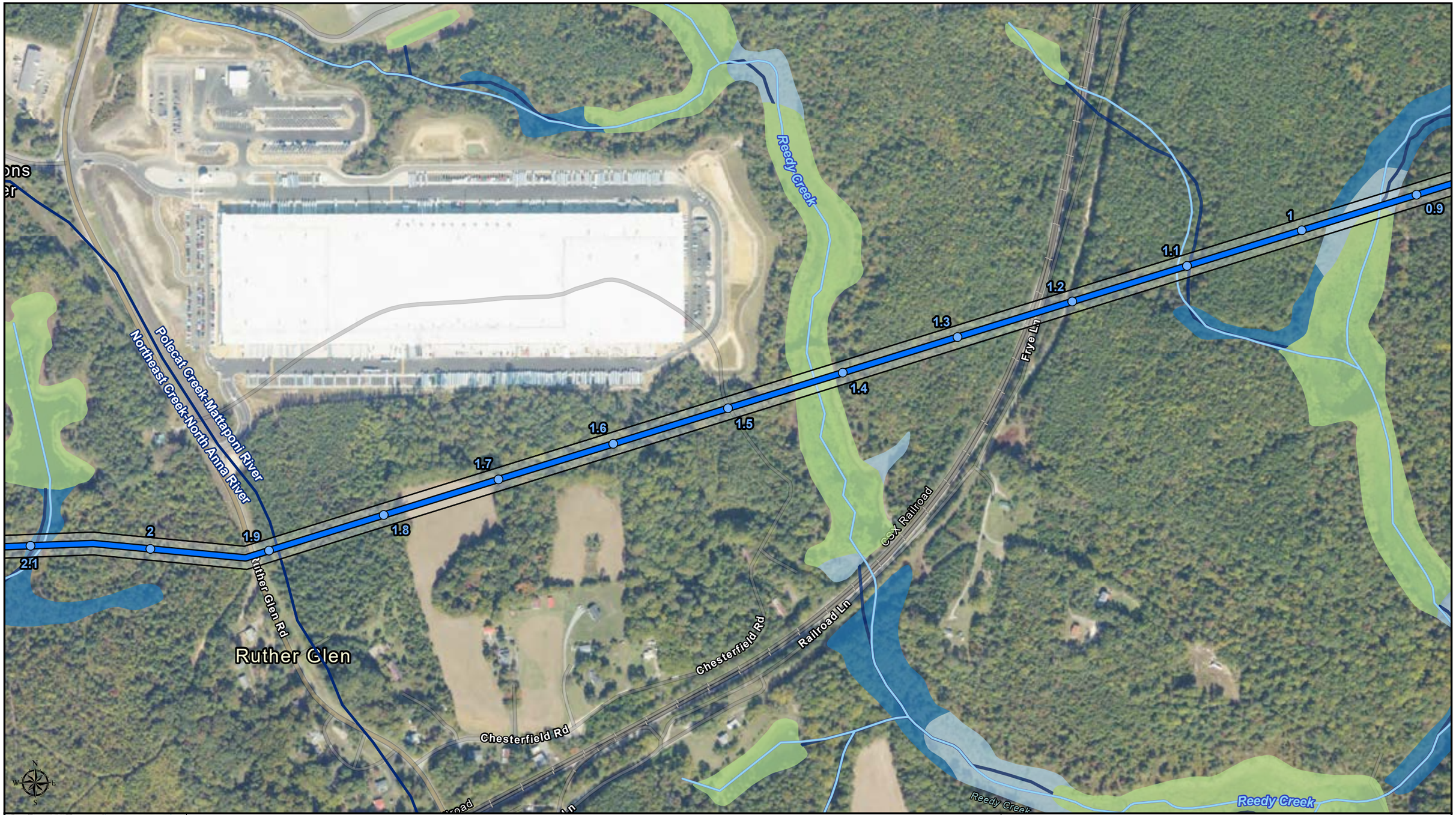
NWI Wetlands, NHD Waterbodies, and HUC 10 Watersheds

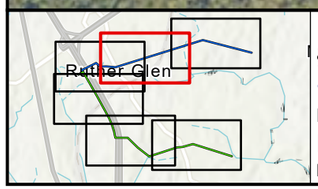
Carmel Church 230 kV Electric Transmission Project

Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy





- Route 1 MP
- Route 1
- NHD Flowline

NWI Wetland

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Riverine
- HUC 10 Watershed

Note: All route Rights-of-Way are 100-foot wide

0 250 500
Feet

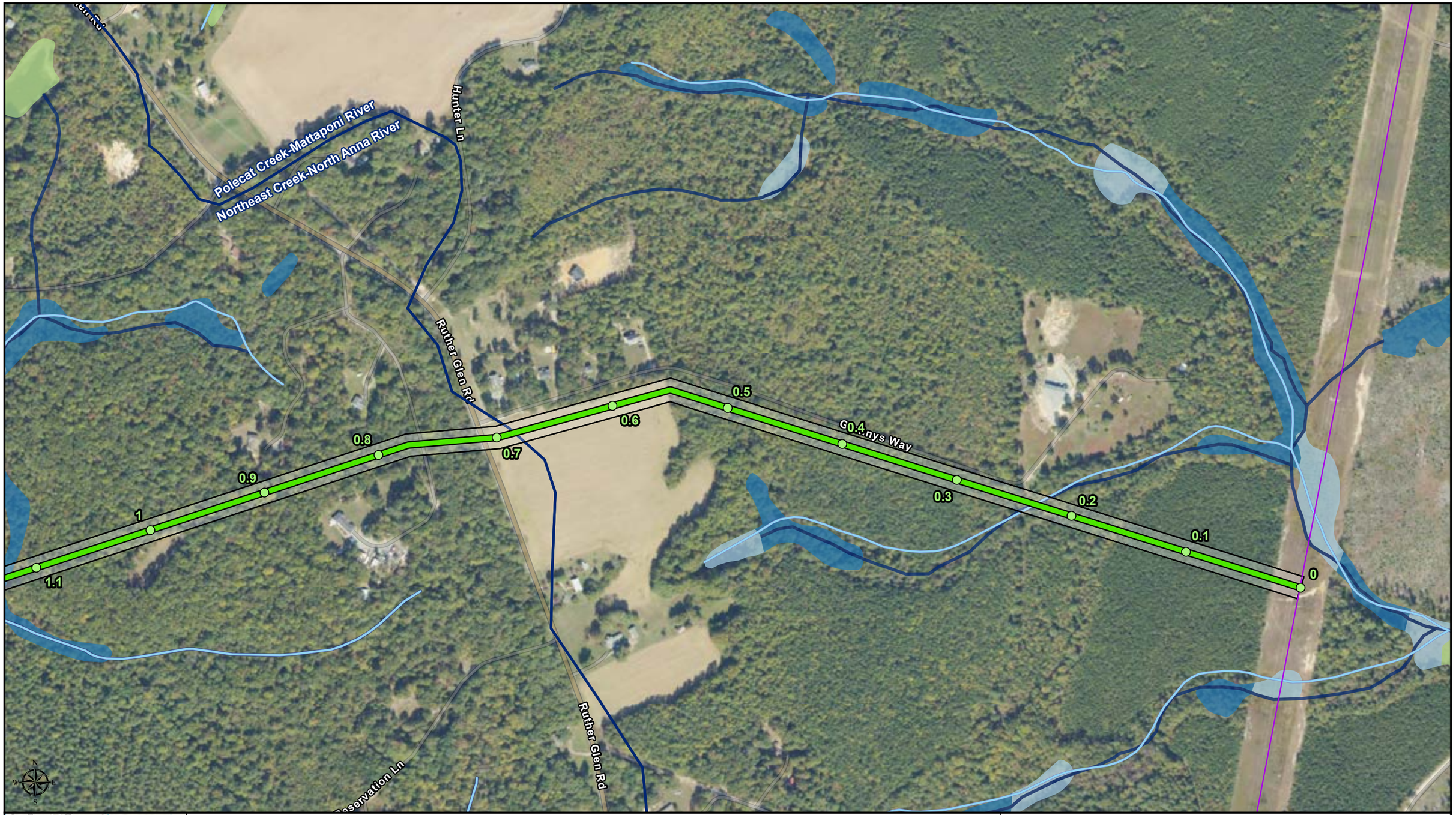
1:4,800

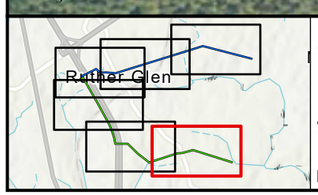
NWI Wetlands, NHD Waterbodies, and HUC 10 Watersheds
Carmel Church 230 kV Electric Transmission Project

Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy





Existing Dominion Energy Electric Transmission Line
Route 2 MP
Route 2

Note: All route Rights-of-Way are 100-foot wide

NHD Flowline

NWI Wetland

Freshwater Emergent Wetland
Freshwater Forested/Shrub Wetland
Freshwater Pond
Riverine
HUC 10 Watershed

0 250 500
Feet

1:4,800

NWI Wetlands, NHD Waterbodies, and HUC 10 Watersheds

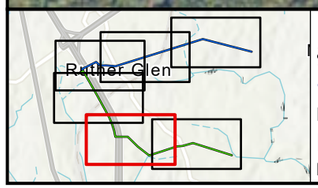
Carmel Church 230 kV Electric Transmission Project

Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy





Route 2 MP
Route 2
NHD Flowline
NWI Wetland
Freshwater Emergent Wetland
Freshwater Forested/Shrub Wetland
Freshwater Pond
Riverine
HUC 10 Watershed
Note: All route Rights-of-Way are 100-foot wide

0 250 500
Feet

1:4,800

NWI Wetlands, NHD Waterbodies, and HUC 10 Watersheds

Carmel Church 230 kV Electric Transmission Project

Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

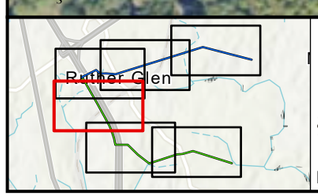
CARMEL
CHURCH SWITCHING STATION

2.6
2.5
2.4
2.3
2.2
2.1
2

95

Chesterfield Rd
CSX Railroad
Railroad Ln
Rutherglen Rd
Polecat Creek-Mattaponi River
Northeast Creek-North Anna River
Holly Ridge Ln

N
W
E
S



△ Proposed Switching Station
Route 1 MP
Route 2 MP
Route 1
Route 2
NHD Flowline

NWI Wetland
Freshwater Emergent Wetland
Freshwater Forested/Shrub Wetland
Freshwater Pond
Riverine
HUC 10 Watershed

Note: All route Rights-of-Way are 100-foot wide

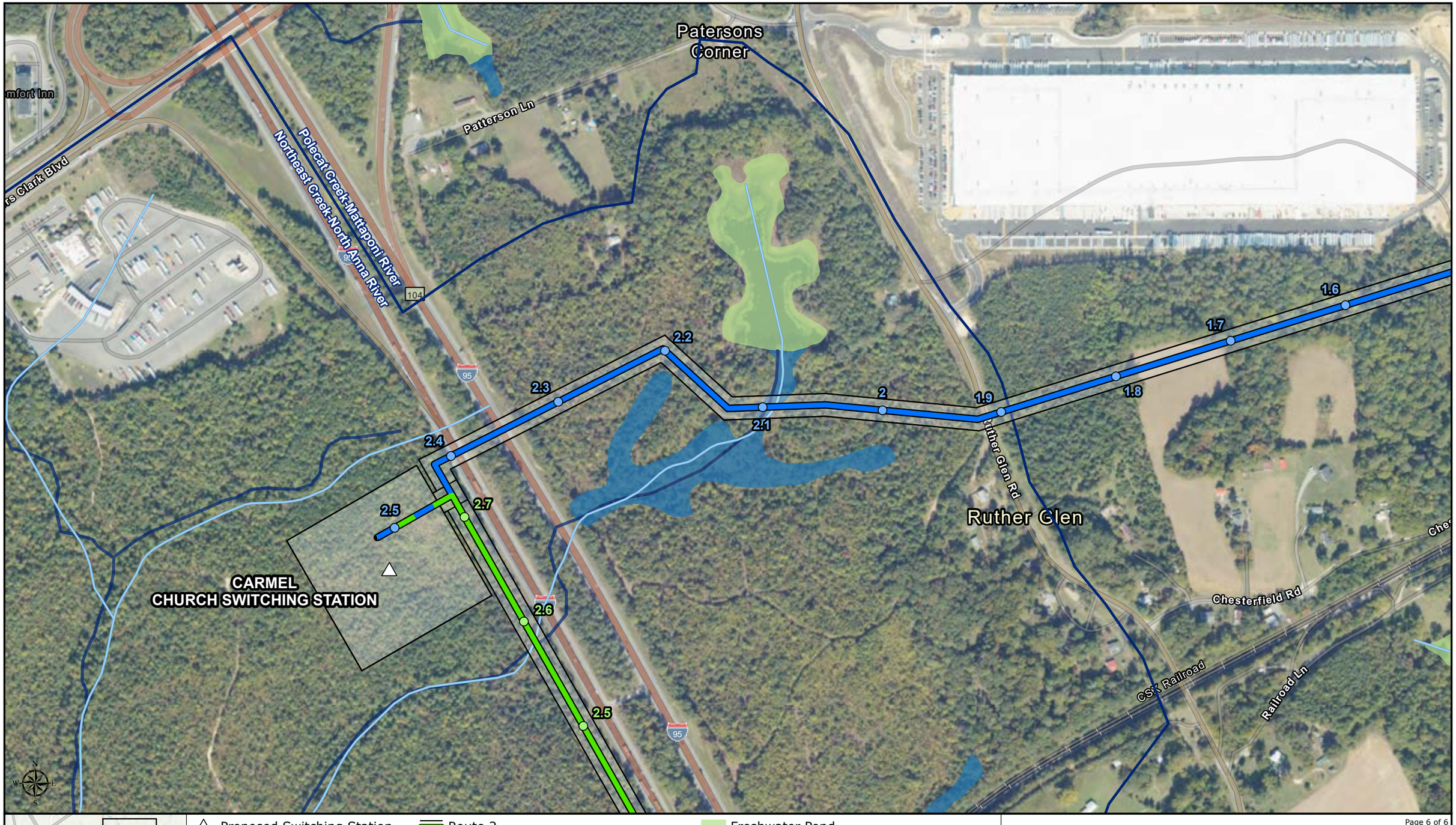
0 250 500
Feet
1:4,800

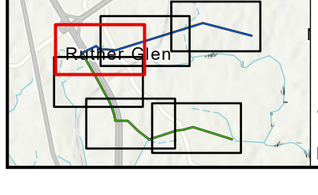
NWI Wetlands, NHD Waterbodies, and HUC 10 Watersheds
Carmel Church 230 kV Electric Transmission Project

Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy





- Proposed Switching Station
- Route 1 MP
- Route 2 MP
- Route 1
- Route 2
- NHD Flowline

NWI Wetland

- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Riverine
- HUC 10 Watershed

0 250 500
Feet
1:4,800

Note: All route Rights-of-Way are 100-foot wide

NWI Wetlands, NHD Waterbodies, and HUC 10 Watersheds

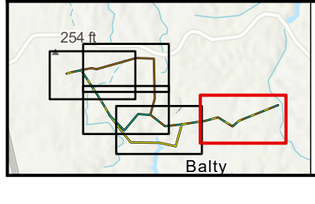
Carmel Church 230 kV Electric Transmission Project

Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy





Existing Dominion Energy Electric Transmission Line
Route 4 MP
Route 5 MP
Route 6 MP
Route 4
Route 5
Route 6
NHD Flowline

NWI Wetland

Freshwater Emergent Wetland
Freshwater Forested/Shrub Wetland
Freshwater Pond
Riverine
HUC 10 Watershed

Note: All route Rights-of-Way are 100-foot wide

0 250 500
Feet

1:4,800

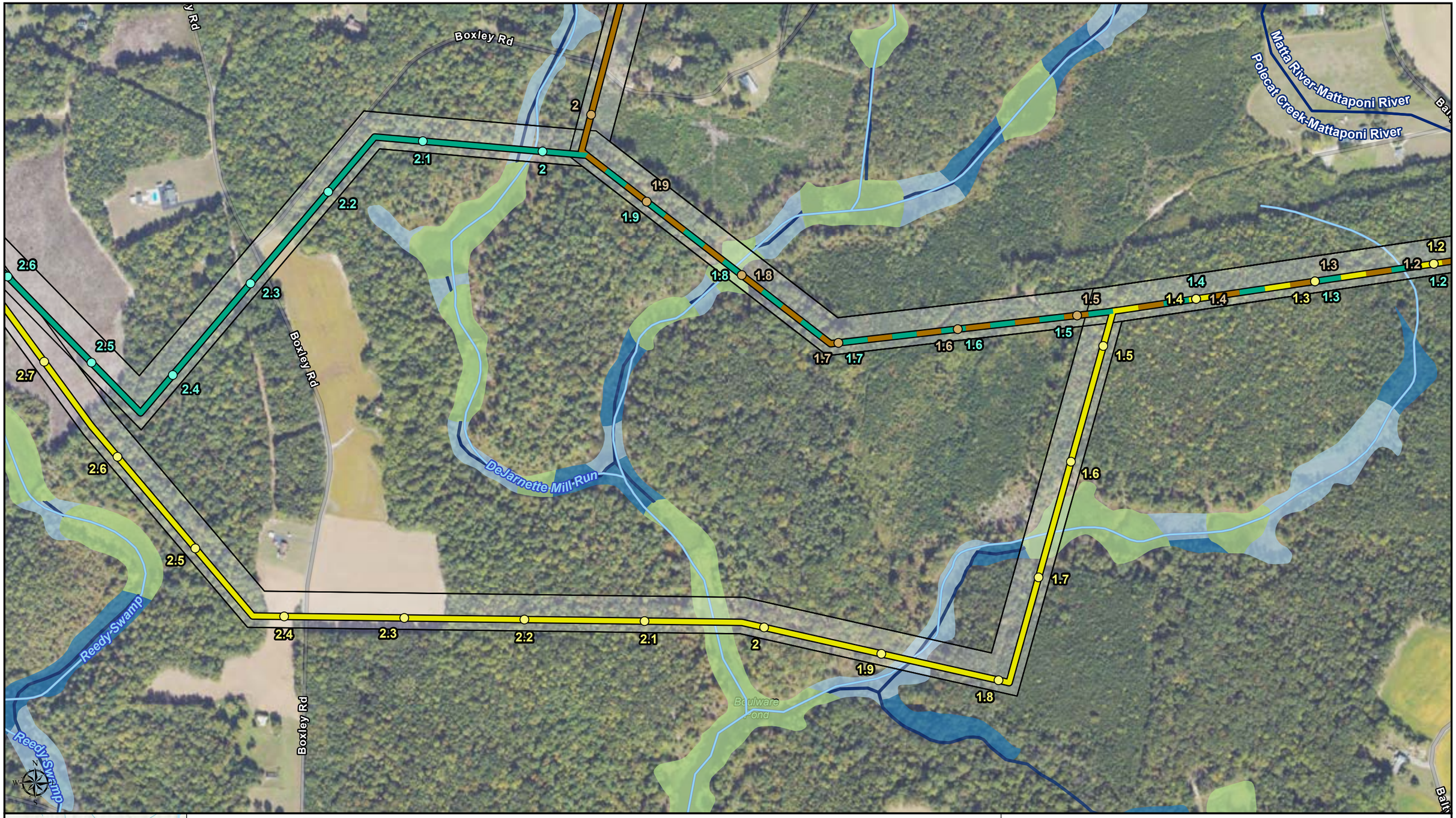
NWI Wetlands, NHD Waterbodies, and HUC 10 Watersheds

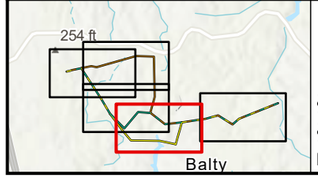
Ruther Glen 230 kV Electric Transmission Project

Dominion Energy Virginia
Caroline County, Virginia

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Dominion Energy





Route 4 MP
Route 5 MP
Route 6 MP
Route 4
Route 5
Route 6
NHD Flowline

NWI Wetland

Freshwater Emergent Wetland
Freshwater Forested/Shrub Wetland
Freshwater Pond
Riverine
HUC 10 Watershed

Note: All route Rights-of-Way are 100-foot wide

0 250 500
Feet

1:4,800

NWI Wetlands, NHD Waterbodies, and HUC 10 Watersheds

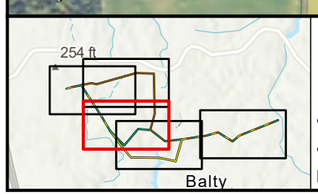
Ruther Glen 230 kV Electric Transmission Project

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- Route 4 MP
- Route 5 MP
- Route 6 MP
- Route 4
- Route 5
- Route 6
- NHD Flowline
- **NWI Wetland**
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Riverine
- HUC 10 Watershed

Note: All route Rights-of-Way are 100-foot wide

0 250 500
Feet

1:4,800

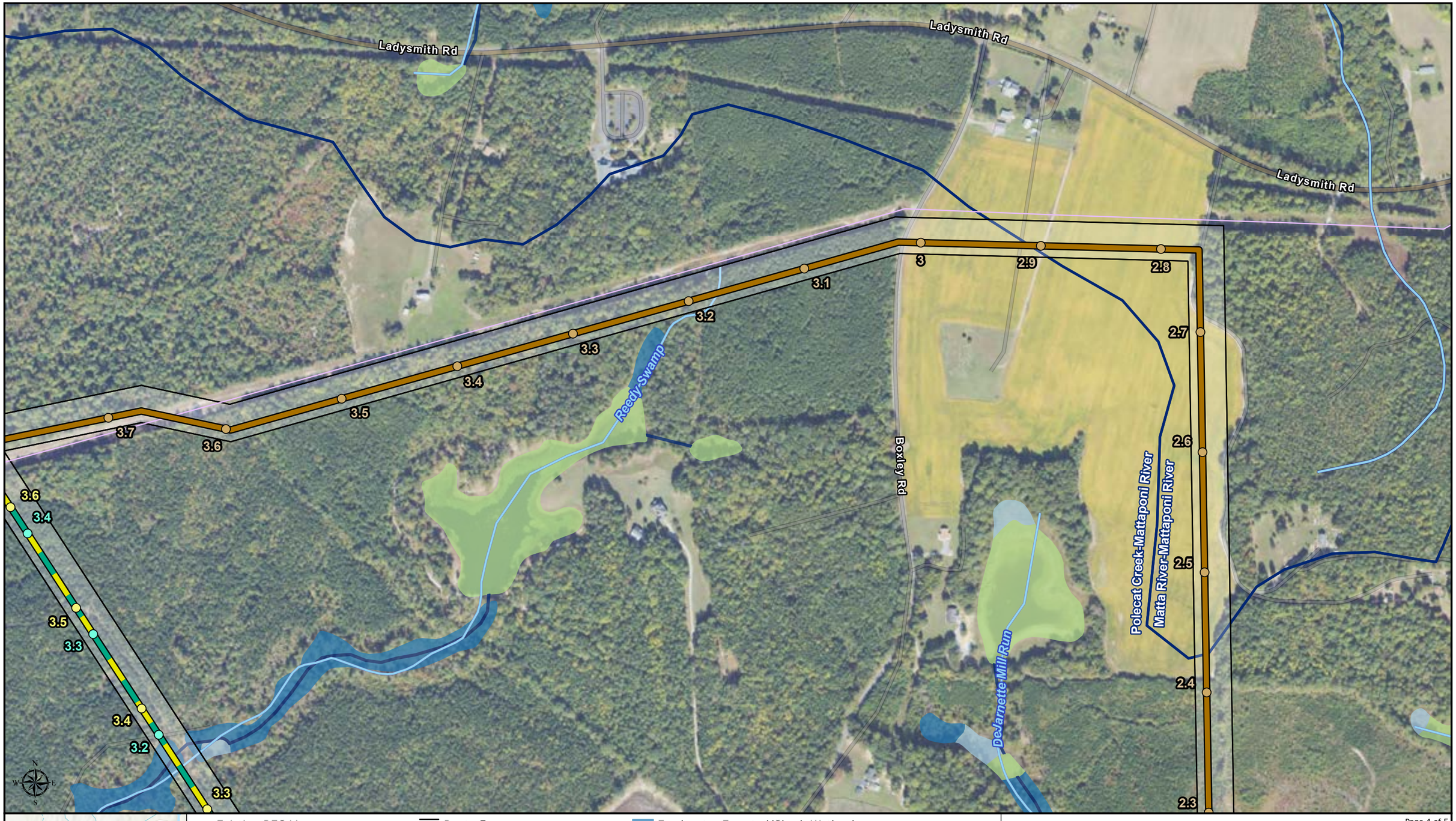
NWI Wetlands, NHD Waterbodies, and HUC 10 Watersheds

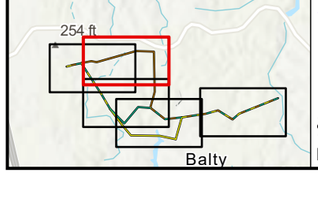
Ruther Glen 230 kV Electric Transmission Project

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Existing REC Line
Route 4 MP
Route 5 MP
Route 6 MP
Route 4
Route 5
Route 6
NHD Flowline
NWI Wetland
Freshwater Emergent Wetland
Freshwater Forested/Shrub Wetland
Freshwater Pond
Riverine
HUC 10 Watershed

Note: All route Rights-of-Way are 100-foot wide

0 250 500
Feet
1:4,800

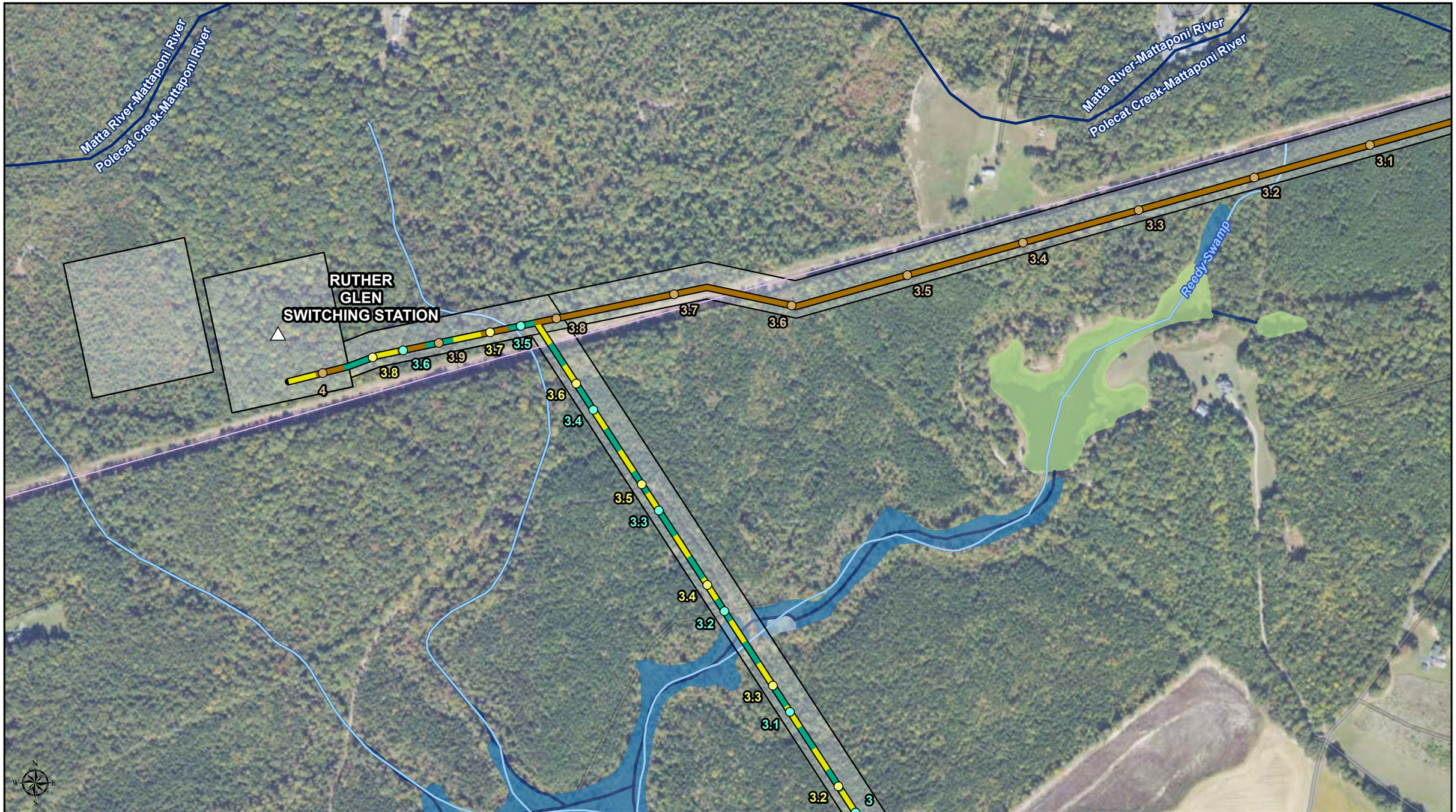
NWI Wetlands, NHD Waterbodies, and HUC 10 Watersheds

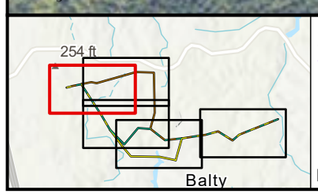
Ruther Glen 230 kV Electric Transmission Project

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Caroline County, Virginia

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Proposed Switching Station
Existing REC Line
Route 4 MP
Route 5 MP
Route 6 MP

Route 4
Route 5
Route 6
NHD Flowline

NWI Wetland
Freshwater Emergent Wetland
Freshwater Forested/Shrub Wetland
Freshwater Pond
Riverine
HUC 10 Watershed

Note: All route Rights-of-Way are 100-foot wide

0 250 500
Feet

1:4,800

NWI Wetlands, NHD Waterbodies, and HUC 10 Watersheds

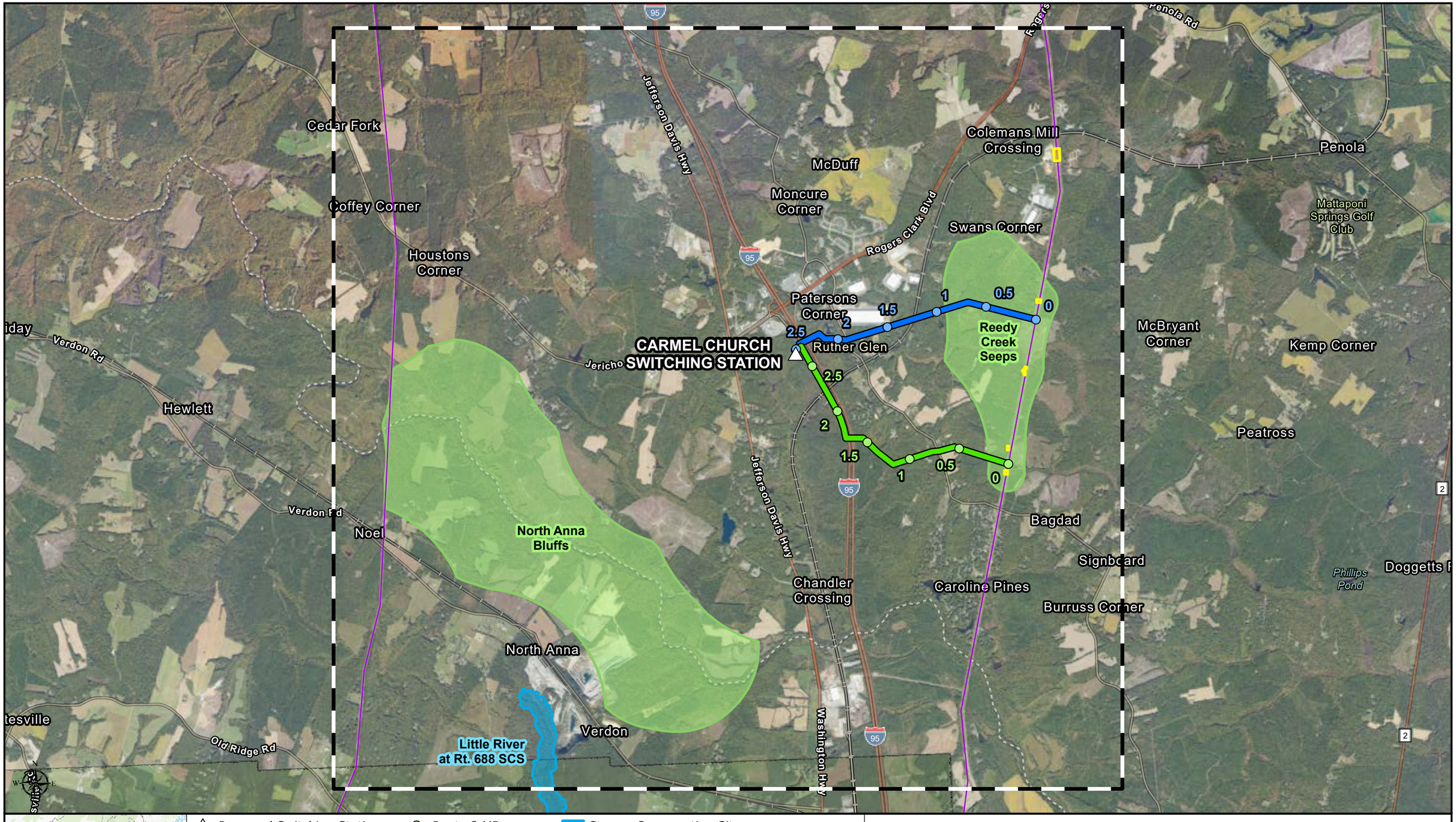
Ruther Glen 230 kV Electric Transmission Project

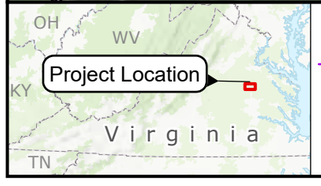
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FIGURE 4.2-3 VDCR CONSERVATION LANDS AND VDCR-REPORTED NEW JERSEY RUSH POPULATIONS





- Proposed Switching Station
- Existing Dominion Energy Electric Transmission Line
- Route 1 MP
- Route 2 MP
- Route 1
- Route 2
- Conservation Site
- Stream Conservation Site
- New Jersey Rush Occurrence
- Study Area

0 0.5 1
Miles

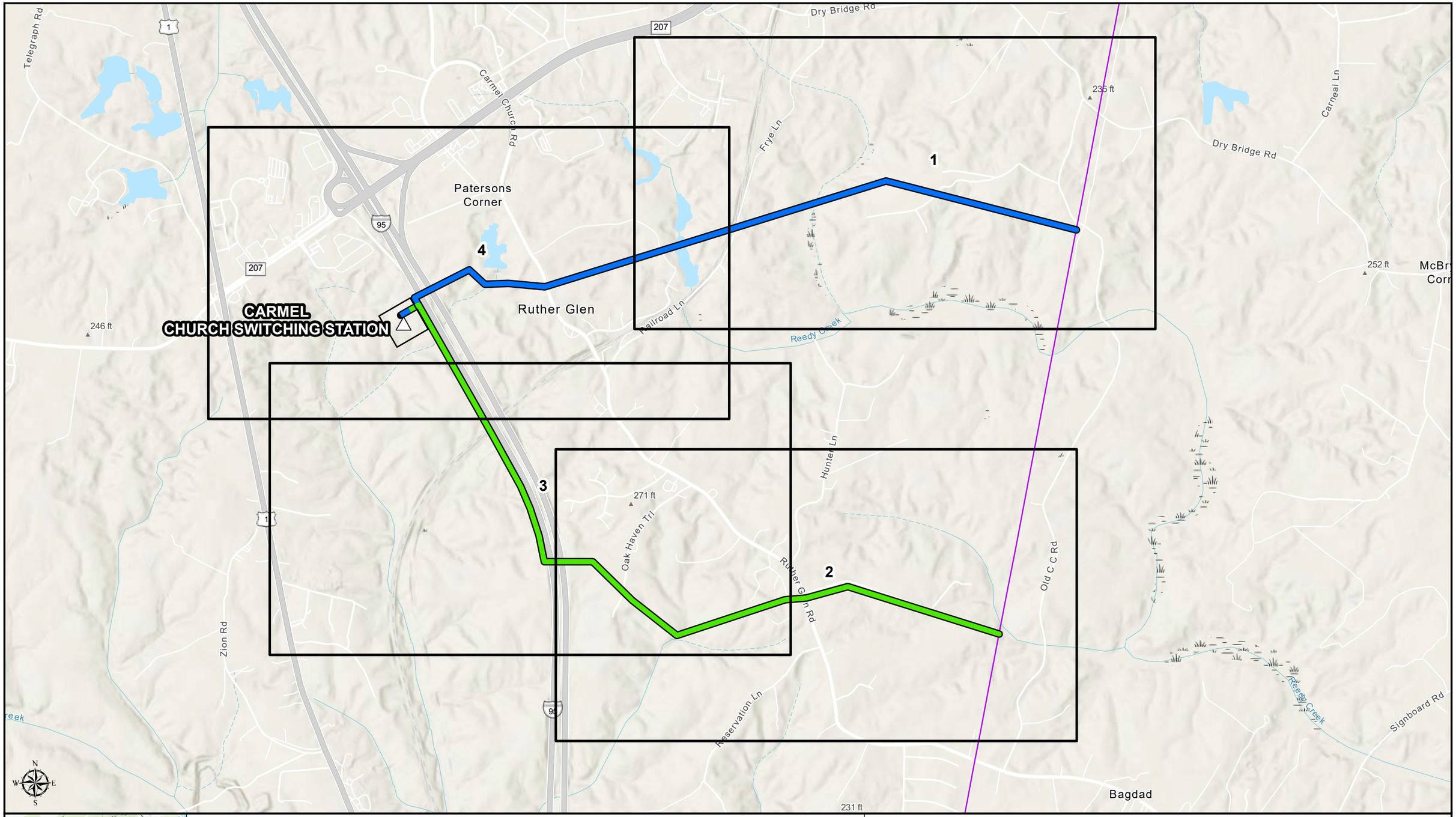
1:56,000

VDCR Conservation Lands and VDCR-Reported New Jersey Rush Populations
Carmel Church 230 kV Electric Transmission Project
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Caroline County, Virginia

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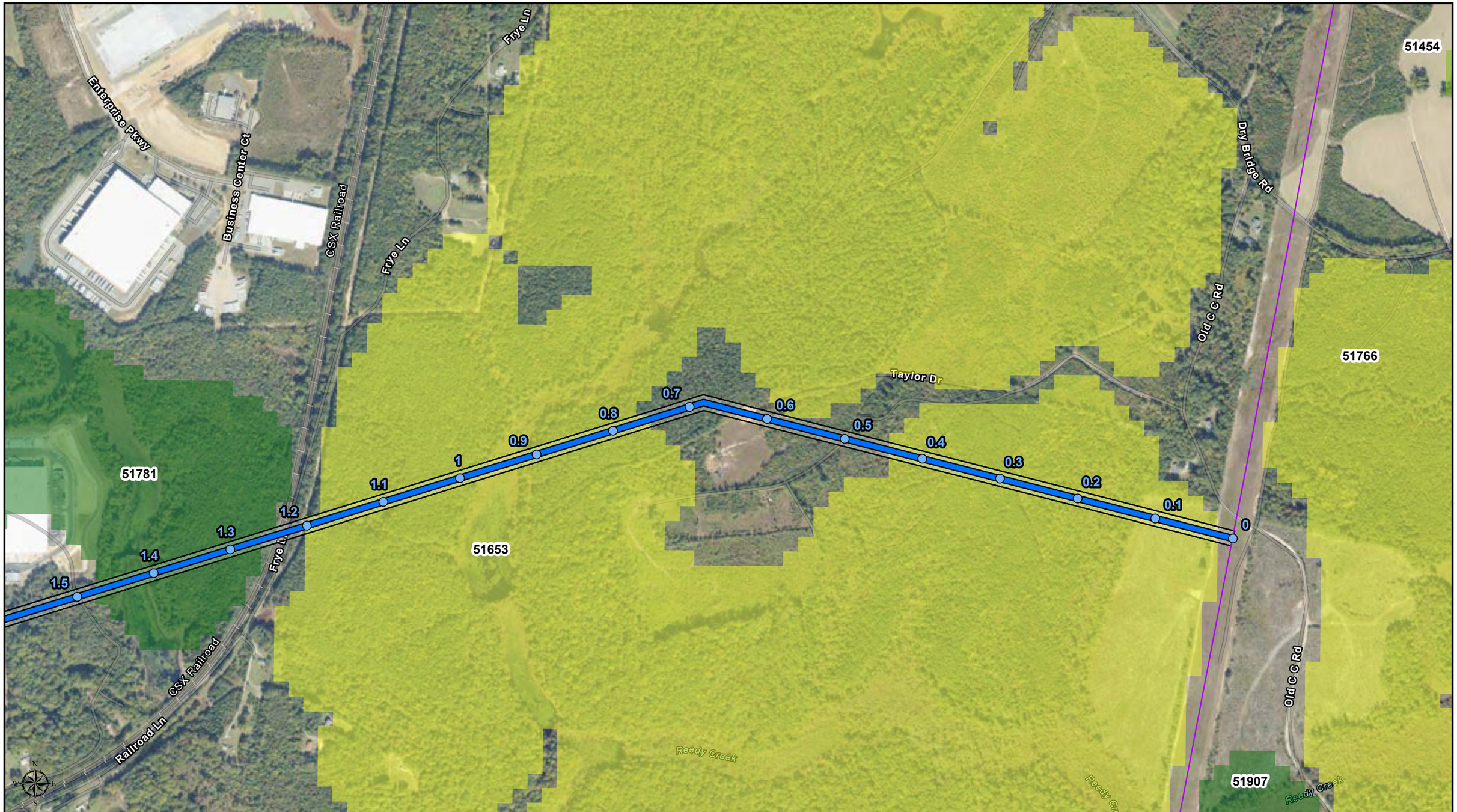
FIGURE 4.2-4 ECOLOGICAL CORES

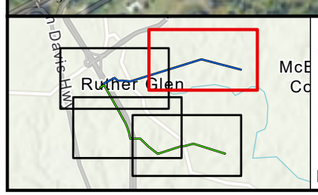


Ecological Cores Index
Carmel Church 230 kV Electric Transmission Project
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Caroline County, Virginia

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Existing Dominion Energy Electric Transmission Line

Route 1 MP

Route 1

Core Rank

C3: High

C4: Moderate

C5: General

0 300 600

Feet

1:7,200

Note: All route Rights-of-Way are 100-foot wide

Ecological Cores

Carmel Church 230 kV Electric Transmission Project

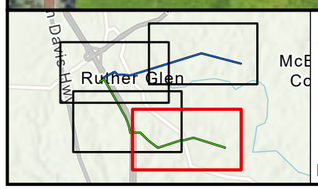
Dominion Energy Virginia

Caroline County, Virginia

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Dominion Energy





Existing Dominion Energy Electric Transmission Line

Route 2 MP

Route 2

Core Rank

C3: High

C4: Moderate

C5: General

0 300 600

Feet

1:7,200

Note: All route Rights-of-Way are 100-foot wide

Ecological Cores

Carmel Church 230 kV Electric Transmission Project

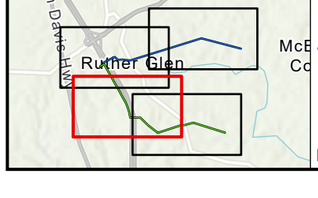
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Route 2 MP
Route 2

Core Rank
C3: High
C4: Moderate
C5: General

Note: All route Rights-of-Way are 100-foot wide

0 300 600
Feet

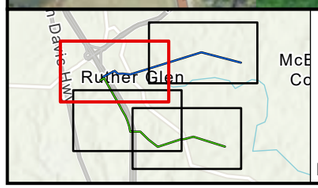
1:7,200

Ecological Cores
Carmel Church 230 kV Electric Transmission Project
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Caroline County, Virginia

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Proposed Switching Station
Route 1 MP
Route 2 MP
Route 1
Route 2

Core Rank
C3: High
C5: General

0 300 600
Feet
1:7,200

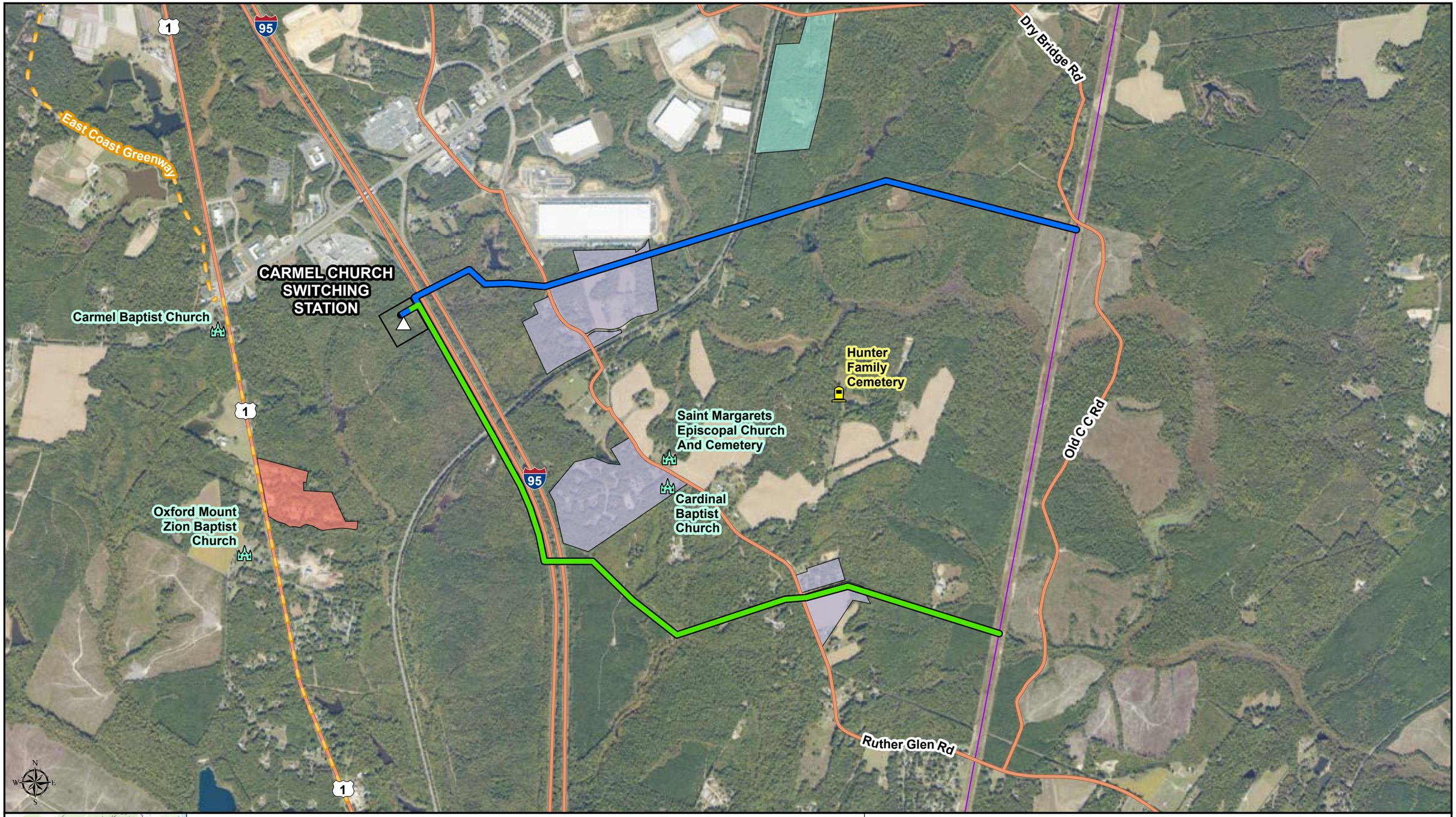
Note: All route Rights-of-Way are 100-foot wide

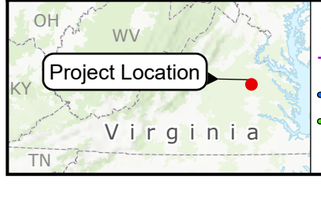
Ecological Cores
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Caroline County, Virginia

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FIGURE 4.3-1 VISUALLY SENSITIVE RESOURCES





Proposed Switching Station
Existing Dominion Energy Electric Transmission Line
Route 1
Route 2

VSR Types
Cemetery
Place of Worship
State Existing Trail

Roadway

Residential Neighborhood/Cluster
Dry Ridge Road Residences
Ruther Glen Road Residences
US Route 1 Residences

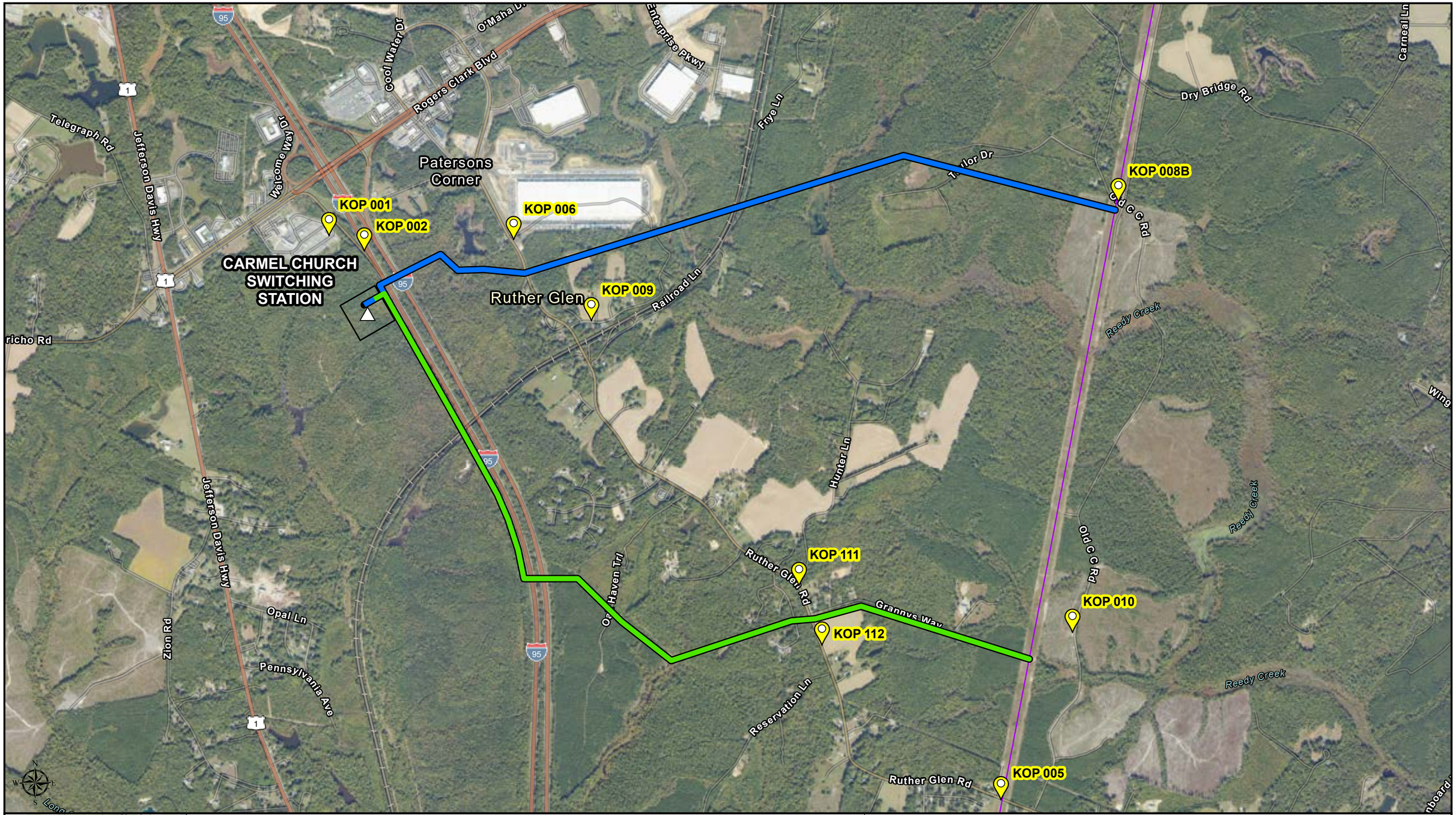
0 600 1,200
Feet
1:20,000

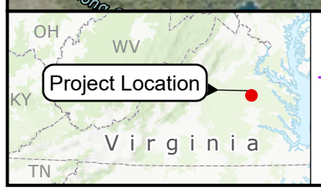
Visually Sensitive Resources
Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

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FIGURE 4.3-2 KEY OBSERVATION POINTS





△ Proposed Switching Station

Existing Dominion Energy Electric Transmission Line

Route 1

Route 2

Key Observation Point

0 600 1,200

Feet

1:18,000

Key Observation Points

Carmel Church 230 kV Electric Transmission Project

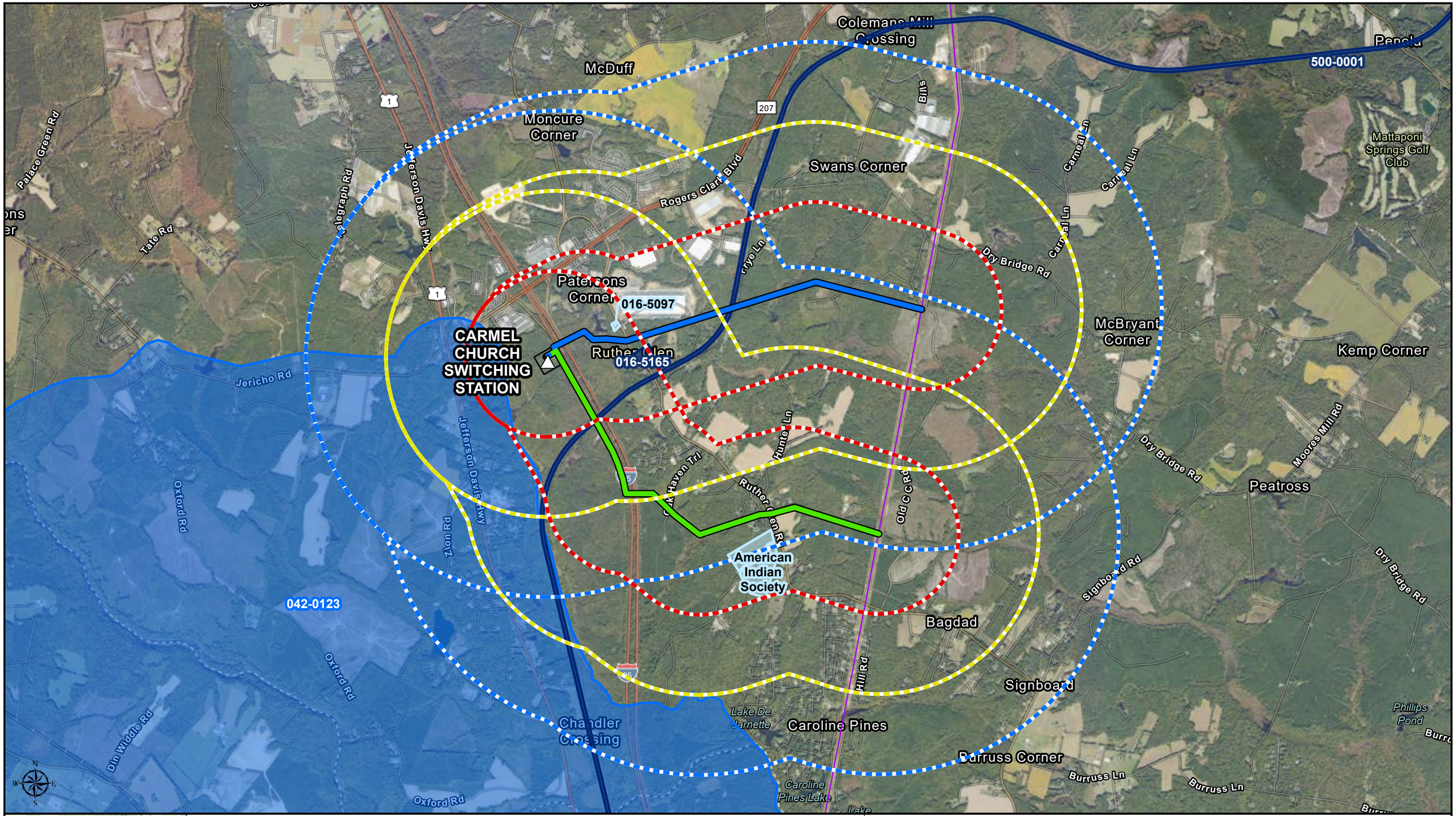
Dominion Energy Virginia

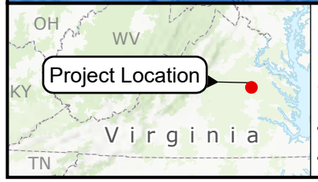
Caroline County, Virginia

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FIGURE 4.4-1 LOCATIONS OF CONSIDERED AND HISTORIC RESOURCES





△ Proposed Switching Station

Existing Dominion Energy Electric Transmission Line

Route 1

Route 2

Architecture Resources Evaluation Status

Locally Significant

Potentially Eligible

Eligible

0.5-Mile Buffer

1.0-Mile Buffer

1.5-Mile Buffer

0 1,500 3,000

Feet

1:36,000

Locations of Considered and Historic Resources

Carmel Church 230 kV Electric Transmission Project

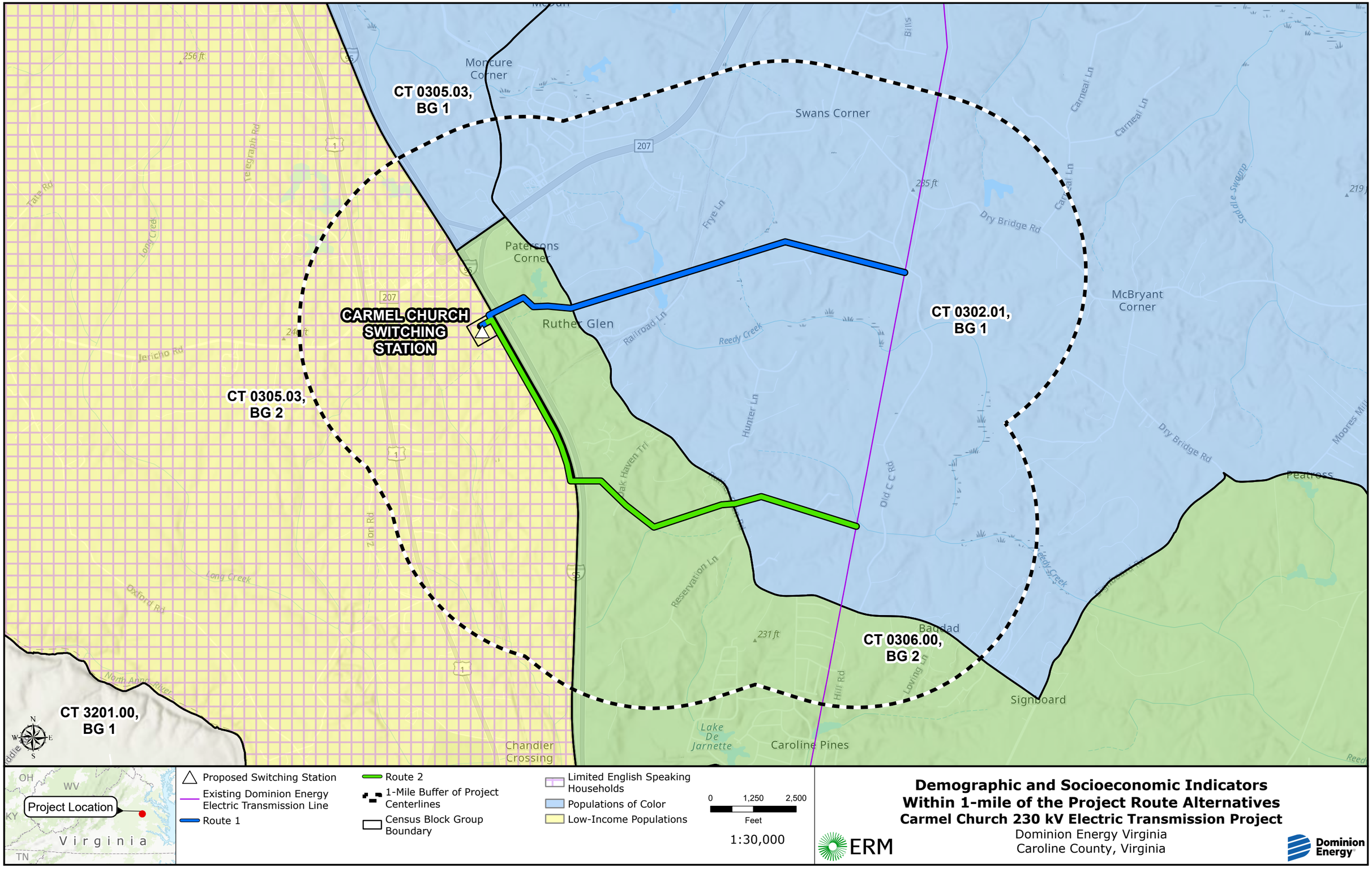
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Caroline County, Virginia

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FIGURE 4.5-1 DEMOGRAPHIC AND SOCIOECONOMIC INDICATORS WITHIN 1-MILE OF THE PROJECT ROUTE ALTERNATIVES



Demographic and Socioeconomic Indicators
Within 1-mile of the Project Route Alternatives
Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

APPENDIX B FEATURE CROSSING TABLE

FEATURE CROSSINGS TABLE FOR THE CARMEL CHURCH PROJECT

Environmental Feature [a, b]	Unit	Route 1	Route 2	Carmel Church Switching Station
ROUTE LENGTH AND CONSTRUCTION FOOTPRINT				
Centerline Length	miles	2.5	2.8	NA
Construction Footprint	acres	29.8	33.1	10.0
ROUTING OPPORTUNITIES				
Collocation (total)	miles	0.0	1.5	NA
Road Collocation	miles	0.0	1.5	NA
Utility and Road Collocation	miles	0.0	0.0	NA
Utility Collocation	miles	0.0	0.0	NA
LAND USE				
Land Ownership				
Parcels Crossed (total)	number	14	12	1
Private	number	14	12	1
Public	number	0	0	0
Total Landowners Crossed by ROW	number	11	9	1
Conservation Easements Crossed	acres	0.0	0.0	0.0
Industrial Park	acres	16.2	12.2	10.0
Land Use/Land Cover [c]				
Forested	acres	25.6	28.7	10.0
Agricultural	acres	0.9	1.9	0.0
Developed	acres	0.7	0.7	0.0
Open Space	acres	2.1	1.6	0.0
Open Water	acres	0.4	0.0	0.0
Wetland	acres	0.2	0.2	0.0
Recreation Areas (total)	number	0	0	0
Resource Protection Areas and Resource Management Areas	miles	0.5	0.3	-
Residences and Other Structures				
Dwellings within ROW	number	0	0	0
Dwellings within 60 Feet of ROW	number	0	0	0
Dwellings within 100 Feet of Centerline	number	0	0	0

Environmental Feature [a, b]	Unit	Route 1	Route 2	Carmel Church Switching Station
Dwellings within 250 Feet of Centerline	number	0	6	0
Dwellings within 500 Feet of Centerline	number	4	9	0
Non-residential Buildings within ROW	number	0	0	0
Non-residential Buildings within 500 Feet of Centerline	number	4	3	0
Cemeteries, Schools, and Places of Worship				
Cemeteries within 500 Feet of Centerline	number	0	0	0
Schools within 500 Feet of Centerline	number	0	0	0
Places of Worship within 500 Feet of Centerline	number	0	0	0
Zoning Districts				
Rural Preservation (RP)	acres miles	17.8 1.1	13.8 1.1	0.0 -
Industrial (M-1)	acres miles	4.8 0.4	0.0 0.0	0.0 -
Planned Mixed Use (PMUD)	acres miles	5.8 0.5	18.2 1.6	10.0 -
Planned Developments				
Planned Innovation, Research and Technology Area (PIRT)	acres	11.3	0.0	0.0
Transportation				
Existing Road Crossings (total)	number	4	3	0
Local Road Crossings	number	3	2	0
Highways Crossings	number	1	1	0
NATURAL RESOURCES				
Wetlands [d]				
Wetlands Affected (total)	acres miles	2.8 0.2	1.7 0.1	NA NA
Palustrine Forested	acres	0.9	1.6	NA
Palustrine Scrub-Shrub	acres	NA	NA	NA
Palustrine Emergent	acres	0.4	NA	NA
Palustrine Unconsolidated Bottom	acres	1.3	NA	NA
Riverine	acres	0.1	0.1	NA

Environmental Feature [a, b]	Unit	Route 1	Route 2	Carmel Church Switching Station
Waterbodies [e]				
Waterbody (total)	number	6	4	0
Perennial	number	0	0	0
Intermittent	number	5	4	0
Lake/Pond	number	1	0	0
Natural Heritage Resources				
SCS or Conservation Sites				
Reedy Creek Seeps Conservation Site	acres	10.9	2.4	0.0
Ecological Cores				
C3: High	number acres	1 10.5	0 -	0 -
C4: Moderate	number acres	0 -	3 13.3	0 -
C5: General	number acres	3 7.7	1 1.0	1 6.7
Forest Conservation Value				
Average (1)	acres	12.4	17.0	4.9
Moderate (2)	acres	5.4	4.0	5.1
High (3)	acres	1.5	4.4	0.0
Very High (4)	acres	7.2	1.3	0.0
Outstanding (5)	acres	1.6	0.3	0.0
Protected Species				
Bald Eagle Nests within 330 Feet	number	0	0	0
Bald Eagle Nests within 660 Feet	number	0	0	0
CULTURAL RESOURCES				
Archaeological Sites within ROW	number	0	0	0
NRHP Eligible and NRHP Listed Properties, NHLs, Battlefields, and Historic Landscapes within ROW	number	1	1	0
NRHP Eligible and NRHP Listed Properties, NHLs, Battlefields, and Historic Landscapes within 0.5 Mile	number	1	1	1
NHLs between 1.0 and 1.5 Miles	number	0	0	0

Environmental Feature [a, b]	Unit	Route 1	Route 2	Carmel Church Switching Station
Historic Districts Crossed	number	1	1	0
NRHP Listed Battlefields Crossed	number	0	0	0
NRHP Eligible Battlefields Crossed	number	0	0	0
VDHR Easements Crossed	number	0	0	0
Battlefields (National Park Service ABPP) Crossed	number	0	0	0

ABPP = American Battlefield Protection Program; NHL = National Historic Landmark; NRHP = National Register of Historic Places; ROW = right-of-way; SCS = Stream Conservation Site; VDHR = Virginia Department of Historic Resources

a The sum of the parts may not equal the totals due to rounding.

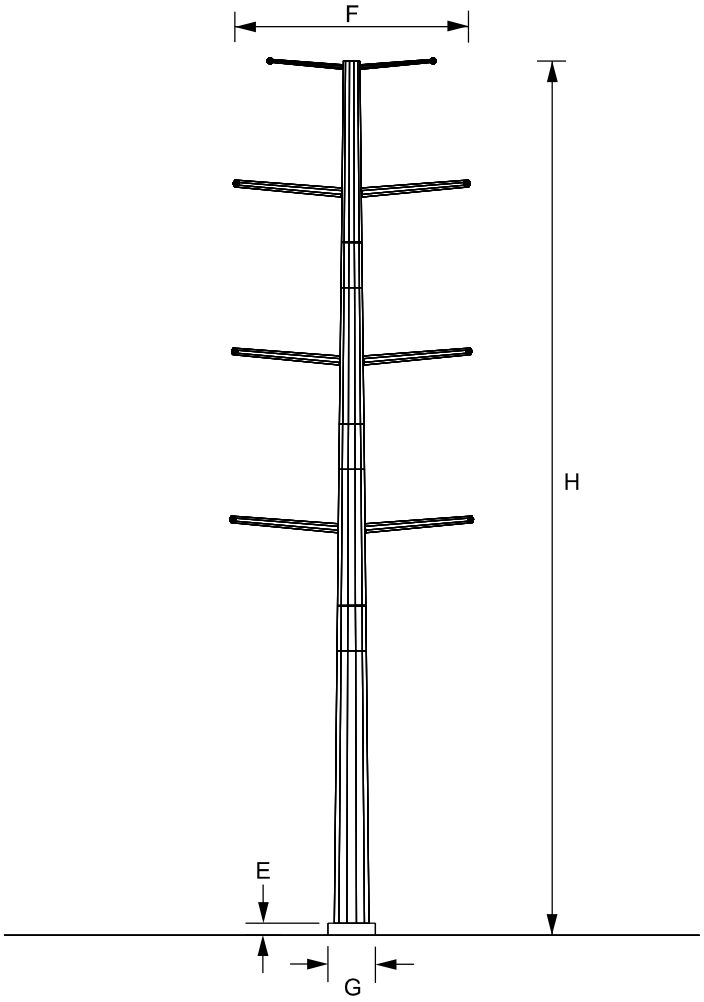
b The crossing lengths presented in this table for all feature categories are based on hypothetical centerlines within the right of way for each route alternative.

c Based on Virginia Land Cover Dataset (VGIN 2024).

d Wetland acreages are based on results of the wetland and waterbody desktop study (see Appendix D). NA indicates not applicable due to absence of a wetland type within the Project footprint; 0.0 indicates less than 0.05 acre of the wetland is present.

e Waterbody counts are based on the USGS National Hydrography Dataset (USGS 2024).

APPENDIX C STRUCTURAL DRAWINGS



TYPICAL DC ENGINEERED MONOPOLE DOUBLE DEADEND STRUCTURE

A. STRUCTURE MAPPING	N/A
B. RATIONALE FOR STRUCTURE TYPE:	MINIMIZES RIGHT OF WAY ACQUISITION
C. LENGTH OF R/W (STRUCTURE QTY):	2.40 MILES (6 STRUCTURES) - SEE NOTE 1
D. STRUCTURE MATERIAL:	WEATHERING STEEL
RATIONALE FOR STRUCTURE MATERIAL:	MATCH CURRENT STANDARDS8 AND EXISTING STRUCTURES IN THE AREA
E. FOUNDATION MATERIAL: AVERAGE FOUNDATION REVEAL:	CONCRETE SEE NOTE 2
F. AVERAGE WIDTH AT CROSSARM:	26'
G. AVERAGE WIDTH AT BASE:	SEE NOTE 3
H. MINIMUM STRUCTURE HEIGHT (SEE NOTE 4): MAXIMUM STRUCTURE HEIGHT (SEE NOTE 4): AVERAGE STRUCTURE HEIGHT (SEE NOTE 4):	90' 115' 108'
I. AVERAGE SPAN LENGTH (RANGE):	507' - SEE NOTE 4
J. MINIMUM CONDUCTOR-TO-GROUND:	25.5' (AT MAXIMUM OPERATING TEMPERATURE)

NOTES:
1. ROW LENGTH & STRUCTURE QUANTITY ARE EXCLUSIVE OF COMPANY-OWNED SUBSTATION PROPERTIES
2. MINIMUM FOUNDATION REVEAL SHALL BE 1.5'
3. FOUNDATION DIAMETER SHALL BE BASED ON GEOTECHNICAL FINDINGS DURING FINAL ENGINEERING
4 THE SPAN LENGTHS ASSOCIATED WITH THIS STRUCUTRE TYPE ARE THE AHEAD SPANS

THE INFORMATION CONTAINED ON THIS DRAWING IS CONSIDERED PRELIMINARY IN NATURE AND IS SUBJECT TO CHANGE BASED ON FINAL DESIGN

Dominion Energy
Dominion Energy
5000 Dominion Blvd.
Glen Allen, VA 23060

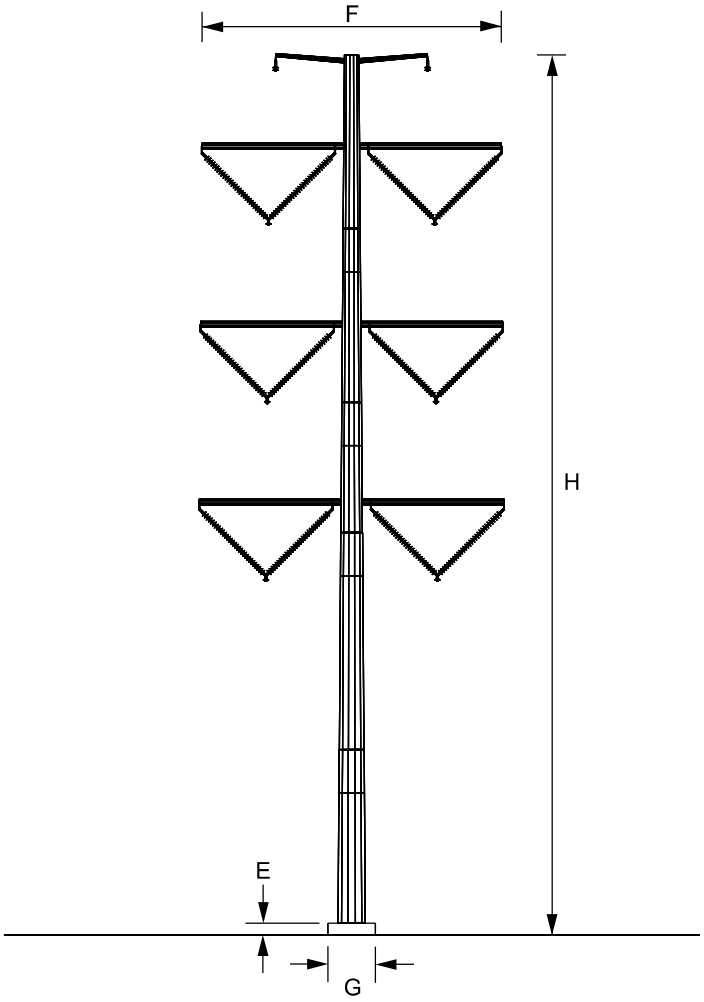
LINES 2410, 2422 (ROUTE 1)

TYPICAL DC ENGINEERED MONOPOLE DOUBLE DEADEND STRUCTURE

ATTACHMENT NO.

II.B.3.a

DRAWN BY: SDH



TYPICAL DC ENGINEERED MONOPOLE SUSPENSION STRUCTURE (V-STRING)

A. STRUCTURE MAPPING	N/A
B. RATIONALE FOR STRUCTURE TYPE:	MINIMIZES RIGHT OF WAY ACQUISITION; V-STRING INCREASES CLEARANCES AND OPTMIZES EXISTING ROW USAGE
C. LENGTH OF R/W (STRUCTURE QTY):	2.40 MILES (14 STRUCTURES) - SEE NOTE 1
D. STRUCTURE MATERIAL:	WEATHERING STEEL
RATIONALE FOR STRUCTURE MATERIAL:	MATCH CURRENT STANDARDS8 AND EXISTING STRUCTURES IN THE AREA
E. FOUNDATION MATERIAL: AVERAGE FOUNDATION REVEAL:	CONCRETE SEE NOTE 2
F. AVERAGE WIDTH AT CROSSARM:	34.5'
G. AVERAGE WIDTH AT BASE:	SEE NOTE 3
H. MINIMUM STRUCTURE HEIGHT (SEE NOTE 4): MAXIMUM STRUCTURE HEIGHT (SEE NOTE 4): AVERAGE STRUCTURE HEIGHT (SEE NOTE 4):	100' 135' 111'
I. AVERAGE SPAN LENGTH (RANGE):	507' - SEE NOTE 4
J. MINIMUM CONDUCTOR-TO-GROUND:	25.5' (AT MAXIMUM OPERATING TEMPERATURE)

NOTES:
1. ROW LENGTH & STRUCTURE QUANTITY ARE EXCLUSIVE OF COMPANY-OWNED SUBSTATION PROPERTIES
2. MINIMUM FOUNDATION REVEAL SHALL BE 1.5'
3. FOUNDATION DIAMETER SHALL BE BASED ON GEOTECHNICAL FINDINGS DURING FINAL ENGINEERING
4. THE SPAN LENGTHS ASSOCIATED WITH THIS STRUCUTRE TYPE ARE THE AHEAD SPANS

THE INFORMATION CONTAINED ON THIS DRAWING IS CONSIDERED PRELIMINARY IN NATURE AND IS SUBJECT TO CHANGE BASED ON FINAL DESIGN

Dominion Energy
Dominion Energy
5000 Dominion Blvd.
Glen Allen, VA 23060

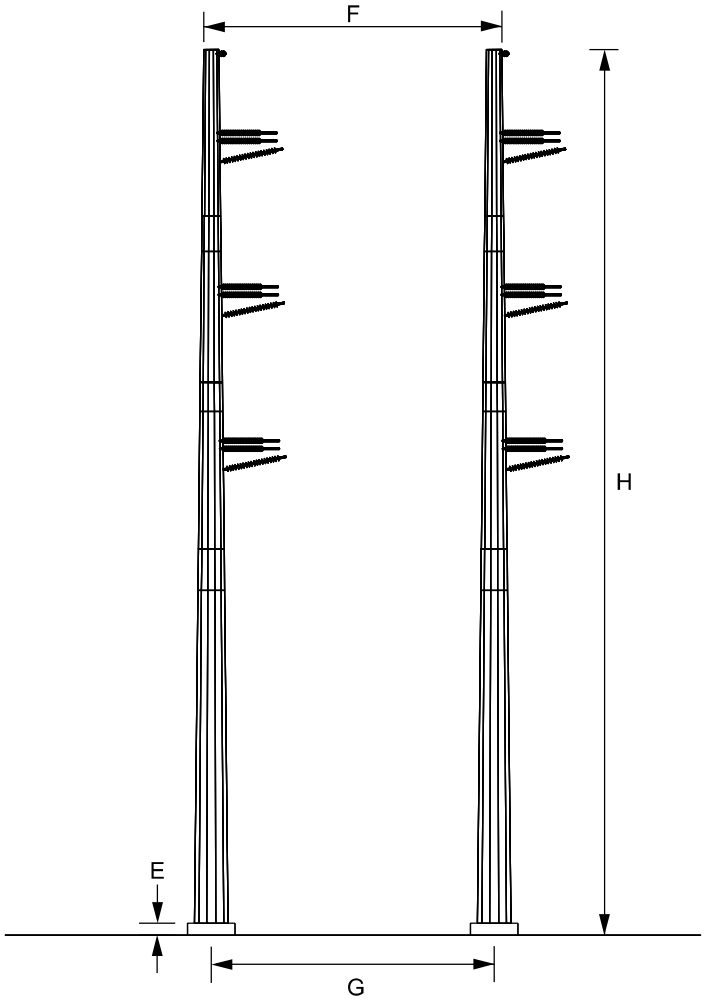
LINES 2410, 2422 (ROUTE 1)

TYPICAL DC ENGINEERED MONOPOLE SUSPENSION STRUCTURE (V-STRING)

ATTACHMENT NO.

II.B.3.b

DRAWN BY: SDH



TYPICAL DC ENGINEERED 2-POLE DOUBLE DEADEND STRUCTURE

A. STRUCTURE MAPPING	N/A
B. RATIONALE FOR STRUCTURE TYPE:	MINIMIZES RIGHT OF WAY ACQUISITION; 2-POLES USED FOR HEAVY ANGLES TO OPTIMIZE POLE/FOUNDATION SIZE AND COST
C. LENGTH OF R/W (STRUCTURE QTY):	2.40 MILES (3 STRUCTURES) - SEE NOTE 1
D. STRUCTURE MATERIAL:	WEATHERING STEEL
RATIONALE FOR STRUCTURE MATERIAL:	MATCH CURRENT STANDARDS AND EXISTING STRUCTURES IN THE AREA
E. FOUNDATION MATERIAL: AVERAGE FOUNDATION REVEAL:	CONCRETE SEE NOTE 2
F. AVERAGE WIDTH AT CROSSARM:	36'
G. AVERAGE WIDTH AT BASE:	SEE NOTE 3
H. MINIMUM STRUCTURE HEIGHT (SEE NOTE 4): MAXIMUM STRUCTURE HEIGHT (SEE NOTE 4): AVERAGE STRUCTURE HEIGHT (SEE NOTE 4):	100' 100' 100'
I. AVERAGE SPAN LENGTH (RANGE):	507' - SEE NOTE 4
J. MINIMUM CONDUCTOR-TO-GROUND:	25.5' (AT MAXIMUM OPERATING TEMPERATURE)

NOTES:
1. ROW LENGTH & STRUCTURE QUANTITY ARE EXCLUSIVE OF COMPANY-OWNED SUBSTATION PROPERTIES
2. MINIMUM FOUNDATION REVEAL SHALL BE 1.5'
3. FOUNDATION DIAMETER SHALL BE BASED ON GEOTECHNICAL FINDINGS DURING FINAL ENGINEERING
4. THE SPAN LENGTHS ASSOCIATED WITH THIS STRUCUTRE TYPE ARE THE AHEAD SPANS

THE INFORMATION CONTAINED ON THIS DRAWING IS CONSIDERED PRELIMINARY IN NATURE AND IS SUBJECT TO CHANGE BASED ON FINAL DESIGN

Dominion Energy
Dominion Energy
5000 Dominion Blvd.
Glen Allen, VA 23060

LINES 2410, 2422 (ROUTE 1)

TYPICAL DC ENGINEERED 2-POLE DOUBLE DEADEND STRUCTURE

ATTACHMENT NO.

II.B.3.c

DRAWN BY: SDH

APPENDIX D WETLAND AND WATERBODY DESKTOP STUDY

ERM

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erm.com

Virginia Department of Environmental Quality
Office of Environmental Impact Review
Ms. Bettina Rayfield, Manager
P.O. Box 1105
Richmond, Virginia 23218

DATE
12 December 2024

SUBJECT
CARMEL CHURCH 230 KV LINE EXTENSION PROJECT

REFERENCE
0715013

Dear Ms. Rayfield:

Environmental Resources Management (ERM), on behalf of Virginia Electric and Power Company (Dominion Energy Virginia, Dominion, or the Company), conducted a desktop wetland and waterbody review of publicly available information for the new proposed Carmel Church 230 kilovolt (kV) Line Extension Project (Project) in Caroline County, Virginia. This delineation was done using desktop resources and methodology. A field delineation is required to verify the accuracy and extent of aquatic resource boundaries. Project route alternatives are shown in Attachment 1, with wetland boundaries identified in this desktop review shown in Attachment 2.

Dominion Energy Virginia is filing an application with the State Corporation Commission (SCC) to construct and operate the following:

- A new, double circuit, overhead 230 kV transmission line (Carmel Church Loop) in new rights-of-way that will cut the existing Dominion Line #256 and connect to the proposed Carmel Church Switching Station; and
- A new 230 kV delivery point switching station (Carmel Church Switching Station) in Caroline County, which will provide interconnection to Rappahannock Electric Cooperative (REC) to serve existing and planned development in the area.

The Project is necessary to provide electrical service requested by REC to support data center development in Caroline County, maintain reliable service for overall load growth in the area, and comply with mandatory North American Electric Reliability Corporation (NERC) Standards.

The purpose of this desktop analysis is to identify and evaluate potential impacts of the Project on aquatic resources (wetlands, streams, creeks, runs, and open water features) in the area. In accordance with Virginia Department of Environmental Quality (DEQ) and the SCC's Memorandum of Agreement, the evaluation was conducted using various data sets that may indicate wetland location and type. This report is being submitted to the DEQ as part of the DEQ Wetland Impacts Consultation.

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This assessment did not include field investigations required for wetland delineations, as defined in the U.S. Army Corps of Engineers Wetland Delineation Manual (Environmental Laboratory, 1987) and the 2012 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (Version 2.0) or the 2010 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0), depending on the location of the wetland.

PROJECT STUDY AREA AND POTENTIAL ROUTES

A study area was developed encompassing the Project origin and termination points for the planned facilities as well as an area broad enough for the identification of reasonable route alternatives meeting the Project objectives. Additionally, and to the extent practicable, the limits of the study area were defined by reference to easily distinguishable landmarks, such as roads or other recognizable features.

Based on the above, ERM and Dominion defined the boundaries of the study area for the Project as follows:

- The Lake Caroline community and the intersection of Dominion's existing Line #256 at Rogers Clark Boulevard to the north;
- Verdon Road at U.S. Route (US) 1 (also signed as Jefferson Davis Highway) and the industrial development along US 1 to the south;
- Dominion's existing Line #256 transmission corridor to the east; and
- Dominion's existing Line #574 transmission corridor to the west.

The study area identified for the Project encompasses approximately 36,200 acres (56.6 square miles) within southwestern Caroline County and in northwestern Hanover County (approximately 43.0 square miles in Caroline County and 13.6 square miles in Hanover County). The Project origin is the Company's existing Ladysmith CT – St. Johns Line (Line #256), terminating at the proposed Carmel Church Switching Station located adjacent to the west side of Interstate 95 (I-95). There are no incorporated cities within the study area. The study area is shown in Attachment 1.

Within the study area, ERM initially identified four potential cut-in locations along the Company's existing Line #256 on the eastern edge of the study area and two potential cut in locations along the Company's existing Line #574 on the western edge of the study area. ERM identified four potential route options to connect to Line #256 and two route options to connect to Line #574. Of these, two potential cut-in locations (both on existing Line #256) and their associated routes (Routes 1 and 2) were retained for further analysis, while the others were eliminated. Descriptions of the routes are provided in the subsections below and shown on Attachment 1.

ROUTE ALTERNATIVES

ROUTE 1

Route 1 extends from a tap along the Company's existing Line #256 to the proposed Carmel Church Switching Station at the northern end of the Washington DC South development. The tap is approximately 100 feet south of Line #256 crossing of Old CC Road. From there, Route 1 extends west-northwest across primarily forested land for approximately 0.7 mile, then turns west-southwest, continuing through primarily forested land. The easternmost 1.0 mile of Route 1 is within Caroline County's Planned Innovation, Research, and Technology (PIRT) District. Approximately 1.2 miles west of the tap point, Route 1 crosses portions of Reedy Creek, a Columbia Natural Gas easement, and the CSX Railroad line. Following those crossings, the route continues west-southwest for approximately 1.1 miles, passing behind existing industrial development and crossing Ruther Glen Road. The remaining 0.5 mile of the route extends west across forested property held by AVAOI Digital, across I-95, and into the proposed Carmel Church Switching Station.

Route 1 measures approximately 2.5 miles. The right-of-way for this alternative (29.8 acres) and the proposed Carmel Church Switching Station site (10.0 acres) would encompass a combined 39.8 acres.

ROUTE 2

Route 2 extends from a tap along the Company's existing Line #256 to the proposed Carmel Church Switch Station at the northern end of the Washington DC South development. The tapis approximately 0.5 mile north of the existing line's crossing of Ruther Glen Road. From there, Route 2 travels west-northwest through forested land for approximately 0.5 mile parallel to and south of Granny's Way, then approximately 0.2 mile west-southwest along the edge of an agricultural field (also to the south of Granny's Way) before crossing Ruther Glen Road. Route 2 continues west for about 0.5 mile through forested between residential parcels land before turning northwest for approximately 0.4 mile through forested property held by AVAOI Digital. Route 2 crosses I-95 and then continues north paralleling the western edge of I-95 for approximately 1.0 mile. Route 2 crosses a Columbia Natural Gas easement and the CSX Railroad line approximately 0.5 mile before connecting into the Carmel Church Switch Station.

Route 2 measures approximately 2.8 miles. The right-of-way for this alternative (33.1 acres) and the proposed Carmel Church Switching Station site (10.0 acres) would encompass a combined 43.1 acres.

ERM

DATE
12 December 2024

REFERENCE
0715013

DESKTOP EVALUATION METHODOLOGY

The area of effect considered for this study consists of the proposed rights-of-way identified above within which the electric transmission lines would be constructed and operated. Data sources used for this review include the following, each of which is described briefly below:

- National Agricultural Imagery Program (NAIP) aerial imagery flown December 2023, (NAIP 2023)
- USA NAIP Imagery: Color Infrared NAIP Infrared Images, Virginia, 1-meter pixel resolution (NAIP 2024)
- USA NAIP Imagery: Natural Color Images (2010-2022), Virginia, 1-meter pixel or better resolution (NAIP 2024a)
- Google Earth Aerial Imagery (Google LLC 2024)
- ESRI World Elevation Terrain 2-foot contours (ESRI et al. 2024)
- U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) mapping (USFWS 2024)
- U.S. Department of Agriculture-Natural Resources Conservation Service (USDA-NRCS) Soil Survey Geographic (SSURGO) database (USDA-NRCS 2023)
- The National Hydrography Dataset Plus High Resolution (NHD) (USGS 2024)

NATURAL COLOR AND INFRARED AERIAL PHOTOGRAPHY

Recent (2023) natural color aerial photography was used to provide a visual overview of the Project area and to assist in evaluating current conditions. Infrared aerial photography was used to identify the potential presence of wetlands based on signatures associated with the levels of reflectance. For example, areas that are inundated with water appear very dark (almost black) due to the low level of reflectance in the infrared spectrum. The presence of these dark colors can be used as a potential indicator of hydric or inundated soils that are likely associated with wetlands.

TOPOGRAPHIC MAPS

Recent ESRI world topographic maps show the topography of the area as well as other important landscape features such as forest cover, development, buildings, agricultural areas, streams, lakes, and wetlands (USGS 2024; ESRI et al., 2024).

USFWS NATIONAL WETLAND INVENTORY MAPPING

NWI maps provide the boundaries and classifications of potential wetland areas as mapped by the USFWS (USFWS 2024). NWI data is based primarily on aerial photo interpretations with limited ground-truthing and may represent incorrect boundaries or wetland cover types.

NWI data can be unreliable in some areas, especially in forested landscapes, where aerial photography is used as the major data source. The classifications of the majority of the NWI polygons in the study area appear to be accurate based on a review of the cover types observed in the aerial photography. However, in areas where there was an obvious discrepancy between the NWI classification and the aerial photography, ERM modified the classification to more accurately reflect current conditions. In order to acknowledge ERM's adjustment of NWI classifications where appropriate, all the wetland types referenced in this assessment are referred to as "assigned wetland cover types" regardless of whether the cover type was modified from the NWI classification.

USDA-NRCS SOILS DATA

Soils in the study area were identified and assessed using the SSURGO database, which is a digital version of the original county soil surveys (USDA-NRCS 2023). The attribute data within the SSURGO database provides the proportionate extent of the component soils and their properties (e.g., hydric rating) for each soil map unit. The soils in the study area were grouped into three categories based on the hydric rating of the component soils within each map unit: hydric, partially hydric, and non-hydric. Hydric soils were defined as those where the major component soils, and minor components in some cases, are designated as hydric. Hydric components in these map units account for more than 80 percent of the map unit. Partially hydric soils include map units that only contain minor component soils that are designated as hydric. The partially hydric map units in the Project area contain 10 percent or less hydric soils. The remaining map units do not contain any component soils that are designated as hydric. Areas mapped as hydric or partially hydric have a higher probability of containing wetlands than areas with no hydric soils.

USGS NATIONAL HYDROGRAPHY DATASET

The National Hydrography Dataset (NHD) dataset contains features such as lakes, ponds, streams, rivers, and canals (USGS 2024). The waterbodies mapped by the NHD appeared generally consistent with those visible on the USGS maps and aerial photography.

PROBABILITY ANALYSIS

ERM used a stepwise process to identify probable wetland areas along the proposed routes, as follows:

- Infrared and natural color aerial photography was used in conjunction with topographic maps and soils maps to identify potential wetland areas. Boundaries were assigned to the areas that appeared to exhibit wetland signatures based on this review and a cover type was determined based on aerial photo interpretation. For the purpose of the study, these areas are referred to as Interpreted Wetlands.

- To further determine the probability of a wetland occurring within a given location, the Interpreted Wetland polygon shape files were digitally layered with the NWI mapping and soils information from the SSURGO database.
- The probability of a wetland occurring was assigned based on the number of overlapping data layers (i.e., indicators of potential wetland presence) that occurred in a particular area.

The criteria assigned to each probability are outlined in Table 1.

TABLE 1: CRITERIA USED TO RANK THE PROBABILITY OF WETLAND AND WATERBODY OCCURRENCE

Probability	Criteria
High	Areas where layers of hydric soils, Interpreted Wetlands, and NWI data overlap
Medium/High	NWI data overlaps hydric soils; or NWI data overlaps Interpreted Wetlands with or without partially hydric soils; or Hydric soils overlap Interpreted Wetlands
Medium	Interpreted Wetlands with or without overlap by partially hydric soils
Medium/Low	Hydric soils only; or NWI data with or without overlap by partially hydric soils
Low	Partially hydric soils only
Very Low	Non-hydric soils only

WETLAND AND WATERBODY CROSSINGS

The desktop analysis provides a probability of wetlands and waterbody occurrence within each route, with wetlands and waterbodies classified based on the Cowardin classification system described below:

- Palustrine Emergent (PEM) wetlands – characterized by erect, rooted, herbaceous hydrophytes (i.e., aquatic plants) and woody species less than 3 feet in height, excluding mosses and lichens;
- Palustrine Scrub-Shrub (PSS) wetlands – characterized by woody vegetation, excluding woody vines, approximately 3 to 20 feet in height;
- Palustrine Forested (PFO) wetlands – characterized by woody vegetation, excluding woody vines, approximately 20 feet or more in height and 3 in. or larger diameter at breast height (DBH);

- Palustrine Unconsolidated Bottom (PUB) open waters – characterized by bottom substrate particles smaller than stones (less than 10 inches) covering greater than 25 percent of the area, with plants covering less than 30 percent of the area; and
- Riverine streams – channels containing periodically or continuously moving water (USFWS 2013).

A range of wetland occurrence probabilities are reported by this study from very low to high. The probability of wetland occurrence increases as multiple indicators begin to overlap towards the "high" end of the spectrum. The medium, medium-high, and high probability categories are the most reliable representation of in-situ conditions, due to overlapping data sets, and these categories are reported in the summary below as a percentage of the total acreage of each route.

As stated above, field delineations were not performed and would be required to verify the accuracy and extent of aquatic resource boundaries. However, a field delineation was completed by WSP USA Inc. in July 2024 on the parcel containing the proposed Carmel Church Substation, which identified aquatic resources along Route 2 between MPs 2.3 and 2.6 (WSP 2024). The boundaries of these field delineated aquatic resources were used in the desktop wetland delineation and are included in the wetland and waterbody numbers provided in this report.

Attachment 2 depicts the interpreted wetland and waterbody probability and type displayed on color base map images.

RESULTS

Results of the probability analysis are presented in Table 2 below. Summaries are provided in the sections following the table. No wetlands or waterbodies were identified within the Carmel Church Substation footprint.

TABLE 2: SUMMARY OF THE PROBABILITIES OF WETLAND AND WATERBODY OCCURRENCE ALONG THE ROUTE ALTERNATIVES [a]

Probability	Total Within Right-of-way (acres)[b]	Wetland and Waterbody type (acres)				
		PEM (Emergent)	PFO (Forested)	PSS (Scrub Shrub)	PUB (Freshwater pond)	Riverine (Stream)
Route 1						
High	0.8	NA	NA	NA	0.8	NA

Probability	Total Within Right-of-way (acres)[b]	Wetland and Waterbody type (acres)				
		PEM (Emergent)	PFO (Forested)	PSS (Scrub Shrub)	PUB (Freshwater pond)	Riverine (Stream)
Medium/High	0.6	0.0	0.0	NA	0.5	0.0
Medium	1.4	0.4	0.9	NA	0.1	0.0
Medium/Low	0.1	0.0	0.1	NA	0.0	0.0
Low	NA	NA	NA	NA	NA	NA
Very Low	NA	NA	NA	NA	NA	NA
Route 2						
High	0.2	NA	0.2	NA	NA	0.0
Medium/High	0.8	NA	0.7	NA	NA	0.1
Medium	0.7	NA	0.7	NA	NA	0.0
Medium/Low	0.0	NA	0.0	NA	NA	0.0
Low	NA	NA	NA	NA	NA	NA
Very Low	NA	NA	NA	NA	NA	NA

NA: Not applicable due to absence of wetland or waterbody type within the alternative route

a Numbers in this table have been rounded for presentation purposes; as a result, the totals may not reflect the sum of the addends.

b Total acres may not total the sum of wetland and waterbody types because some of the lower probability rankings do not overlap with NWI or interpreted wetlands, and therefore do not have a wetland/waterbody type associated with them.

WETLAND CROSSINGS

Within the study area, most wetlands are forested and are generally concentrated around Reedy Creek and its tributaries in the northeastern part of the study area and North Anna

River and its tributaries in the southwestern part of the study area. Riverine (stream) and PUB (open water features) are described in the Waterbody Crossings section below.

ROUTE 1

The length of the corridor for Carmel Church Route 1 is approximately 2.5 miles and encompasses a total of approximately 29.8 acres (not including the 10.0-acre Carmel Church Switching Station footprint). Based on the methodology discussed above, the right-of-way footprint will encompass approximately 9.3 percent (2.8 acres) of land with a medium or higher probability of containing wetlands and waterbodies. Of the 2.8 acres of wetlands and waterbodies, 0.9 acres consist of PFO wetlands, 0.4 acre consists of PEM wetlands, 1.3 acres consist of PUB open water features, and 0.1 acre consists of riverine features.

ROUTE 2

The length of the corridor for Carmel Church Route 2 is approximately 2.8 miles and encompasses a total of approximately 33.1 acres (not including the 10.0-acre Carmel Church Switching Station footprint). Based on the methodology discussed above, the right-of-way footprint will encompass approximately 5.0 percent (1.7 acres) of land with a medium or higher probability of containing wetlands and waterbodies. Of the 1.7 acres of wetlands and waterbodies, 1.6 acres consist of PFO wetlands and 0.1 acre of riverine features.

WATERBODY CROSSINGS

ERM identified and mapped waterbodies in the study area using similar publicly available GIS databases as those used to identify and map wetlands. Waterbody counts crossed by the route alternatives are summarized in Table 3 below. Waterbodies crossed by the Carmel Church Routes include Reedy Creek and unnamed, intermittent tributaries to Reedy Creek and the North Anna River as well as open water features. No waterbodies were identified within the Carmel Church Substation footprint.

TABLE 3: WATERBODIES CROSSED BY THE ROUTE ALTERNATIVES

Waterbodies Crossed	Unit	Route 1	Route 2
Perennial Streams/Rivers	Number	0	0
Intermittent Streams/Rivers	Number	5	4
Perennial Lakes/Ponds	Number	1	0
Total	Number	6	4

Source: USGS NHD (NHD 2023)

ROUTE 1

Route 1 would have a total of six NHD-mapped waterbody crossings, including a perennial lake/pond associated with Reedy Creek and five unnamed, intermittent streams. As described above, based on ERM's desktop wetland and waterbody analysis, the right-of-way for Route 1 would encompass approximately 1.2 acres of PUB open water features and 0.1 acre of riverine features.

ROUTE 2

Route 2 would have a total of four NHD-mapped waterbody crossings, all unnamed, intermittent streams. As described above, based on ERM's desktop wetland and waterbody analysis, the right-of-way for Route 3 would encompass approximately 0.1 acre of riverine features.

PROJECT IMPACTS

Avoiding or minimizing new impacts on wetlands and streams was among the criteria used in developing routes for the Project. To minimize impacts on wetland areas, the transmission line has been designed to span or avoid wetlands and waterbodies where possible, keeping transmission structures outside of aquatic resources to the extent practicable.

The majority of potential direct impacts on wetlands due to Project construction would be temporary in nature. Mats would be used for construction equipment to travel over wetlands, as appropriate. Due to the absence of an existing right-of-way, some new access roads may be necessary along the route. If a section of line cannot be accessed from existing roads, Dominion Energy Virginia may need to install a culvert, ford, or temporary bridge along the right-of-way to cross small streams. In such cases, some temporary fill material in wetlands adjacent to such crossings may be required. This fill would be placed on erosion control fabric and removed when work is completed, returning ground elevations to original contours. When siting transmission lines, perpendicular crossings of wetland systems are prioritized to minimize direct impacts to these sensitive areas and reduce overall impacts to the watershed.

Direct impacts would be limited to placement of structures within wetlands, if unavoidable, and the permanent conversion of PSS/PFO wetlands within the proposed right-of-way to PSS or PEM type wetlands.

There would be no change in contours of wetlands and waterbodies, or redirection of the flow of water, and the amount of spoil from foundations and structure placement would be minimal. Excess soil in wetlands generated through foundation construction would be mitigated through Best Management Practices (erosion and sediment controls) and would be removed from the wetland.

Required tree removal adjacent to waterbodies would reduce riparian buffer functions such as stream bank stabilization and erosion control, nutrient and sediment filtration, floodwater

DATE
12 December 2024

REFERENCE
0715013

storage and peak flow reduction, habitat diversity, and water temperature modification from shading. Where the removal of trees or shrubby vegetation occurs within wetlands, Dominion Energy Virginia would use the least intrusive method reasonably possible to clear the corridor. Within the stream buffers (100 feet), and as needed to minimize impacts to wetlands, trees and vegetation will be hand felled and stumps left in place to reduce the potential for erosion. Shrubs and trees with a diameter at breast height of less than three inches will be left in place unless it impedes temporary access where they would be clipped, leaving roots in place which will be able to naturally regenerate. Vegetation within the right-of-way would be allowed to return to maintained grasses and shrubs after construction, which would provide some filtration stabilization to help protect waterbodies from pollutants.

SUMMARY

This Wetland and Waterbody Summary report was prepared in accordance with the Memorandum of Agreement between the DEQ and the SCC for the purpose of initiating a Wetlands Impact Consultation. Please note that a formal onsite wetland delineation was not conducted as part of this review.

In addition, there is a Project website where the SCC application will be available after filing, as well as maps and discussions about the Project. It can be accessed by going to: https://www.dominionenergy.com/projects-and-facilities/electric-projects/power-line-projects/carmel-church-ruther-glen.

If you have any questions regarding this wetland assessment, please contact me at 512-374-2258 or by email at gray.ford@erm.com.

Sincerely,

Gray Ford
Environmental Resources Management

cc: Lucas Dupont, Dominion Energy Virginia
Blair Parks, Dominion Energy Virginia

Enclosures: Attachments 1 and 2

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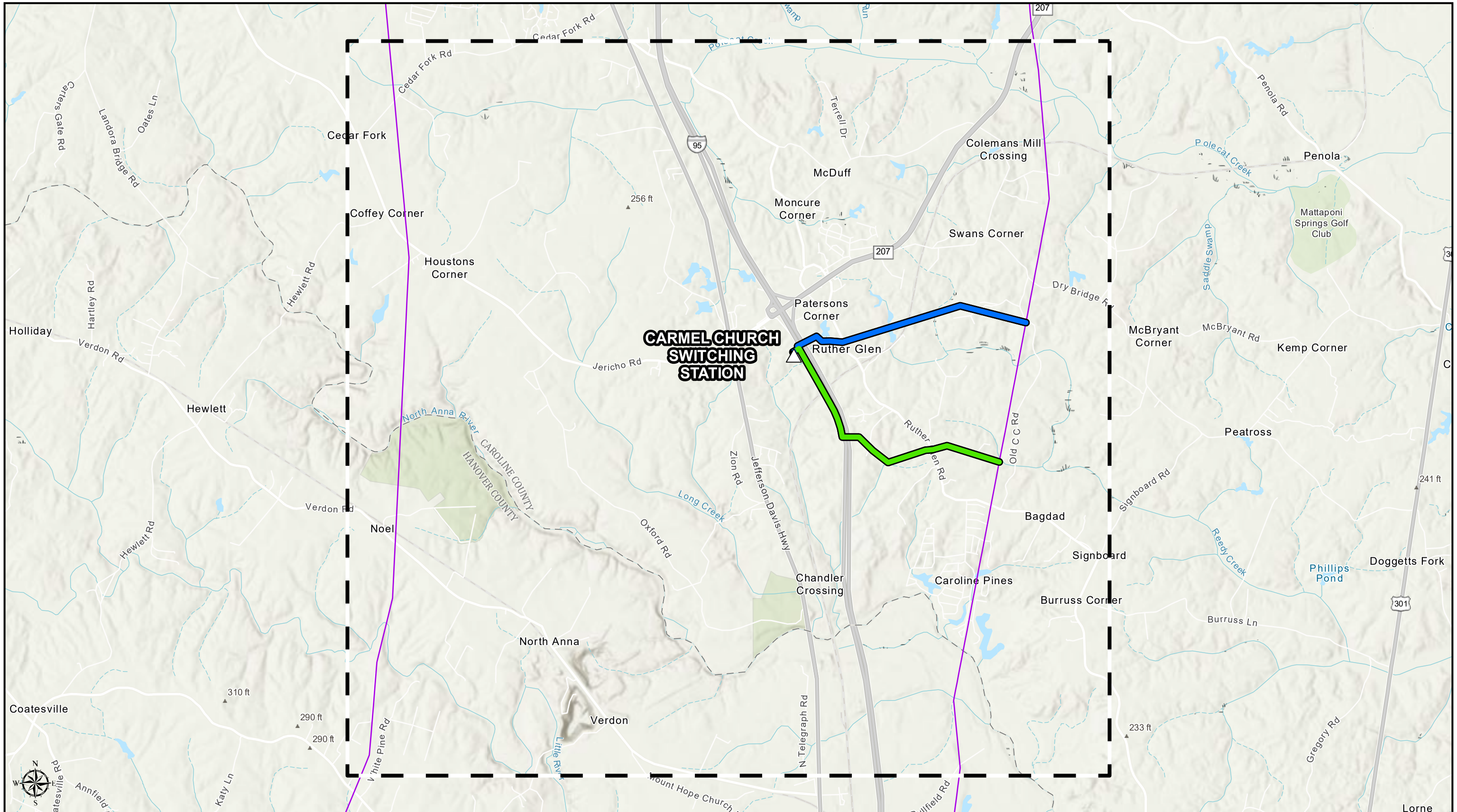
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ATTACHMENT 1

The wetlands and waterbodies depicted on this map are an estimate of possible wetland and waterbody extent based on desktop data review only, and are subject to change in extent and location based on actual field delineation of wetlands and waterbodies



Attachment 1
Overview Map
Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

ERM

222 South 9th Street
Suite 2900
Minneapolis, Minnesota 55402

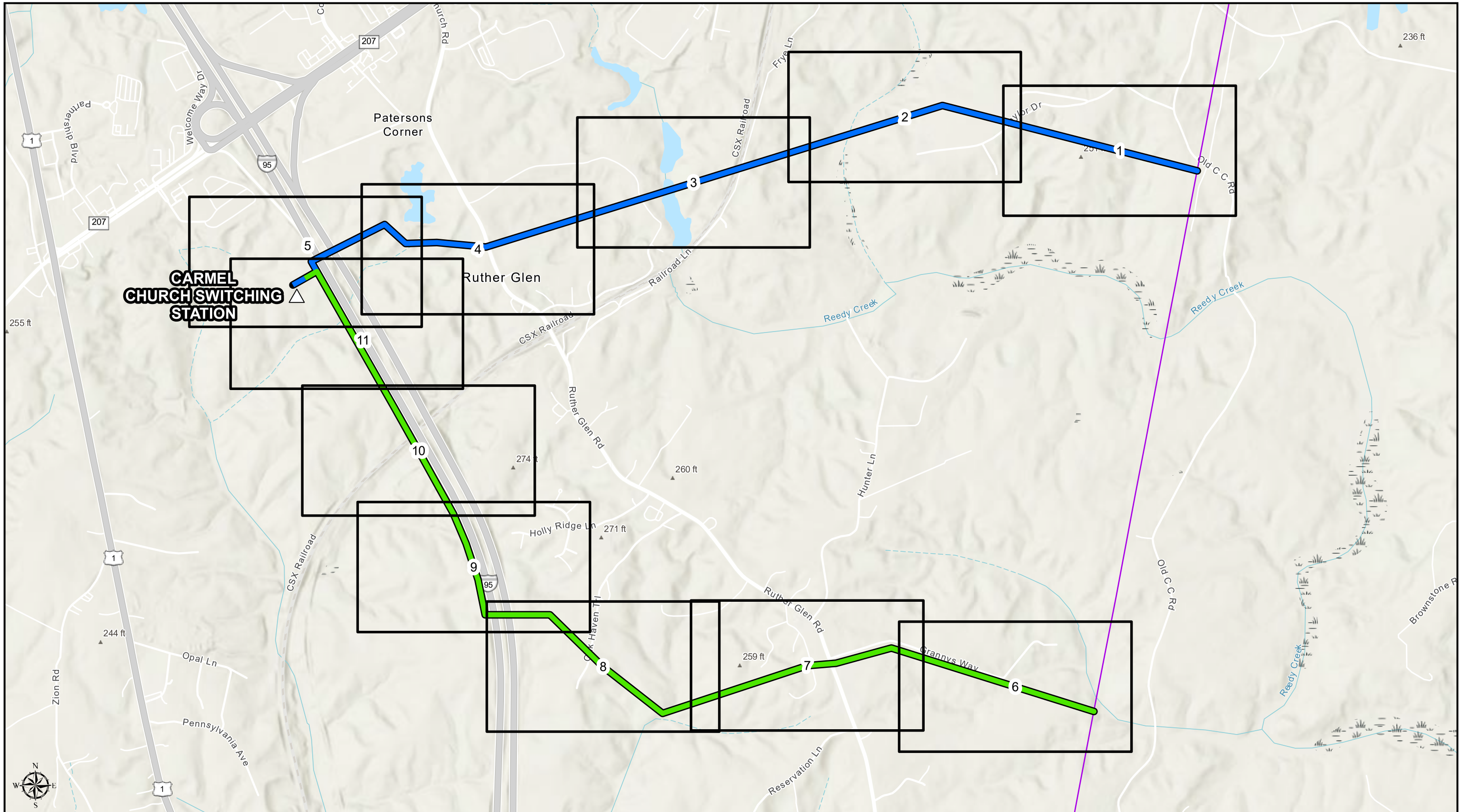
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F +0 804 253 1091

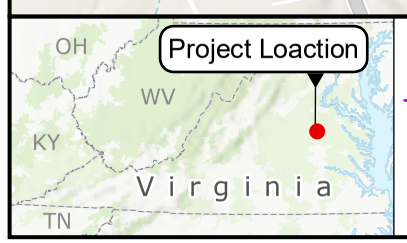
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ATTACHMENT 2

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The wetlands and waterbodies depicted on this map are an estimate of possible wetland and waterbody extent based on desktop data review only, and are subject to change in extent and location based on actual field delineation of wetlands and waterbodies





△ Proposed Switching Station

Existing Dominion Energy Electric Transmission Line

Route 1

Route 2

Index Page

1:15,000

0 750 1,500

Feet

Page 0

Attachment 2 Index
Wetland Probability Map Set
Carmel Church 230 kV Electric Transmission Project

Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

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Existing Dominion Energy Electric Transmission Line
Route 1 MP
Route 1

Wetland Probability
Medium/High
Medium
NHD Stream

NWI Wetland
Nonhydric
Predominantly nonhydric
Predominantly hydric

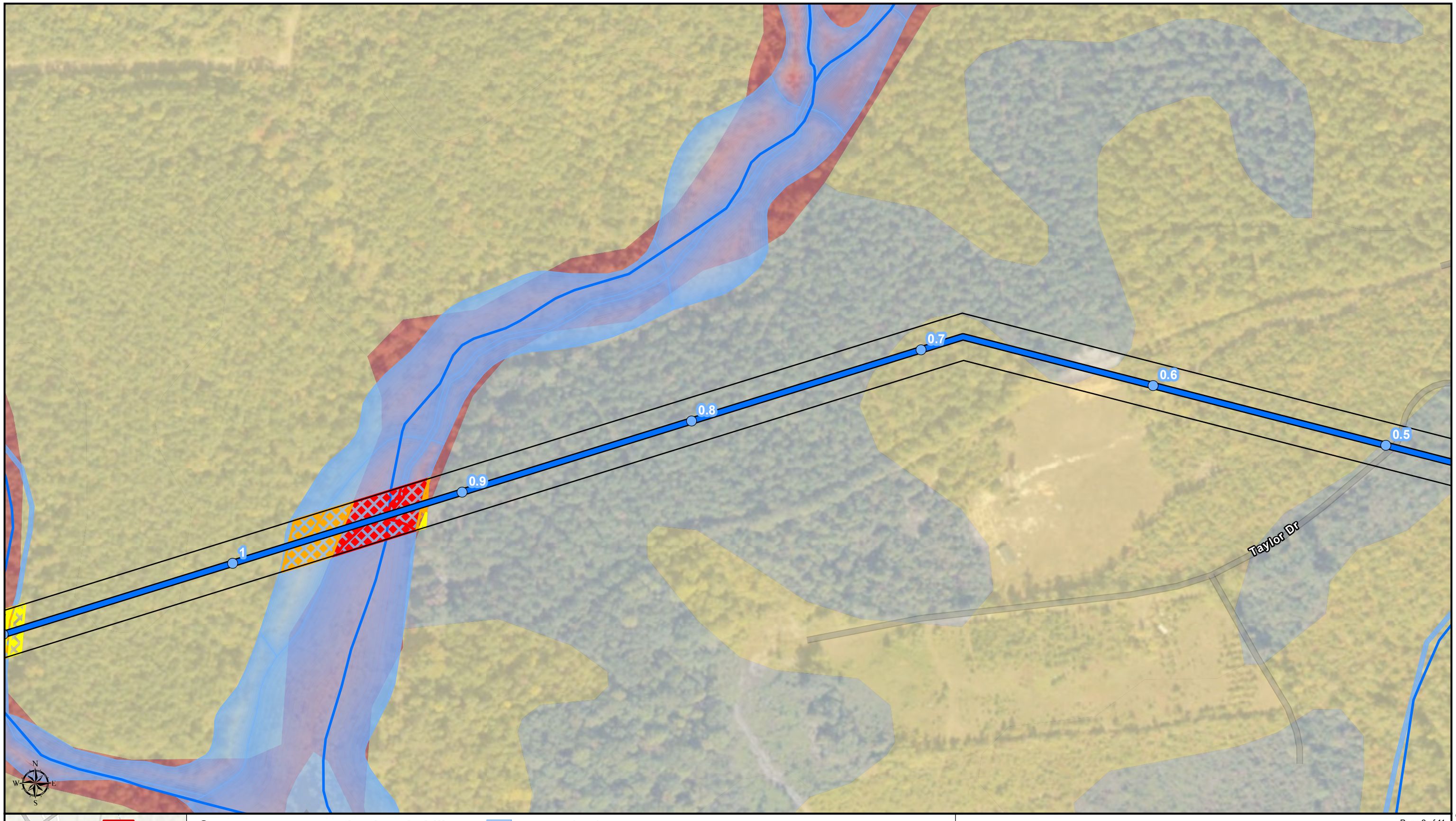
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Attachment 2
Wetland Probability Map Set - Probability
Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

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Route 1 MP
Route 1

Wetland Probability
High
Medium/High
Medium
NHD Stream

NWI Wetland
Nonhydric
Predominantly nonhydric
Predominantly hydric

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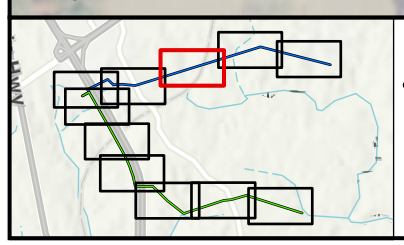
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Wetland Probability Map Set - Probability
Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

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Route 1 MP
Route 1

Wetland Probability
High
Medium/High
Medium
NHD Stream

NWI Wetland
Nonhydric
Predominantly nonhydric
Predominantly hydric

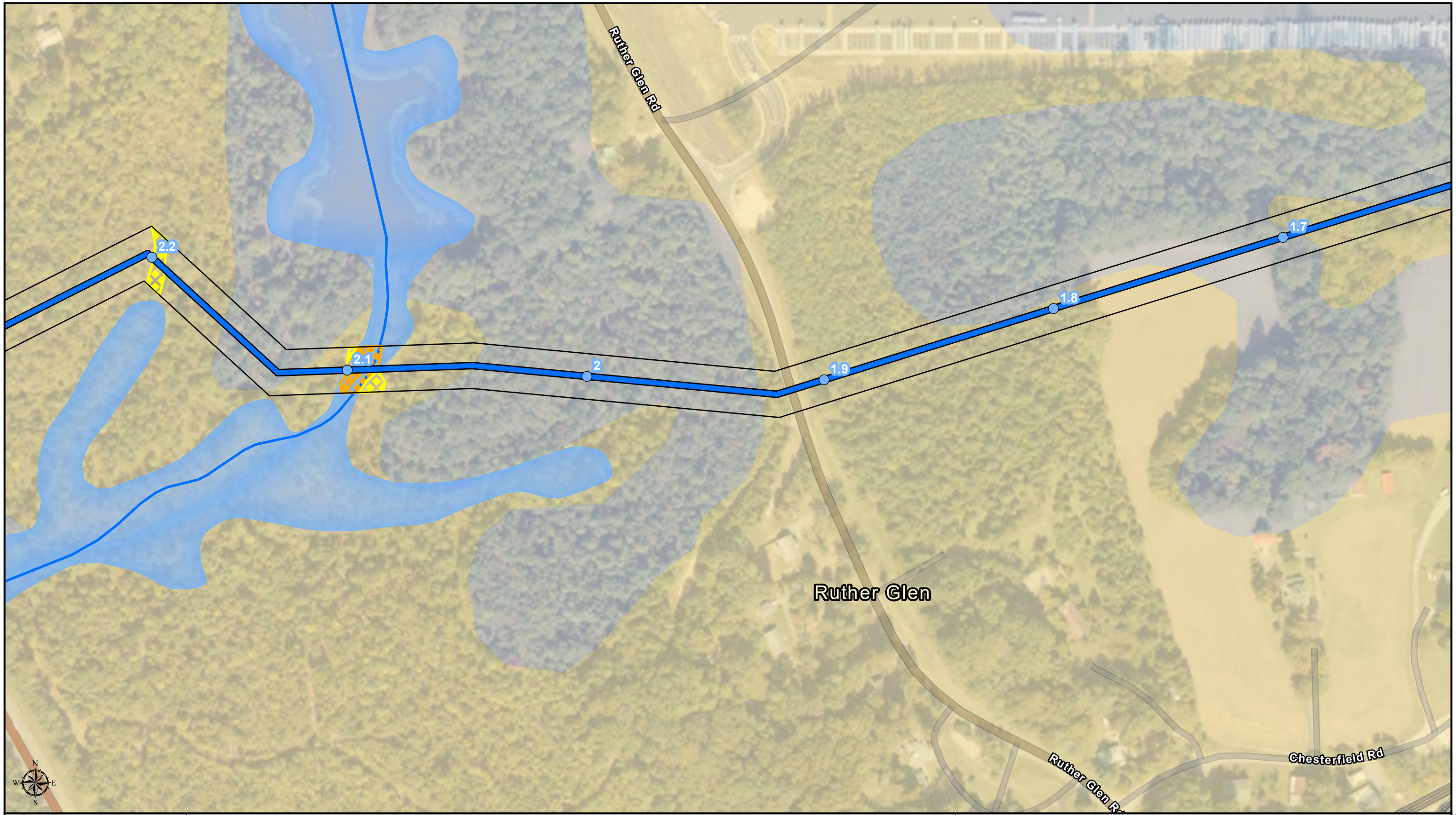
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Attachment 2
Wetland Probability Map Set - Probability
Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

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Route 1 MP
Route 1

Wetland Probability
Medium/High
Medium
NHD Stream

NWI Wetland
Nonhydric
Predominantly nonhydric

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0 100 200
Feet

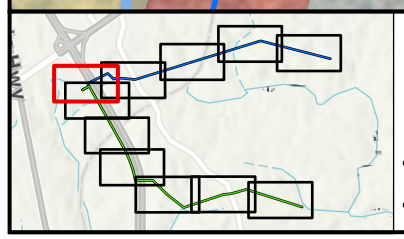
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Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

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- Proposed Switching Station
- Route 1 MP
- Route 2 MP
- Route 1
- Route 2

Wetland Probability

- Medium/High
- Medium
- NHD Stream
- NWI Wetland
- Nonhydric
- Predominantly nonhydric
- Predominantly hydric

1:2,400

0 100 200

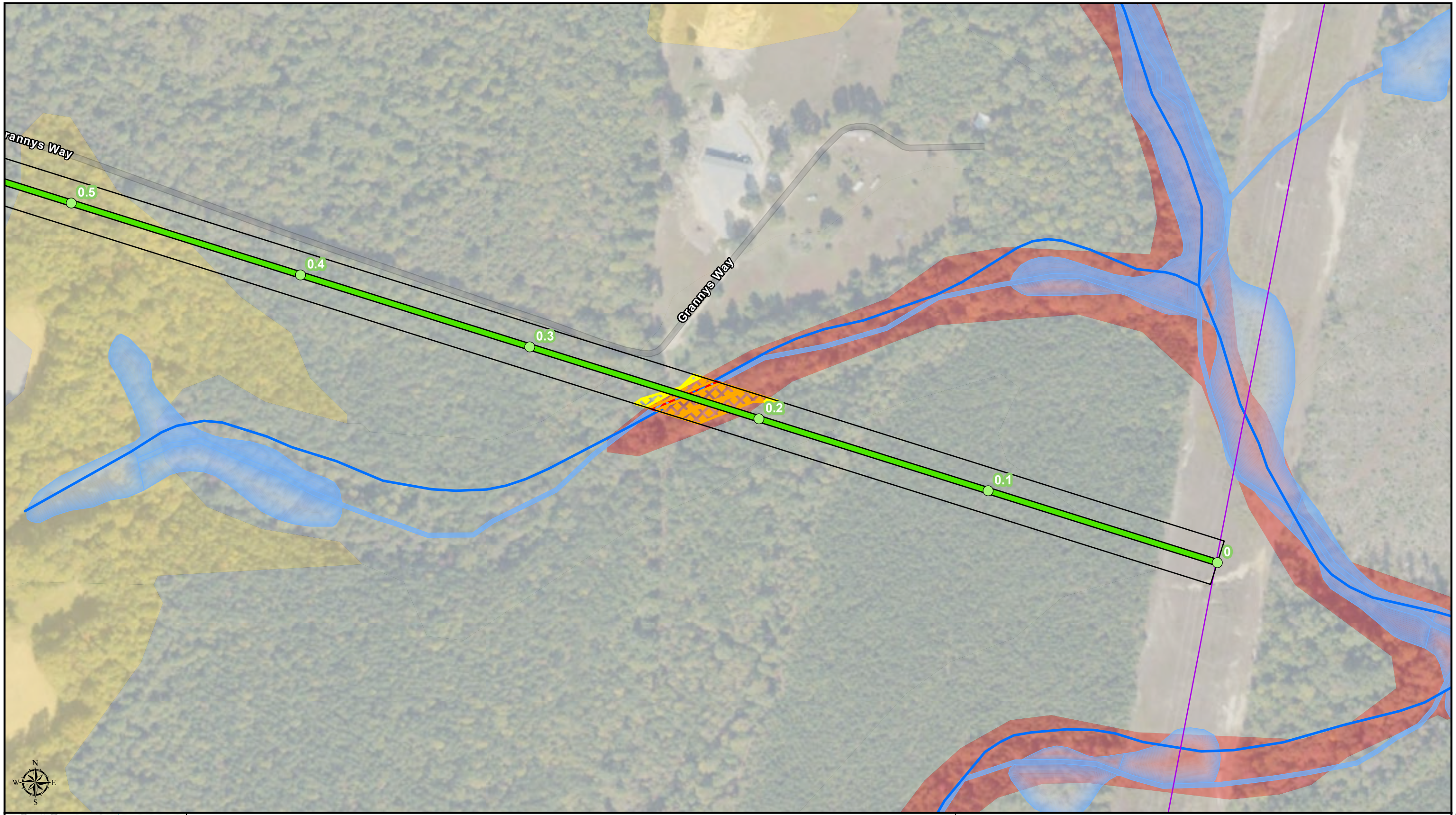
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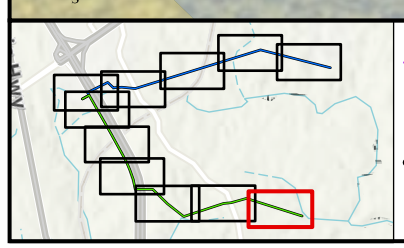
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Wetland Probability Map Set - Probability
Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

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Dominion Energy

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Existing Dominion Energy Electric Transmission Line
Route 2 MP
Route 2

Wetland Probability
High
Medium/High
Medium
NHD Stream

NWI Wetland
Nonhydric
Predominantly nonhydric
Predominantly hydric

1:2,400
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Feet

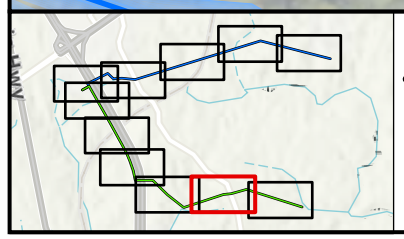
Attachment 2
Wetland Probability Map Set - Probability
Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

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Route 2 MP
Route 2
NHD Stream
NWI Wetland
Nonhydric
Predominantly nonhydric

1:2,400

0 100 200

Feet

Attachment 2
Wetland Probability Map Set - Probability
Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

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Route 2 MP
Route 2

Wetland Probability
High
Medium/High
Medium
NHD Stream

NWI Wetland
Nonhydric
Predominantly nonhydric
Predominantly hydric

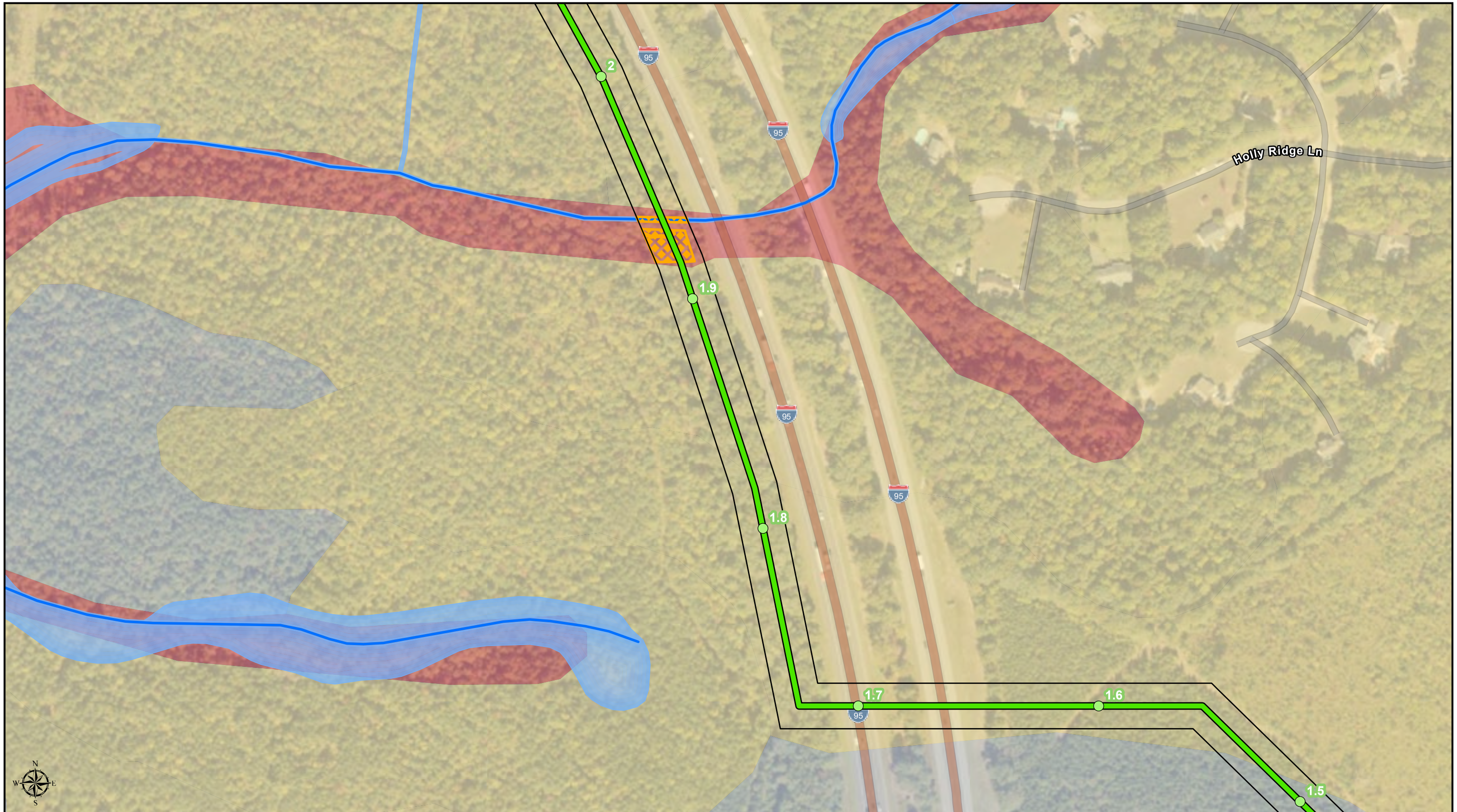
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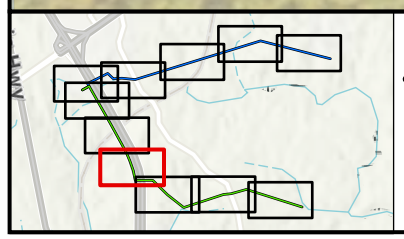
Attachment 2
Wetland Probability Map Set - Probability
Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

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Route 2 MP
Route 2

Wetland Probability
Medium/High
NHD Stream

NWI Wetland
Nonhydric
Predominantly nonhydric
Predominantly hydric

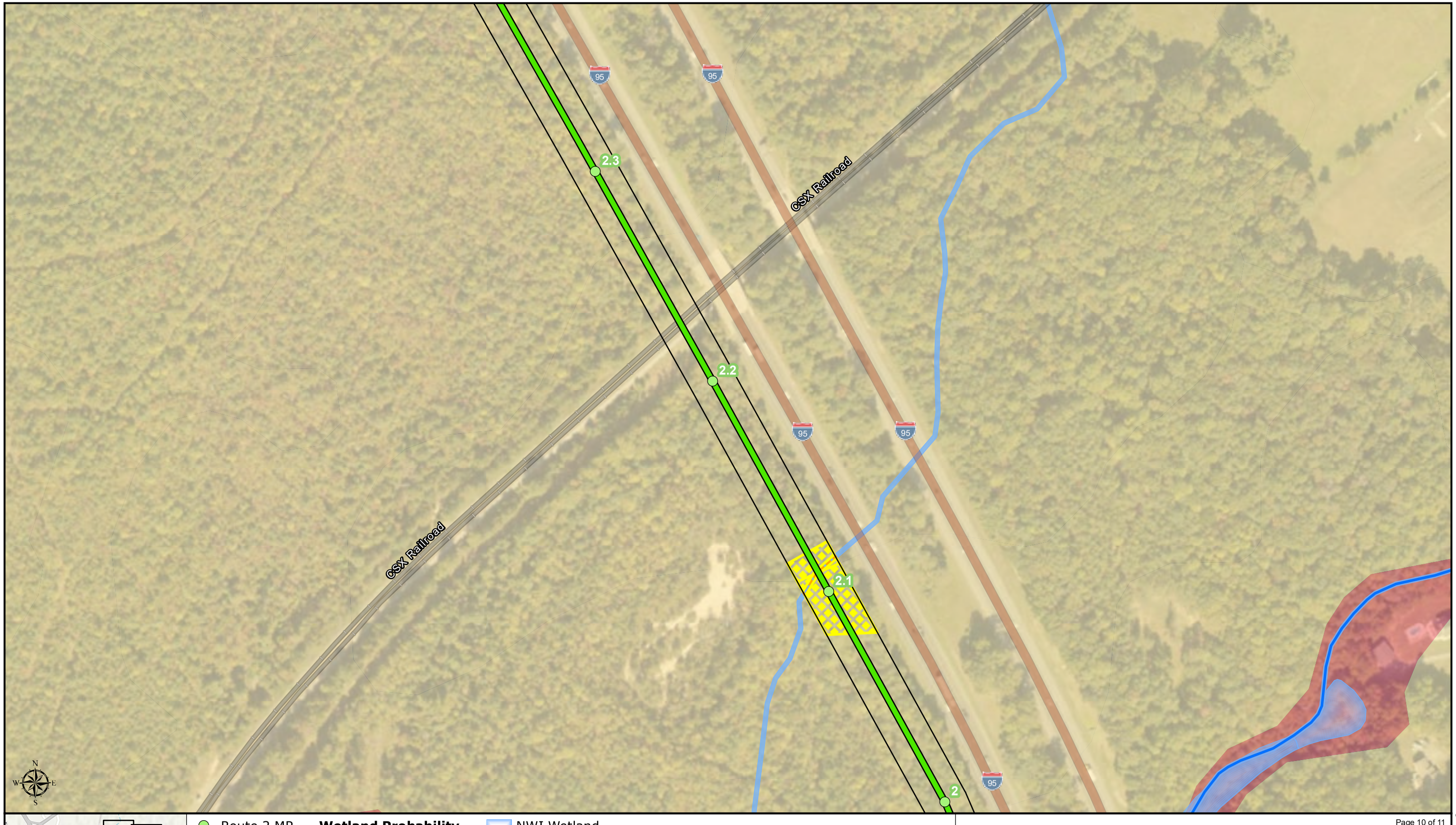
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Attachment 2
Wetland Probability Map Set - Probability
Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

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Route 2 MP
Route 2

Wetland Probability
Medium/High
Medium
NHD Stream

NWI Wetland
Predominantly nonhydric
Predominantly hydric

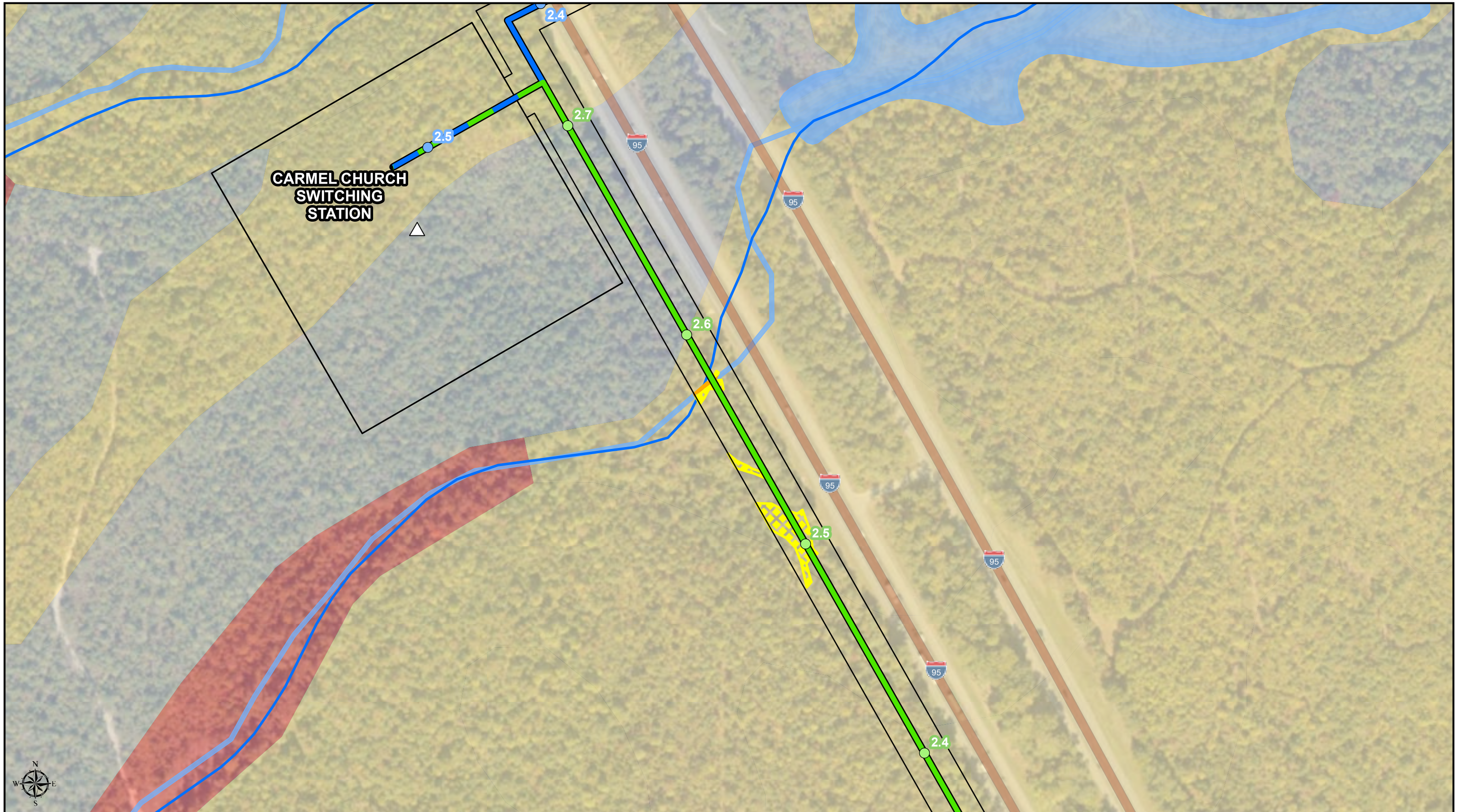
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Attachment 2
Wetland Probability Map Set - Probability
Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

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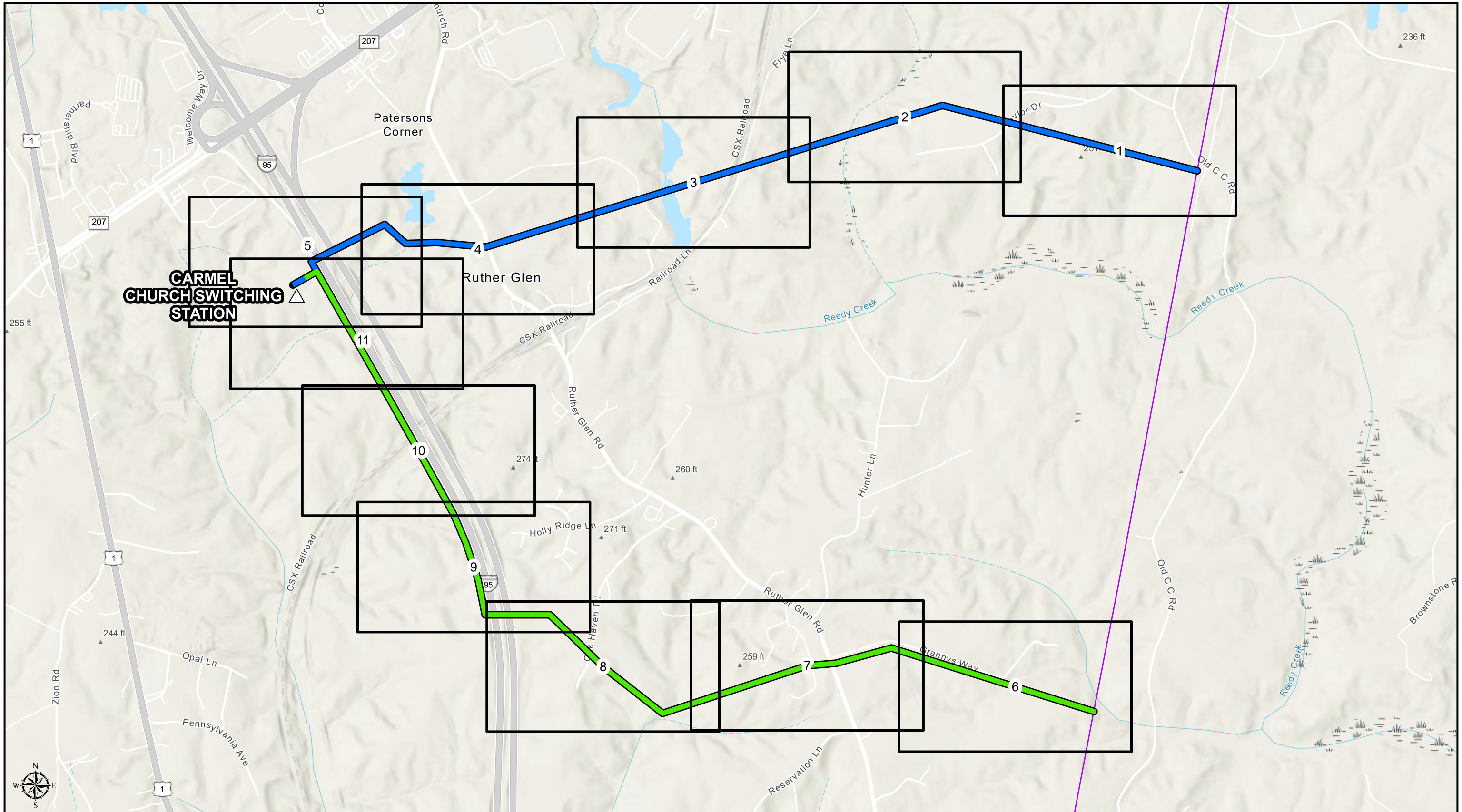


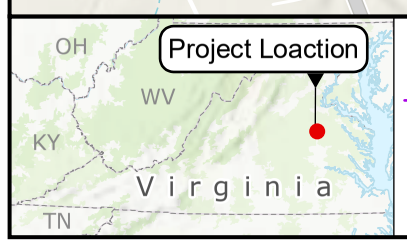
Attachment 2
Wetland Probability Map Set - Probability
Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

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△ Proposed Switching Station

Existing Dominion Energy Electric Transmission Line

Route 1

Route 2

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Attachment 2 Index
Wetland Probability Map Set
Carmel Church 230 kV Electric Transmission Project

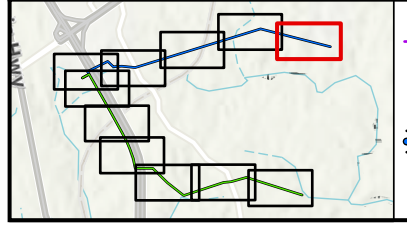
Dominion Energy Virginia
Caroline County, Virginia

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Dominion Energy

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Existing Dominion Energy Electric Transmission Line
Route 1 MP
Route 1

Wetland Cover Type
PFO
Riverine
NHD Stream
NWI Wetland
Nonhydric
Predominantly nonhydric
Predominantly hydric

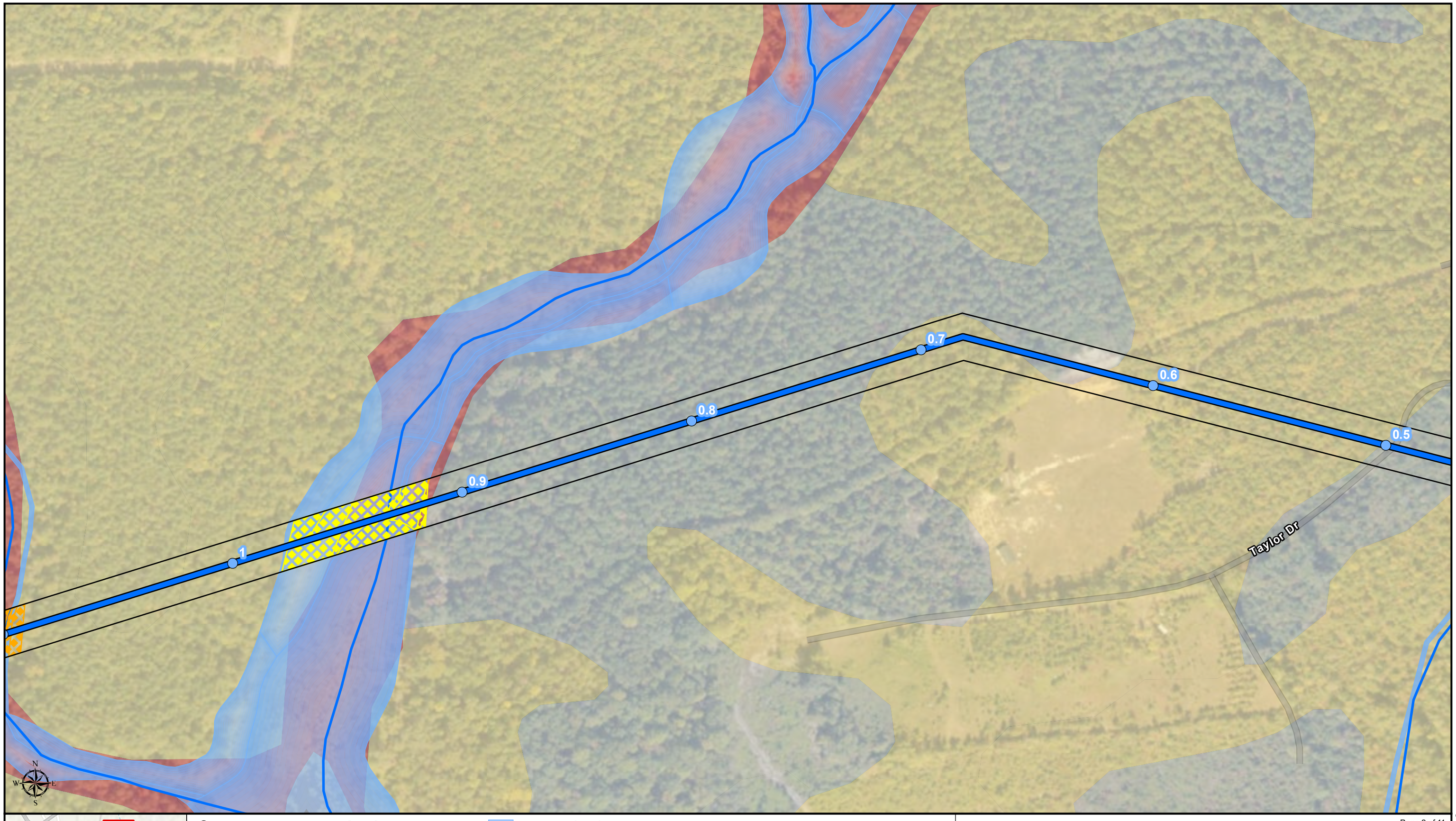
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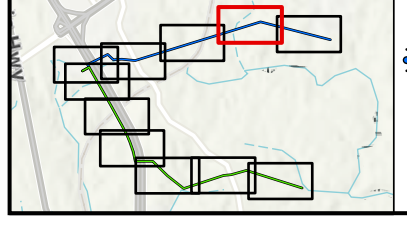
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Wetland Probability Map Set - Wetland Type
Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

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Route 1 MP
Route 1

Wetland Cover Type
PEM
PUB
Riverine
NHD Stream
NWI Wetland
Nonhydric
Predominantly nonhydric
Predominantly hydric

1:2,400
0 100 200
Feet

Attachment 2
Wetland Probability Map Set - Wetland Type
Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM
Dominion Energy

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Route 1 MP
Route 1

Wetland Cover Type
PEM
PFO
PUB
Riverine
NHD Stream

NWI Wetland
Nonhydric
Predominantly nonhydric
Predominantly hydric

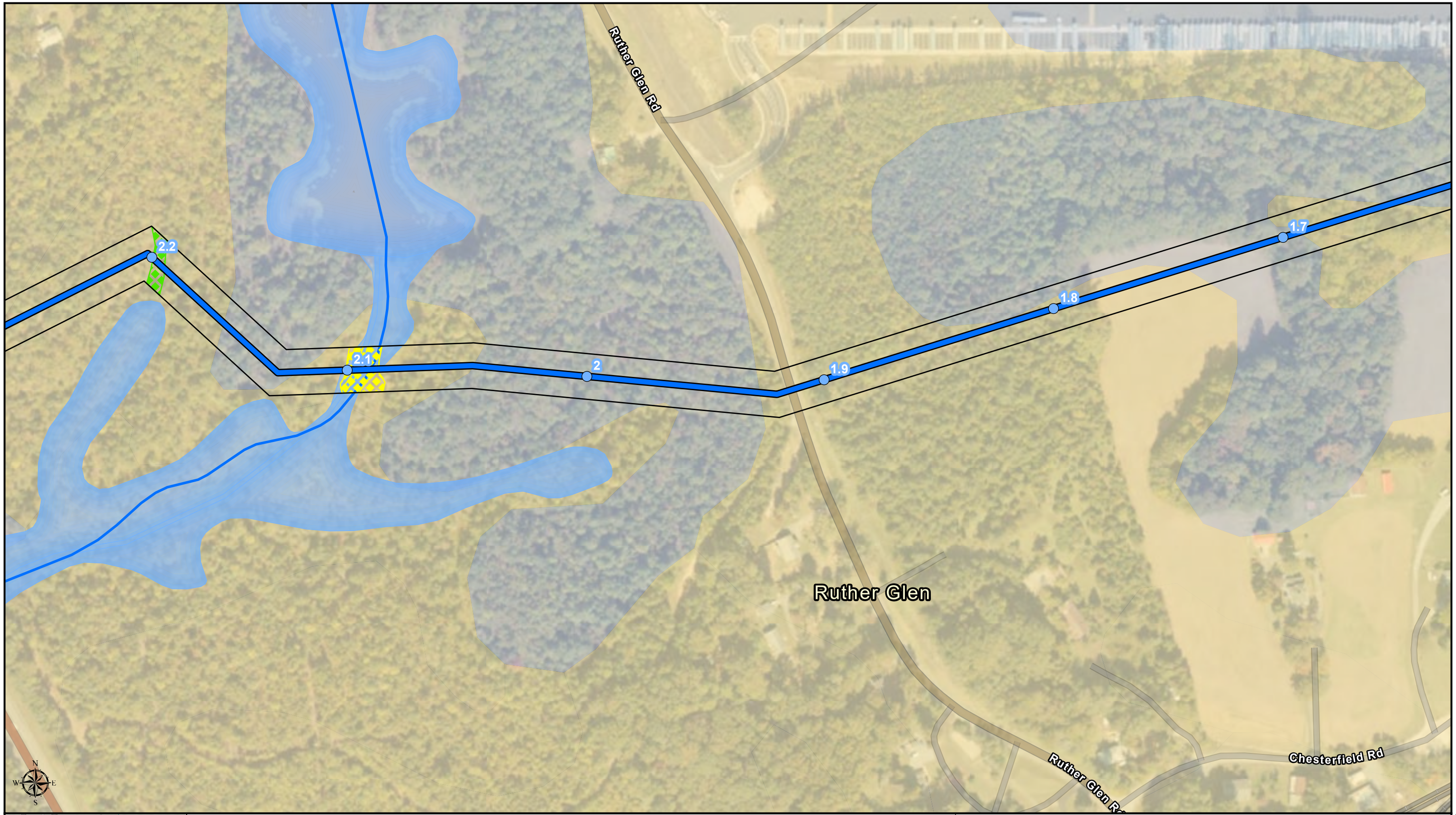
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Wetland Probability Map Set - Wetland Type
Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

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Route 1 MP
Route 1

Wetland Cover Type
PFO
PUB
NHD Stream
NWI Wetland
Nonhydric
Predominantly nonhydric

1:2,400
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Feet

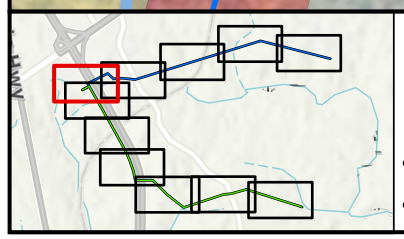
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Wetland Probability Map Set - Wetland Type
Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

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Proposed Switching Station
Route 1 MP
Route 2 MP
Route 1
Route 2

Wetland Cover Type

PFO
PUB
Riverine
NHD Stream
NWI Wetland
Nonhydric
Predominantly nonhydric
Predominantly hydric

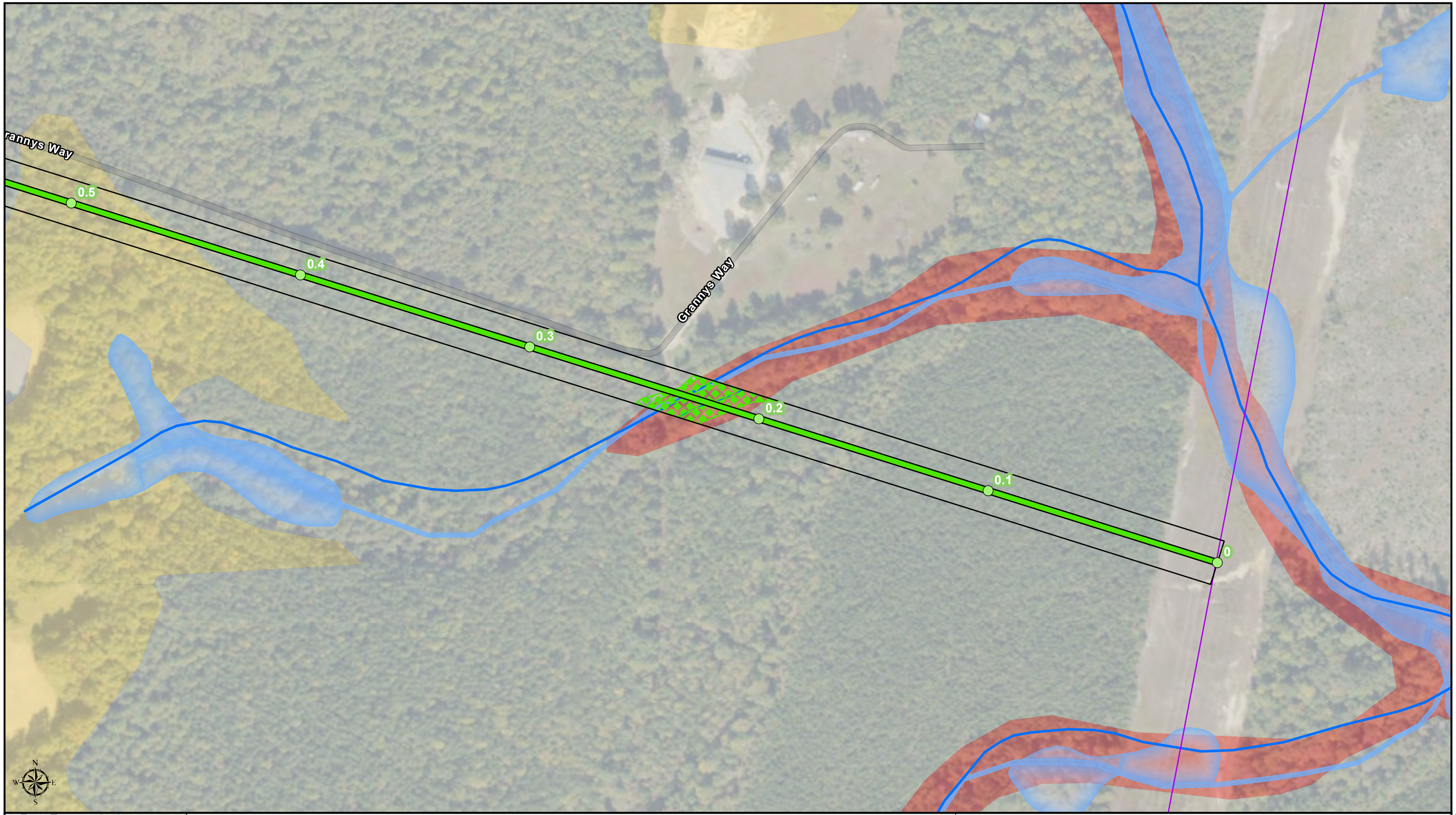
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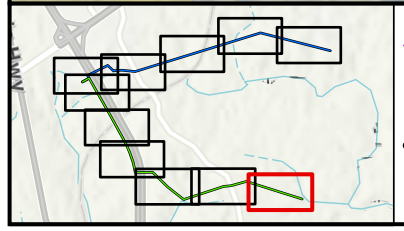
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Wetland Probability Map Set - Wetland Type
Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

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Existing Dominion Energy Electric Transmission Line
Route 2 MP
Route 2

Wetland Cover Type
PFO
Riverine
NHD Stream
NWI Wetland
Nonhydric
Predominantly nonhydric
Predominantly hydric

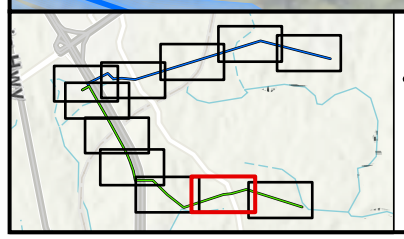
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Wetland Probability Map Set - Wetland Type
Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM
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Route 2 MP
Route 2
NHD Stream
NWI Wetland
Nonhydric
Predominantly nonhydric

1:2,400

0 100 200

Feet

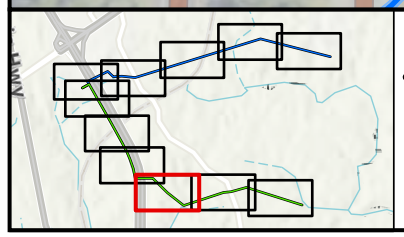
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Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

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Route 2 MP
Route 2

Wetland Cover Type
PFO
Riverine
NHD Stream

NWI Wetland
Nonhydric
Predominantly nonhydric
Predominantly hydric

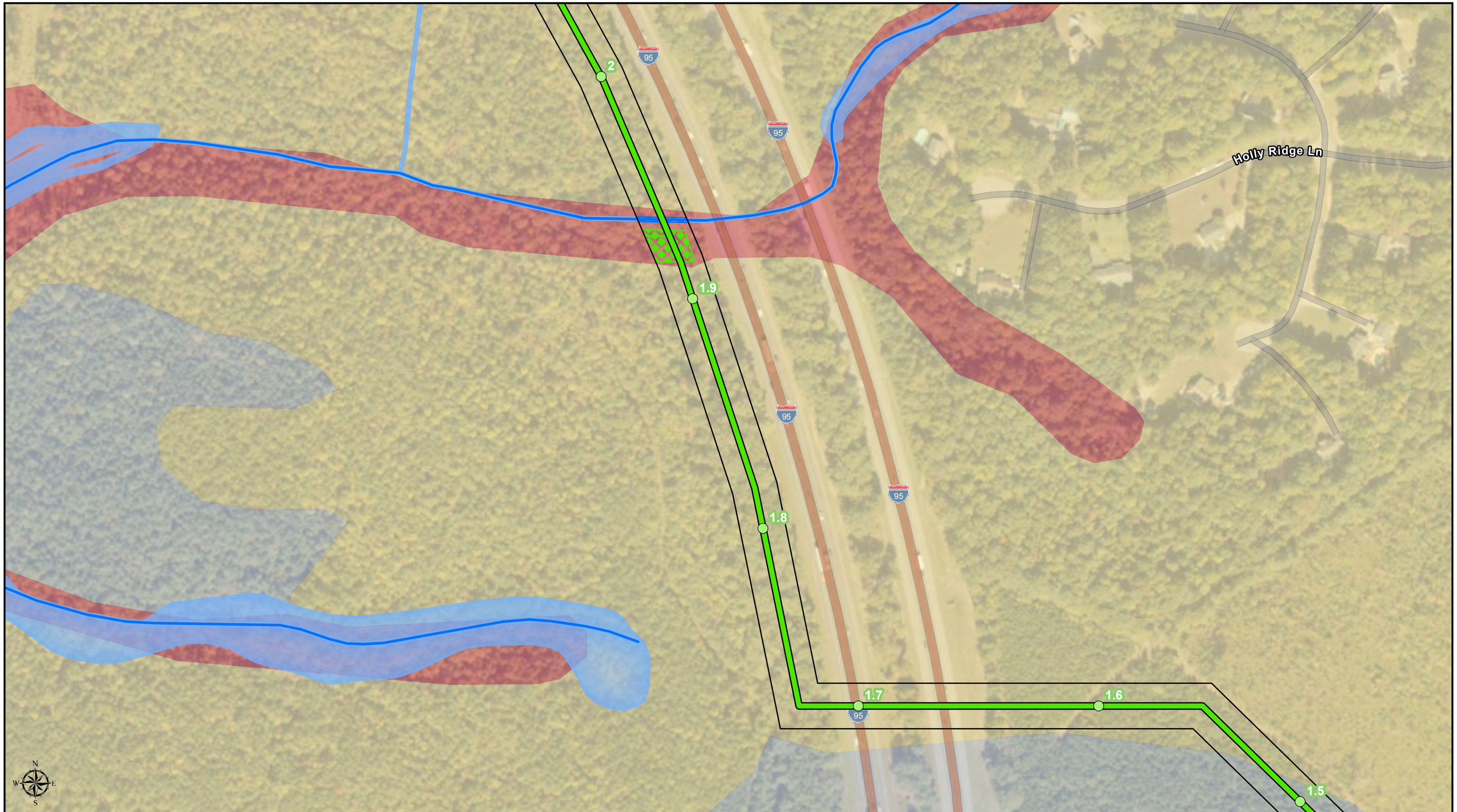
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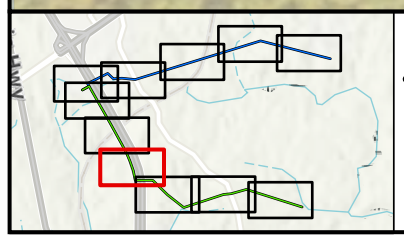
Attachment 2
Wetland Probability Map Set - Wetland Type
Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

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Route 2 MP
Route 2

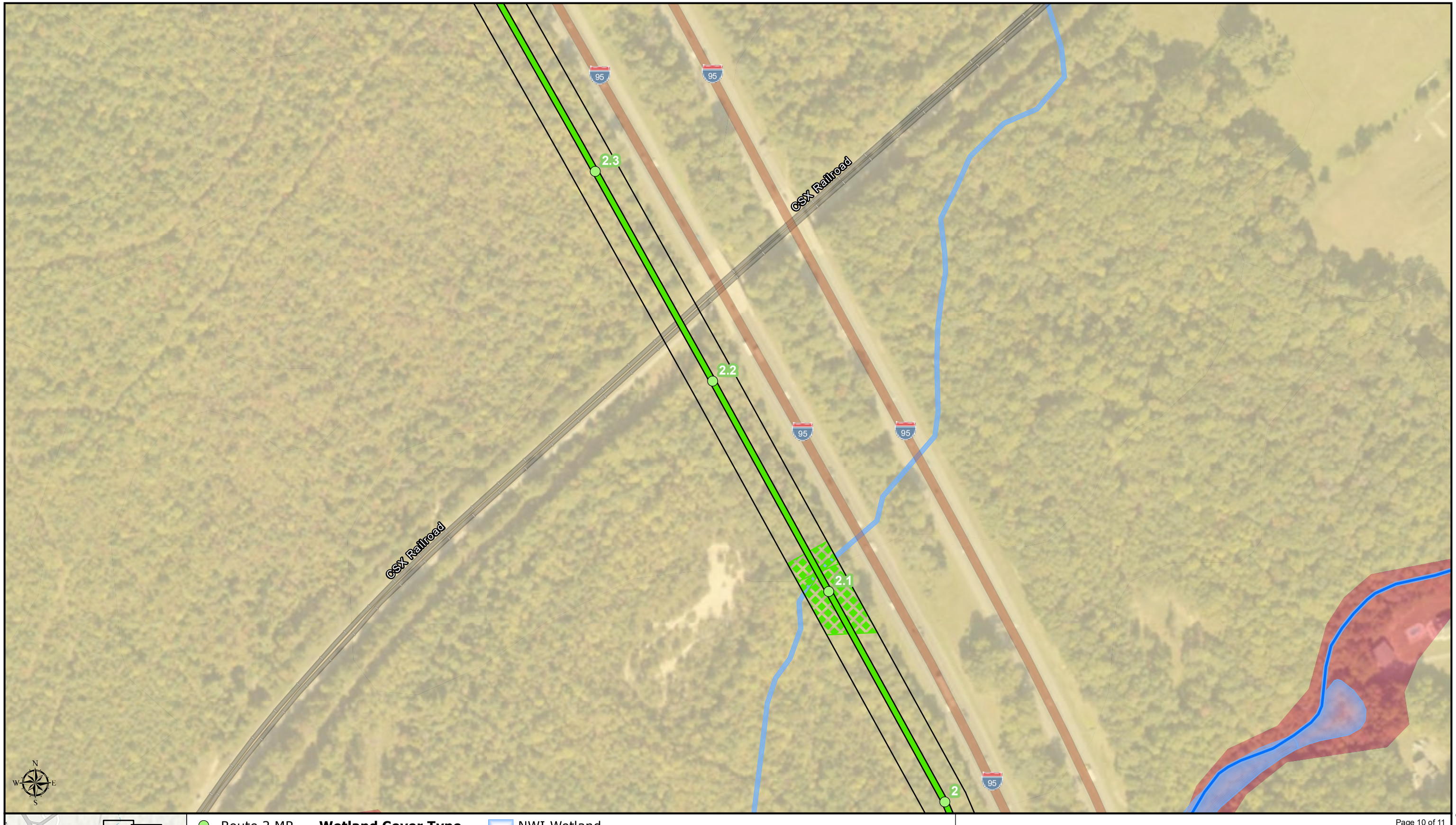
Wetland Cover Type
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Riverine
NHD Stream
NWI Wetland
Nonhydric
Predominantly nonhydric
Predominantly hydric

1:2,400
0 100 200
Feet

Attachment 2
Wetland Probability Map Set - Wetland Type
Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM
Dominion Energy

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Route 2 MP
Route 2

Wetland Cover Type
PFO
NHD Stream

NWI Wetland
Predominantly nonhydric
Predominantly hydric

1:2,400
0 100 200
Feet

Attachment 2
Wetland Probability Map Set - Wetland Type
Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

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Proposed Switching Station
Route 1 MP
Route 2 MP
Route 1
Route 2

Wetland Cover Type
PFO
Riverine
NHD Stream
NWI Wetland
Nonhydric
Predominantly nonhydric
Predominantly hydric

1:2,400
0 100 200
Feet

Attachment 2
Wetland Probability Map Set - Wetland Type
Carmel Church 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

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Dominion Energy

APPENDIX E VDCR CORRESPONDENCE AND FEDERAL- AND STATE-LISTED SPECIES INFORMATION

Travis A. Voyles
Secretary of Natural and Historic Resources

Matthew S. Wells
Director

Andrew W. Smith
Chief Deputy Director

Frank N. Stovall
Deputy Director for Operations

Darryl Glover
Deputy Director for Dam Safety, Floodplain Management and Soil and Water Conservation

Laura Ellis
Deputy Director for Administration and Finance

COMMONWEALTH of VIRGINIA
DEPARTMENT OF CONSERVATION AND RECREATION

September 20, 2024

Briana Cooney
Environmental Resources Management, Inc.
222 South 9th Street, South 2900
Minneapolis, MN 55402

Re: 0715013, Carmel Church Rereview

Dear Ms. Cooney:

The Department of Conservation and Recreation's Division of Natural Heritage (DCR) has searched its Biotics Data System for occurrences of natural heritage resources from the area outlined on the submitted map. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

According to the information in our files, the Reedy Creek Seeps Conservation Site and the North Anna Bluffs Conservation Site are located within the project area, including a 100 foot buffer. Conservation sites are tools for representing key areas of the landscape that warrant further review for possible conservation action because of the natural heritage resources and habitat they support. Conservation sites are polygons built around one or more rare plant, animal, or natural community designed to include the element and, where possible, its associated habitat, and buffer or other adjacent land thought necessary for the element's conservation. Conservation sites are given a biodiversity significance ranking based on the rarity, quality, and number of element occurrences they contain; on a scale of 1-5, 1 being most significant.

The Reedy Creek Seeps Conservation Site has been assigned a biodiversity rank of B3, which represents a site of high significance. The natural heritage resources associated with this site are:

Juncus caesariensis	New Jersey rush	G2G3/S2/SOC/LT
Mimosa microphylla	Little-leaf sensitive-brier	G5T5/S1/NL/NL
Rhynchospora alba	Northern white beaksedge	G5/S2/NL/NL
Siren intermedia	Lesser Siren	G5/S2S3/NL/NL
Xyris curtissii	Curtiss' yellow-eyed grass	G5T5/S1/NL/NL
Carex vestita	Velvet sedge	G5/S2/NL/NL
Kalmia angustifolia	Sheep laurel	G5/S2/NL/NL
Sarracenia purpurea	Purple pitcher plant	G5/S2/NL/NL
Platanthera blephariglottis	Small white fringed orchid	G5/S2/NL/NL

An additional occurrence of New Jersey rush has been documented outside of the conservation site within the existing transmission line right-of-way on the eastern side of the submitted project shape.

The North Anna Bluffs Conservation Site has been assigned a biodiversity rank of B2, which represents a site of very high significance. The natural heritage resources associated with this site are:

Coastal Plain / Outer Piedmont Basic Mesic Forest	G4?/S3/NL/NL
Coastal Plain / Piedmont Floodplain Swamp (Green Ash - Red Maple Type)	G3G4/S3S4/NL/NL
Piedmont / Coastal Plain Hemlock - Hardwood Forest	G2G3/S1/NL/NL
Water-Willow Rocky Bar and Shore	G4G5/S4/NL/NL

In addition, the Little River At Rt. 688 Stream Conservation Site (SCS) is located within the project area. SCSs encompass stream/river reaches, waterbodies, and terrestrial contributing areas containing or associated with aquatic or semi-aquatic resources, including upstream and downstream reaches and tributaries up to 3-km stream distance from the aquatic resources. The size and dimensions of a SCS are based on the hydrology of the waterway and surrounding landscape, taking into consideration dam locations and whether the waterway is tidal. SCS's are also given a biodiversity significance ranking (B-rank) based on the rarity, quality, and number of element occurrences they contain. The Little River At Rt. 688 SCS has been given a B-rank of B3, which represents a site of high significance. The natural heritage resource associated with this SCS is:

Aquatic Natural Community (NP-Pamunkey Fourth Order Stream)	G2/S2/NL/NL

The documented Aquatic Natural Community is based on Virginia Commonwealth University's **INSTAR** (*Interactive Stream Assessment Resource*) database which includes over 2,000 aquatic (stream and river) collections statewide for fish and macroinvertebrate. These data represent fish and macroinvertebrate assemblages, instream habitat, and stream health assessments. The associated Aquatic Natural Community is significant on multiple levels. First, this stream is a grade B, per the VCU-Center for Environmental Sciences (CES), indicating its relative regional significance, considering its aquatic community composition and the present-day conditions of other streams in the region. This stream reach also holds a Healthy stream designation per the INSTAR Virtual Stream Assessment (VSS) score. This score assesses the similarity of this stream to ideal stream conditions of biology and habitat for this region. Lastly, this stream contributes to high Biological Integrity at the watershed level (6th order) based on number of native/non-native, pollution-tolerant/intolerant and rare, threatened or endangered fish and macroinvertebrate species present. Threats to the significant Aquatic Natural Community and the surrounding watershed include water quality degradation related to point and non-point pollution, water withdrawal and introduction of non-native species.

To minimize adverse impacts to the documented natural heritage resources within the project area, DCR recommends avoidance of the Reedy Creek Seeps Conservation Site and the North Anna Bluffs Conservation Site. To minimize adverse impacts to the Little River At Rt. 688 Stream Conservation Site, DCR recommends the implementation of and strict adherence to applicable state and local erosion and sediment control/storm water management laws and regulations, establishment/enhancement of riparian buffers with native plant species and maintaining natural stream flow. DCR also recommends avoidance of construction in wetlands and ephemeral ponds that may occur within the project area. DCR recommends resubmitting this project for further review as the project area becomes more defined.

In addition, the proposed project may impact Ecological Cores **(C1, C2, C3, C4, C5)** as identified in the Virginia Natural Landscape Assessment (https://www.dcr.virginia.gov/natural-heritage/vaconvisvnla). Mapped cores in the project area can be viewed via the Virginia Natural Heritage Data Explorer, available here: http://vanhde.org/content/map.

Ecological Cores are areas of at least 100 acres of continuous interior, natural cover that provide habitat for a wide range of species, from interior-dependent forest species to habitat generalists, as well as species that utilize marsh,

dune, and beach habitats. Interior core areas begin 100 meters inside core edges and continue to the deepest parts of cores. Cores also provide the natural, economic, and quality of life benefits of open space, recreation, thermal moderation, water quality (including drinking water recharge and protection, and erosion prevention), and air quality (including sequestration of carbon, absorption of gaseous pollutants, and production of oxygen). Cores are ranked from C1 to C5 (C5 being the least significant) using nine prioritization criteria, including the habitats of natural heritage resources they contain.

Impacts to cores occur when their natural cover is partially or completely converted permanently to developed land uses. Habitat conversion to development causes reductions in ecosystem processes, native biodiversity, and habitat quality due to habitat loss; less viable plant and animal populations; increased predation; and increased introduction and establishment of invasive species.

DCR recommends avoidance of impacts to cores. When avoidance cannot be achieved, DCR recommends minimizing the area of impacts overall and concentrating the impacted area at the edges of cores, so that the most interior remains intact.

The proposed project may impact one or more cores with very high (C2) to outstanding (C1) ecological integrity. Further investigation of these impacts is recommended and DCR-DNH can conduct a formal impact analysis upon request. This analysis would estimate impacts to cores and habitat fragments, providing an estimate of the total acreage of direct and indirect impacts of the project. For more information about the analysis and service charges, please contact Joe Weber, DCR Chief of Biodiversity Information and Conservation Tools at Joseph.Weber@dcr.virginia.gov.

Under a Memorandum of Agreement established between the Virginia Department of Agriculture and Consumer Services (VDACS) and the DCR, DCR represents VDACS in comments regarding potential impacts on state-listed threatened and endangered plant and insect species.

There are no State Natural Area Preserves under DCR's jurisdiction in the project vicinity.

New and updated information is continually added to Biotics. Please re-submit a completed order form and project map for an update on this natural heritage information if the scope of the project changes and/or six months has passed before it is utilized.

A fee of $500.00 has been assessed for the service of providing this information. Please find attached an invoice for that amount. Please return one copy of the invoice along with your remittance made payable to the Treasurer of Virginia, DCR Finance, 600 East Main Street, 24th Floor, Richmond, VA 23219. Payment is due within thirty days of the invoice date. Please note late payment may result in the suspension of project review service for future projects.

The Virginia Department of Wildlife Resources (VDWR) maintains a database of wildlife locations, including threatened and endangered species, trout streams, and anadromous fish waters that may contain information not documented in this letter. Their database may be accessed at https://services.dwr.virginia.gov/fwis/ or contact Hannah Schul at Hannah.Schul@dwr.virginia.gov. According to the information currently in our files, the North Anna River, which has been designated by the VDWR as a "Threatened and Endangered Species Water" for the Atlantic sturgeon is within the submitted project boundary including a 100-foot buffer. Therefore, DCR recommends coordination with the National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA Fisheries) and Virginia's regulatory authority for the management and protection of this species, the VDWR, to ensure compliance with protected species legislation.

Should you have any questions or concerns, please contact me at 804-225-2429. Thank you for the opportunity to comment on this project.

Sincerely,



Tyler Meader
Natural Heritage Locality Liaison

Cc: Brian Hopper, NOAA Fisheries-Protected Resources Division
Hannah Schul, VDWR

VAFWIS - Department of Wildlife Resources

37.92194 -77.48056
is the Search Point
Submit Cancel

Search Point
- **Change** to "clicked" map point
- **Fixed** at 37.92194 -77.48056

Show Position Rings
Yes No
1 mile and 1/4 mile at the **Search Point**

Show Search Area
Yes No
2 Search distance miles buffer

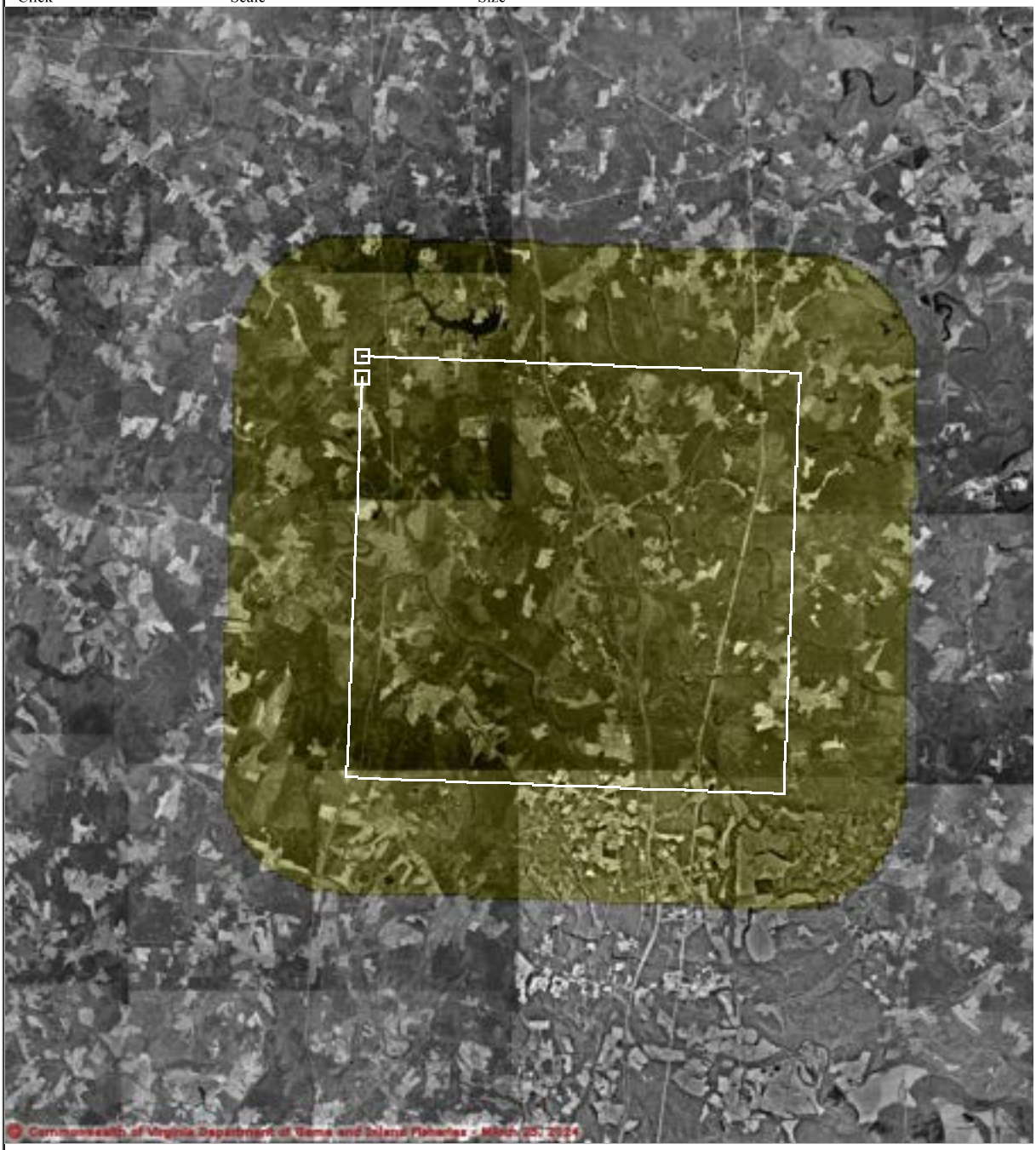
Search Point is at map center

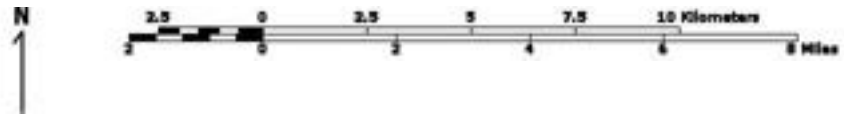
Base Map Choices
BW Aerial Photography

Map Overlay Choices
Current List: Search

Map Overlay Legend
2 mile radius Search Area

back Refresh Browser Page Help
Map Click Pan Id M
Map Scale In Zoom Out
Screen Size Small Size Big





Point of Search 37.92194 -77.48056
Map Location 37.92194 -77.48056

Select **Coordinate System:**
- Degrees,Minutes,Seconds Latitude - Longitude
- Decimal Degrees Latitude - Longitude
- Meters UTM NAD83 East North Zone
- Meters UTM NAD27 East North Zone

Base Map source: Black & White USGS Aerial Photography (see Microsoft terraserver-usa.com for details)

Map projection is UTM Zone 18 NAD 1983 with left 265968 and top 4216056. Pixel size is 31. .
Coordinates displayed are decimal Degrees North and West. Map is currently displayed as 1000 columns by 1000 rows for a total of 1000000 pixles. The map display represents 32000 meters east to west by 32000 meters north to south for a total of 1024.0 square kilometers. The map display represents 105004 feet east to west by 105004 feet north to south for a total of 395.5 square miles.

Topographic maps and Black and white aerial photography for year 1990+-
are from the United States Department of the Interior, United States Geological Survey.
Color aerial photography aquired 2002 is from Virginia Base Mapping Program, Virginia Geographic Information Network.
Shaded topographic maps are from TOPO! ©2006 National Geographic
http://www.national.geographic.com/topo
All other map products are from the Commonwealth of Virginia Department of Wildlife Resources.

map assembled 2024-03-25 18:52:38 (qa/qc March 21, 2016 12:20 - tn=1974781 dist=3218 I
)
$poi=37.9760800 -77.5499700

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VaFWIS Search Report Compiled on 3/25/2024, 6:54:54 PM

Help

Known or likely to occur within a **2 mile buffer around polygon; center 37.9760800 -77.5499699** in **033 Caroline County, 085 Hanover County, VA**

View Map of Site Location

496 Known or Likely Species ordered by Status Concern for Conservation (displaying first 26) (26 species with Status* or Tier I** or Tier II**)

BOVA Code	Status*	Tier**	Common Name	Scientific Name	Confirmed	Database(s)
040228	FESE	Ia	Woodpecker, red-cockaded	Picoides borealis		BOVA
050023	FESE	Ia	Bat, Indiana	Myotis sodalis		BOVA
050022	FEST	Ia	Bat, northern long-eared	Myotis septentrionalis		BOVA
060003	FESE	Ia	Wedgemussel, dwarf	Alasmidonta heterodon		BOVA
010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes	BOVA,TEWaters
060029	FTST	IIa	Lance, yellow	Elliptio lanceolata		BOVA,HU6
050020	SE	Ia	Bat, little brown	Myotis lucifugus		BOVA
050034	SE	Ia	Bat, Rafinesque's eastern big-eared	Corynorhinus rafinesquii macrotis		BOVA,HU6
050027	FPSE	Ia	Bat, tri-colored	Perimyotis subflavus		BOVA,HU6
040293	ST	Ia	Shrike, loggerhead	Lanius ludovicianus		BOVA
040385	ST	Ia	Sparrow, Bachman's	Peucaea aestivalis		BOVA,HU6
060081	FPST	IIa	Floater, green	Lasmigona subviridis		BOVA
040292	ST		Shrike, migrant loggerhead	Lanius ludovicianus migrans		BOVA
100079	FC	IIIa	Butterfly, monarch	Danaus plexippus		BOVA
030063	CC	IIIa	Turtle, spotted	Clemmys guttata	Yes	BOVA,SppObs,HU6
010077		Ia	Shiner, bridle	Notropis bifrenatus		BOVA,HU6
100248		Ia	Fritillary, regal	Speyeria idalia idalia		HU6
040052		IIa	Duck, American black	Anas rubripes		BOVA,HU6
040029		IIa	Heron, little blue	Egretta caerulea caerulea		BOVA
040036		IIa	Night-heron, yellow-crowned	Nyctanassa violacea violacea		BOVA
040181		IIa	Tern, common	Sterna hirundo		HU6
040320		IIa	Warbler, cerulean	Setophaga cerulea		BOVA,HU6
040140		IIa	Woodcock, American	Scolopax minor		BOVA,HU6
060071		IIa	Lampmussel, yellow	Lampsilis cariosa		BOVA,HU6

040203		IIb	Cuckoo, black-billed	Coccyzus erythropthalmus		BOVA
040105		IIb	Rail, king	Rallus elegans		BOVA

To view **All 496 species** View 496

*FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FP=Federal Proposed; FC=Federal Candidate; CC=Collection Concern

**I=VA Wildlife Action Plan - Tier I - Critical Conservation Need; II=VA Wildlife Action Plan - Tier II - Very High Conservation Need; III=VA Wildlife Action Plan - Tier III - High Conservation Need; IV=VA Wildlife Action Plan - Tier IV - Moderate Conservation Need
Virginia Widlife Action Plan Conservation Opportunity Ranking:
a - On the ground management strategies/actions exist and can be feasibly implemented.;
b - On the ground actions or research needs have been identified but cannot feasibly be implemented at this time.;
c - No on the ground actions or research needs have been identified or all identified conservation opportunities have been exhausted.

View Map of All Query Results from All Observation Tables

Bat Colonies or Hibernacula: **Not Known**

Anadromous Fish Use Streams (3 records)

View Map of All Anadromous Fish Use Streams

Stream ID	Stream Name	Reach Status	Anadromous Fish Species			View Map
			Different Species	Highest TE*	Highest Tier**	
C182	Mattaponi river	Confirmed	6		IV	Yes
C39	Little river	Confirmed	1			Yes
C54	North Anna river	Confirmed	5		IV	Yes

Impediments to Fish Passage (9 records)

View Map of All Fish Impediments

ID	Name	River	View Map
569	BOULWARES MILLPOND DAM	DE JARNETTE MILL RUN	Yes
533	CAMPBELL DAM	BEAVER CREEK	Yes
684	CAROLINE PINES DAM	TR-NORTH ANNA RIVER	Yes
571	COBURN DAM	TR-POLECAT CREEK	Yes
560	LAKE CAROLINE DAM	STEVENS MILL RUN	Yes
572	LAKE DEJARNETTE DAM	TR-NORTH ANNA	Yes
573	LAKE PINEWOOD DAM	TR-NORTH ANNA RIVER	Yes
570	R. COLLINS DAM	TR-MATTAPONI RIVER	Yes
674	USRY PROPERTY INC. DAM	TR-N ANNA RIVER	Yes

Colonial Water Bird Survey

N/A

Threatened and Endangered Waters (19 Reaches)

View Map of All Threatened and Endangered Waters

Stream Name	T&E Waters Species						View Map
	Highest TE*	BOVA Code, Status*, Tier**, Common & Scientific Name					
Mattaponi River (0125424)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
Mattaponi River (0139702)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
North Anna River (0103317)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
North Anna River (0103421)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
North Anna River (0103770)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
North Anna River (0106914)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
North Anna River (0111375)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
North Anna River (0112643)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
North Anna River (0112772)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
North Anna River (0113850)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
North Anna River (0116556)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
North Anna River (0117847)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
North Anna River (0118048)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
North Anna River (0119036)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
North Anna River (0119204)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
North Anna River (0119424)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
North Anna River (0119494)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes

North Anna River (0120219)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
North Anna River (0123129)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes

Managed Trout Streams

N/A

Bald Eagle Concentration Areas and Roosts

N/A

Bald Eagle Nests (1 records)

View Map of All Query Results
Bald Eagle Nests

Nest	N Obs	Latest Date	DGIF Nest Status	View Map
CA9901	15	Mar 1 2008	HISTORIC	Yes

Displayed 1 Bald Eagle Nests

Species Observations (441 records - displaying first 20 , 1 Observation with Threatened or Endangered species)

View Map of All Query Results
Species Observations

obsID	class	Date Observed	Observer	N Species			View Map
				Different Species	Highest TE*	Highest Tier**	
364388	SppObs	Jan 1 1900		1	CC	III	Yes
647921	SppObs	Sep 26 2022	Cameron Bryant	9		III	Yes
647922	SppObs	Sep 26 2022	Cameron Bryant	14		III	Yes
647900	SppObs	Jul 12 2022	Cameron Bryant	15		III	Yes
647899	SppObs	Jul 12 2022	Cameron Bryant	13		III	Yes
647880	SppObs	May 5 2022	Cameron Bryant	13		III	Yes
647881	SppObs	May 5 2022	Cameron Bryant	14		III	Yes
647823	SppObs	Sep 7 2021	Cameron Bryant	16		III	Yes
647824	SppObs	Sep 7 2021	Cameron Bryant	12		III	Yes

647805	SppObs	Jul 20 2021	Cameron Bryant	15		III	Yes
647806	SppObs	Jul 20 2021	Cameron Bryant	16		III	Yes
647793	SppObs	May 17 2021	Cameron Bryant	13		III	Yes
647792	SppObs	May 17 2021	Cameron Bryant	7		III	Yes
647530	SppObs	Sep 14 2020	Cameron Bryant	13		III	Yes
647531	SppObs	Sep 14 2020	Cameron Bryant	14		III	Yes
647503	SppObs	Jul 6 2020	Cameron Bryant	16		III	Yes
647504	SppObs	Jul 6 2020	Cameron Bryant	13		III	Yes
647483	SppObs	May 26 2020	Cameron Bryant	12		III	Yes
647482	SppObs	May 26 2020	Cameron Bryant	13		III	Yes
647426	SppObs	Sep 23 2019	Paul Vidonic	14		III	Yes

Displayed 20 Species Observations

Selected 441 Observations View all 441 Species Observations

Habitat Predicted for Aquatic WAP Tier I & II Species

N/A

Habitat Predicted for Terrestrial WAP Tier I & II Species

N/A

Virginia Breeding Bird Atlas Blocks (5 records)

View Map of All Query Results
Virginia Breeding Bird Atlas Blocks

BBA ID	Atlas Quadrangle Block Name	Breeding Bird Atlas Species			View Map
		Different Species	Highest TE*	Highest Tier**	
50126	Hewlett, SE	55		III	Yes
50136	Ladysmith, SE	60		III	Yes
50135	Ladysmith, SW	8		III	Yes
51126	Ruther Glen, SE	64		III	Yes
51136	Woodford, SE	48		III	Yes

Public Holdings:

N/A

Summary of BOVA Species Associated with Cities and Counties of the Commonwealth of Virginia:

FIPS Code	City and County Name	Different Species	Highest TE	Highest Tier
033	Caroline	374	FESE	I
085	Hanover	384	FESE	I

USGS 7.5' Quadrangles:
Hanover Academy
Hewlett
Ladysmith
Ashland
Ruther Glen
Woodford
Hanover
Penola

USGS NRCS Watersheds in Virginia:

N/A

USGS National 6th Order Watersheds Summary of Wildlife Action Plan Tier I, II, III, and IV Species:

HU6 Code	USGS 6th Order Hydrologic Unit	Different Species	Highest TE	Highest Tier
YO10	Newfound River	58	SE	I
YO23	North Anna River-Hawkins Creek	59	SE	I
YO25	Lower Little River	59	SE	I
YO26	North Anna River-Long Creek	58	SE	I
YO46	South River	56	FTST	I
YO47	Mattaponi River-Campbell Creek	64	FTSE	I
YO48	Polecat Creek	53	FTST	II
YO49	Reedy Creek	51	SS	II

Compiled on 3/25/2024, 6:54:54 PM I1974781.0 report=all searchType= P dist= 3218 poi= 37.9760800 -77.5499699 siteDD= 37.9760836 -77.5499761;37.9760259 -77.5429603;37.9759678 -77.5359445;37.9759093 -77.5289287;37.9758503 -77.5219130;37.9757910 -77.5148972;37.9757312 -77.5078815;37.9756709 -77.5008658;37.9756103 -77.4938501;37.9755492 -77.4868344;37.9754877 -77.4798187;37.9754258 -77.4728030;37.9753634 -77.4657874;37.9753006 -77.4587717;37.9752374 -77.4517561;37.9751738 -77.4447405;37.9751098 -77.4377248;37.9750453 -77.4307092;37.9749804 -77.4236937;37.9749151 -77.4166781;37.9748493 -77.4096625;37.9694956 -77.4097428;37.9641418 -77.4098232;37.9587881 -77.4099035;37.9534344 -77.4099837;37.9480806 -77.4100640;37.9427269 -77.4101443;37.9373732 -77.4102245;37.9320194 -77.4103048;37.9266657 -77.4103850;37.9213120 -77.4104652;37.9159582 -77.4105454;37.9106045 -77.4106256;37.9052508 -77.4107058;37.8998971 -77.4107860;37.8945433 -77.4108662;37.8891896 -77.4109463;37.8838359 -77.4110264;37.8784822 -77.4111066;37.8731285 -77.4111867;37.8677747 -77.4112668;37.8678404 -77.4182720;37.8679056 -77.4252773;37.8679704 -77.4322825;37.8680348 -77.4392878;37.8680988 -77.4462931;37.8681623 -77.4532984;37.8682254 -77.4603037;37.8682881 -77.4673091;37.8683503 -77.4743144;37.8684122 -77.4813198;37.8684736 -77.4883251;37.8685346 -77.4953305;37.8685951 -77.5023359;37.8686553 -77.5093413;37.8687150 -77.5163467;37.8687743 -77.5233521;37.8688332 -77.5303576;37.8688916 -77.5373630;37.8689496 -77.5443685;37.8690072 -77.5513739;37.8743611 -77.5513041;37.8797149 -77.5512343;37.8850687 -77.5511645;37.8904225 -77.5510947;37.8957763 -77.5510249;37.9011301 -77.5509550;37.9064839 -77.5508851;37.9118377 -77.5508153;37.9171916 -77.5507454;37.9225454 -77.5506755;37.9278992 -77.5506056;37.9332530 -77.5505357;37.9386069 -77.5504658;37.9439607 -77.5503959;37.9493145 -77.5503259;37.9546683 -77.5502560;37.9600222 -77.5501860;37.9653760 -77.5501160;37.9707298 -77.5500461

PixelSize=64; Anadromous=0.02615; BBA=0.043467; BECAR=0.021746; Bats=0.021068; Buffer=0.466314; County=0.063412; HU6=0.094236; Impediments=0.023188; Init=0.516428; PublicLands=0.037483; Quad=0.053072; SppObs=0.45817; TEWaters=0.030626; TierReaches=0.030421; TierTerrestrial=0.063344; Total=1.747603; Tracking_BOVA=0.16676; Trout=0.031352; huva=0.062218

Threatened and Endangered Waters where Sturgeon, Atlantic (010032) observed

37,58,33.8 -77,32,59.8 is **the Search Point**

Show Position Rings
(•) Yes ( ) No
1 mile and 1/4 mile at the **Search Point**

Show Search Area
(•) Yes ( ) No
2 Search distance miles buffer

Display at center | **Search Point** is not at map center

Base Map Choices
BW Aerial Photography

Map Overlay Choices
Current List: Position, Search, TEWaters

Map Overlay Legend

T & E Waters
Federal
State

Position Rings
1 mile and 1/4 mile at the Search Point

2 mile radius Search Area

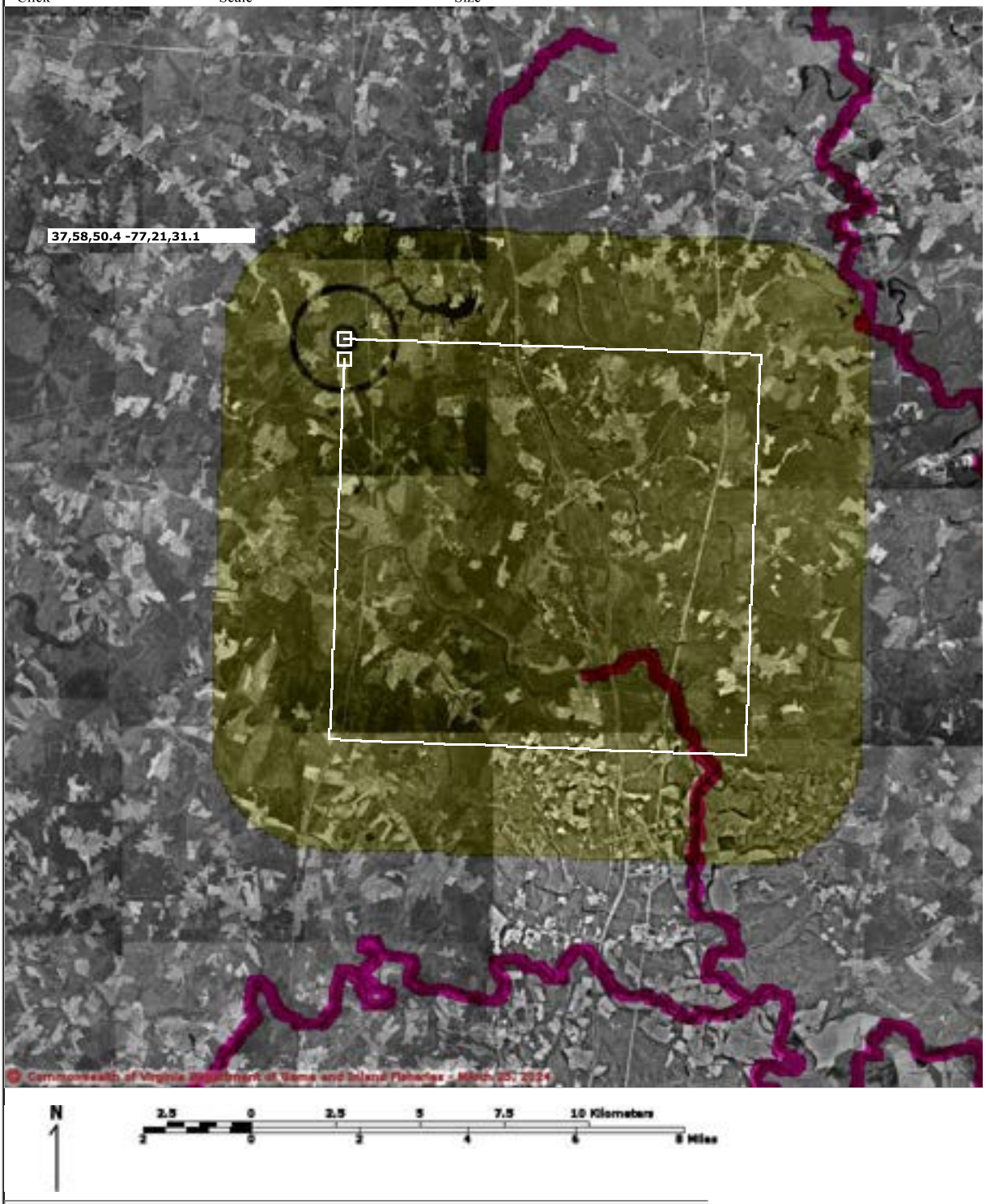
back | Refresh Browser Page

Map Click: Pan | Id | M

Map Scale: In | Zoom | Out

Screen Size: Small | Size | Big

Help



Point of Search 37,58,33.8 -77,32,59.8
Map Location 37,55,19.0 -77,28,50.0

Select **Coordinate System:**
(•) Degrees,Minutes,Seconds Latitude - Longitude
( ) Decimal Degrees Latitude - Longitude
( ) Meters UTM NAD83 East North Zone
( ) Meters UTM NAD27 East North Zone

Base Map source: Black & White USGS Aerial Photography (see Microsoft terraserver-usa.com for details)

Map projection is UTM Zone 18 NAD 1983 with left 265968 and top 4216056. Pixel size is 31. .
Coordinates displayed are Degrees, Minutes, Seconds North and West. Map is currently displayed as 1000 columns by 1000 rows for a total of 1000000 pixles. The map display represents 32000 meters east to west by 32000 meters north to south for a total of 1024.0 square kilometers. The map display represents 105004 feet east to west by 105004 feet north to south for a total of 395.5 square miles.

Topographic maps and Black and white aerial photography for year 1990+-
are from the United States Department of the Interior, United States Geological Survey.
Color aerial photography aquired 2002 is from Virginia Base Mapping Program, Virginia Geographic Information Network.
Shaded topographic maps are from TOPO! ©2006 National Geographic
http://www.national.geographic.com/topo
All other map products are from the Commonwealth of Virginia Department of Wildlife Resources.

map assembled 2024-03-25 18:55:34 (qa/qc March 21, 2016 12:20 - tn=1974781.1 dist=3218 I)
$poi=37.9760800 -77.5499699

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Virginia Department of Wildlife Resources

3/25/2024 6:56:32 PM

Fish and Wildlife Information Service

VaFWIS Search Report Compiled on 3/25/2024, 6:56:32 PM

Help

Known or likely to occur within a **2 mile buffer around polygon; center 37.9760800 -77.5499699**
in **033 Caroline County, 085 Hanover County, VA**
where (010032) **Sturgeon, Atlantic** observed.

View Map of Site Location

Threatened and Endangered Waters where Sturgeon, Atlantic (010032) observed

(19 Reaches)

View Map of All Threatened and Endangered Waters

Stream Name	T&E Waters Species							View Map
	Highest TE*	BOVA Code, Status*, Tier**, Common & Scientific Name						
Mattaponi River (0125424)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus		Yes
Mattaponi River (0139702)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus		Yes
North Anna River (0103317)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus		Yes
North Anna River (0103421)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus		Yes
North Anna River (0103770)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus		Yes
North Anna River (0106914)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus		Yes
North Anna River (0111375)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus		Yes
North Anna River (0112643)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus		Yes
North Anna River (0112772)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus		Yes
North Anna River (0113850)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus		Yes

North Anna River (0116556)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
North Anna River (0117847)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
North Anna River (0118048)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
North Anna River (0119036)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
North Anna River (0119204)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
North Anna River (0119424)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
North Anna River (0119494)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
North Anna River (0120219)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
North Anna River (0123129)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes

*FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FP=Federal Proposed; FC=Federal Candidate; CC=Collection Concern

**I=VA Wildlife Action Plan - Tier I - Critical Conservation Need;
II=VA Wildlife Action Plan - Tier II - Very High Conservation Need;
III=VA Wildlife Action Plan - Tier III - High Conservation Need;
IV=VA Wildlife Action Plan - Tier IV - Moderate Conservation Need
Virginia Widlife Action Plan Conservation Opportunity Ranking:
a - On the ground management strategies/actions exist and can be feasibly implemented.;
b - On the ground actions or research needs have been identified but cannot feasibly be implemented at this time.;
c - No on the ground actions or research needs have been identified or all identified conservation opportunities have been exhausted.

Compiled on 3/25/2024, 6:56:32 PM I1974781.1 report=BOVA searchType= P dist= 3218 poi= 37.9760800 -77.5499699

audit no. 1974781 3/25/2024 6:56:32 PM Virginia Fish and Wildlife Information Service

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Virginia Ecological Services Field Office
6669 Short Lane
Gloucester, VA 23061-4410
Phone: (804) 693-6694

In Reply Refer To: 09/23/2024 20:24:49 UTC
Project Code: 2024-0025642
Project Name: Carmel Church

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

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, 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.*). Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

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 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 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:

https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see https://www.fws.gov/program/migratory-bird-permit/what-we-do.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see https://www.fws.gov/library/collections/threats-birds.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/partner/council-conservation-migratory-birds.

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 Project Code in the header of this

letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Virginia Ecological Services Field Office
6669 Short Lane
Gloucester, VA 23061-4410
(804) 693-6694

PROJECT SUMMARY

Project Code: 2024-0025642
Project Name: Carmel Church
Project Type: Transmission Line - New Constr - Above Ground
Project Description: This request is a part of a pre-permitting effort to determine feasibility of overhead powerline routes

Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@37.92192925,-77.48062155,14z



Counties: Caroline and Hanover counties, Virginia

ENDANGERED SPECIES ACT SPECIES

There is a total of 8 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Indiana Bat *Myotis sodalis* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5949	Endangered
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Endangered
Tricolored Bat *Perimyotis subflavus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

CLAMS

NAME	STATUS
Dwarf Wedgemussel *Alasmidonta heterodon* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/784	Endangered
Green Floater *Lasmigona subviridis* There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7541	Proposed Threatened
Yellow Lance *Elliptio lanceolata* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/4511	Threatened

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

FLOWERING PLANTS

NAME	STATUS
Swamp Pink *Helonias bullata* Population: No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4333	Threatened

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act[1] and the Migratory Bird Treaty Act[2].

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats[3], should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

---

1. The Bald and Golden Eagle Protection Act of 1940.
2. The Migratory Birds Treaty Act of 1918.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

There are likely bald eagles present in your project area. For additional information on bald eagles, refer to Bald Eagle Nesting and Sensitivity to Human Activity

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Sep 1 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

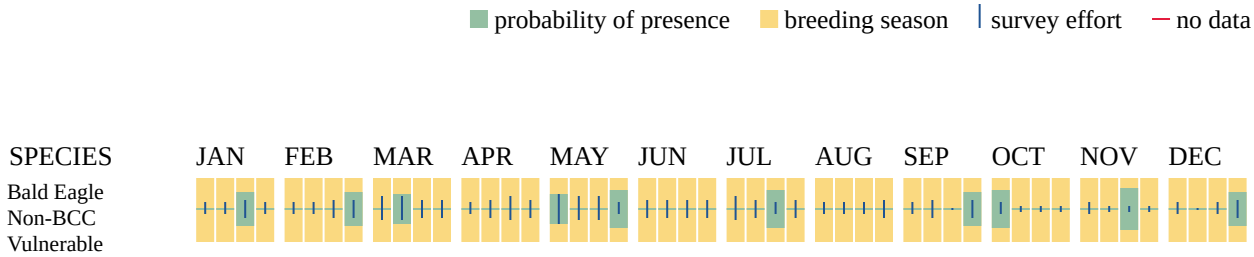
Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)
Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (–)
A week is marked as having no data if there were no survey events for that week.



Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

---

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Sep 1 to Aug 31
Blue-winged Warbler *Vermivora cyanoptera* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9509	Breeds May 1 to Jun 30
Chimney Swift *Chaetura pelagica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9406	Breeds Mar 15 to Aug 25
Chuck-will's-widow *Antrostomus carolinensis* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9604	Breeds May 10 to Jul 10
Eastern Whip-poor-will *Antrostomus vociferus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/10678	Breeds May 1 to Aug 20

NAME	BREEDING SEASON
Grasshopper Sparrow *Ammodramus savannarum perpallidus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/8329	Breeds Jun 1 to Aug 20
Kentucky Warbler *Geothlypis formosa* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9443	Breeds Apr 20 to Aug 20
Prairie Warbler *Setophaga discolor* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9513	Breeds May 1 to Jul 31
Prothonotary Warbler *Protonotaria citrea* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9439	Breeds Apr 1 to Jul 31
Red-headed Woodpecker *Melanerpes erythrocephalus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9398	Breeds May 10 to Sep 10
Rusty Blackbird *Euphagus carolinus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9478	Breeds elsewhere
Scarlet Tanager *Piranga olivacea* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/11967	Breeds May 10 to Aug 10
Wood Thrush *Hylocichla mustelina* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9431	Breeds May 10 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

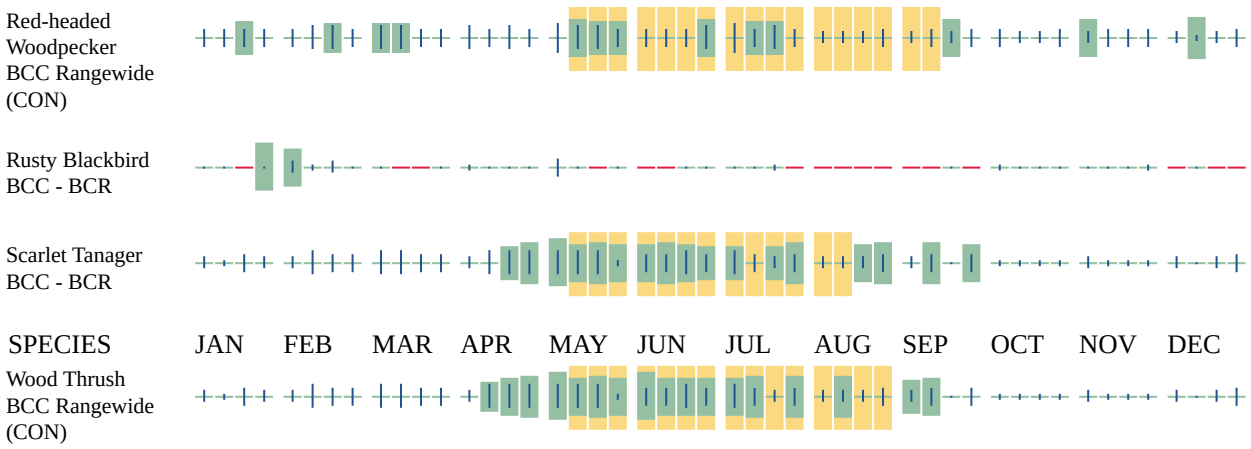
Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)
Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (–)
A week is marked as having no data if there were no survey events for that week.





Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

IPAC USER CONTACT INFORMATION

Agency:	Private Entity
Name:	Briana Cooney
Address:	222 South 9th Street
Address Line 2:	Suite 2900
City:	Minneapolis
State:	MN
Zip:	55402
Email	briana.cooney@erm.com
Phone:	6123477114

CCB Mapping Portal



Layers: VA Eagle Nest Locator

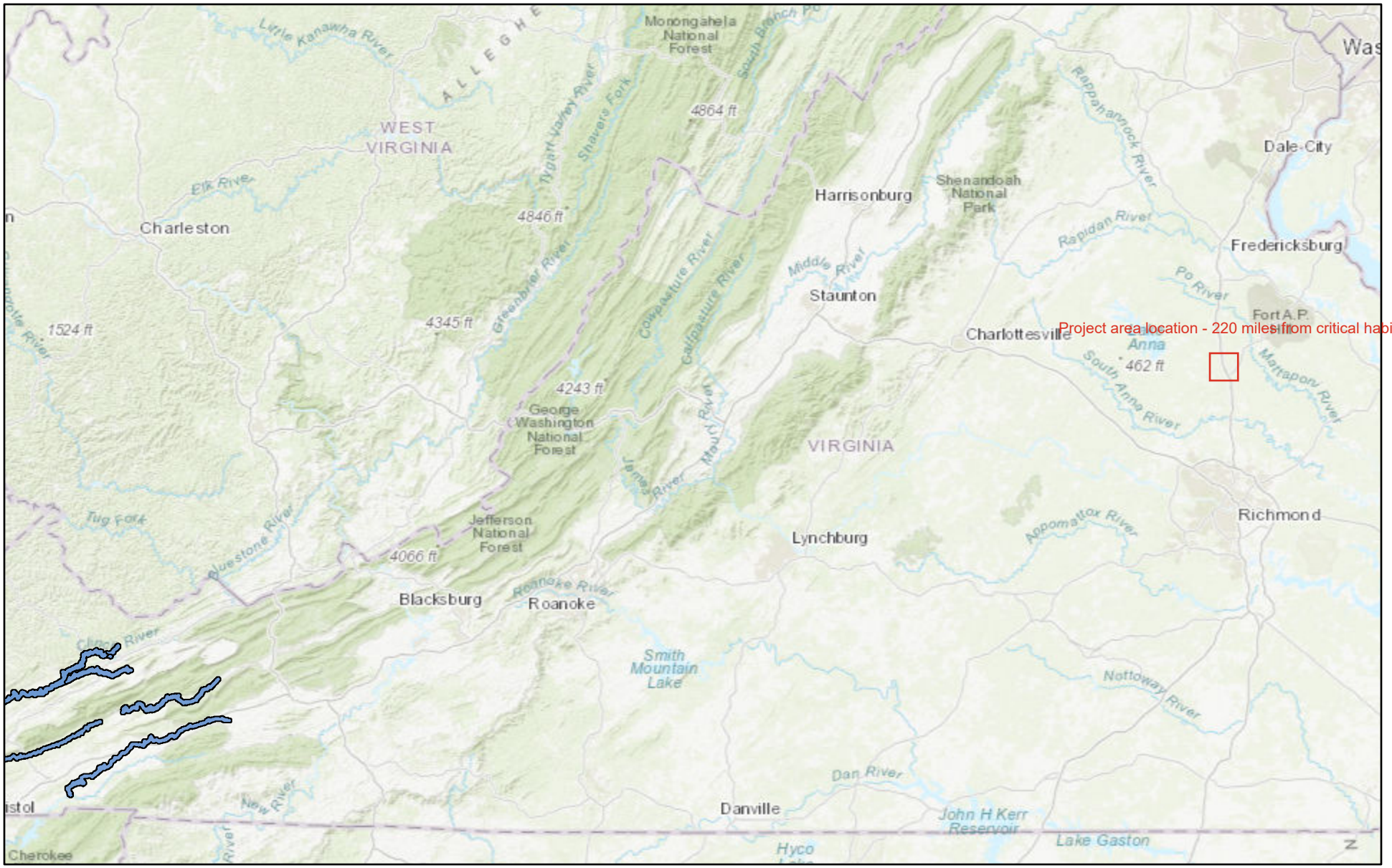
Map Center [longitude, latitude]: [-77.45670318603516, 37.92348237861797]

Map Link:
https://ccbbirds.org/maps/#layer=VA+Eagle+Nest+Locator&zoom=12&lat=37.92348237861797&lng=-77.45670318603516&legend=legend_tab_7c321b7e-e523-11e4-aaa0-0e0c41326911&base=World+Imagery+%28ESRI%29

Report Generated On: 12/12/2023

The Center for Conservation Biology (CCB) provides certain data online as a free service to the public and the regulatory sector. CCB encourages the use of its data sets in wildlife conservation and management applications. These data are protected by intellectual property laws. All users are reminded to view the Data Use Agreement to ensure compliance with our data use policies. For additional data access questions, view our Data Distribution Policy, or contact our Data Manager, Marie Pitts, at mlpitts@wm.edu or 757-221-7503.

Critical Habitat - Carmel Church



December 12, 2023

Virginia Critical Habitat (published)

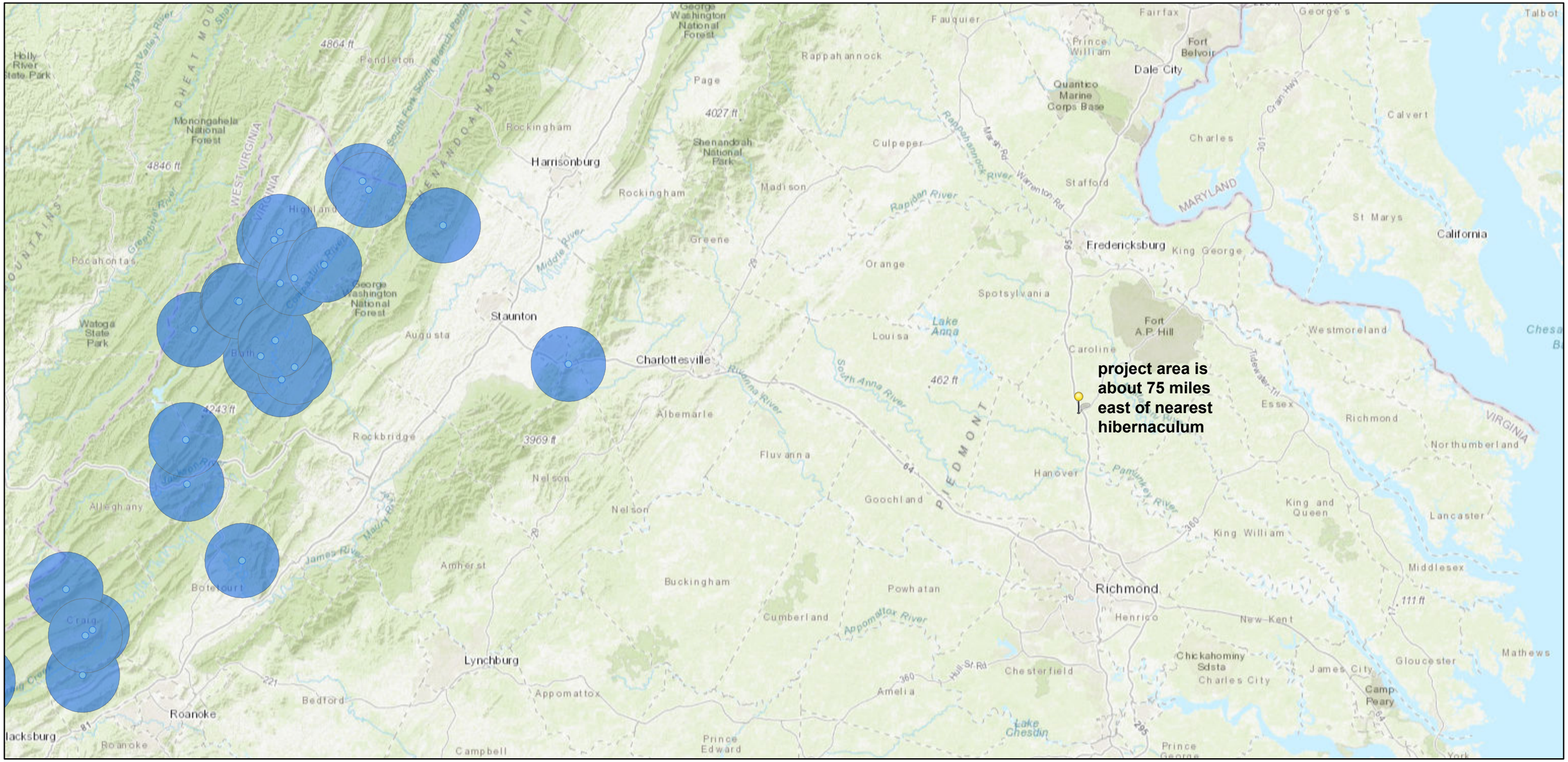
1:2,311,162

0 15 30 60 mi

0 25 50 100 km

Esri, HERE, Garmin, FAO, USGS, EPA, NPS

MYLU-PESU Locations and Roost Trees - Carmel Church



12/12/2023, 2:33:59 PM

Tri-colored and Little Brown Hibernaculum Half Mile Buffer

Tri-colored and Little Brown Hibernaculum 5.5 Mile Buffer

1:1,155,581

0 10 20 40 mi

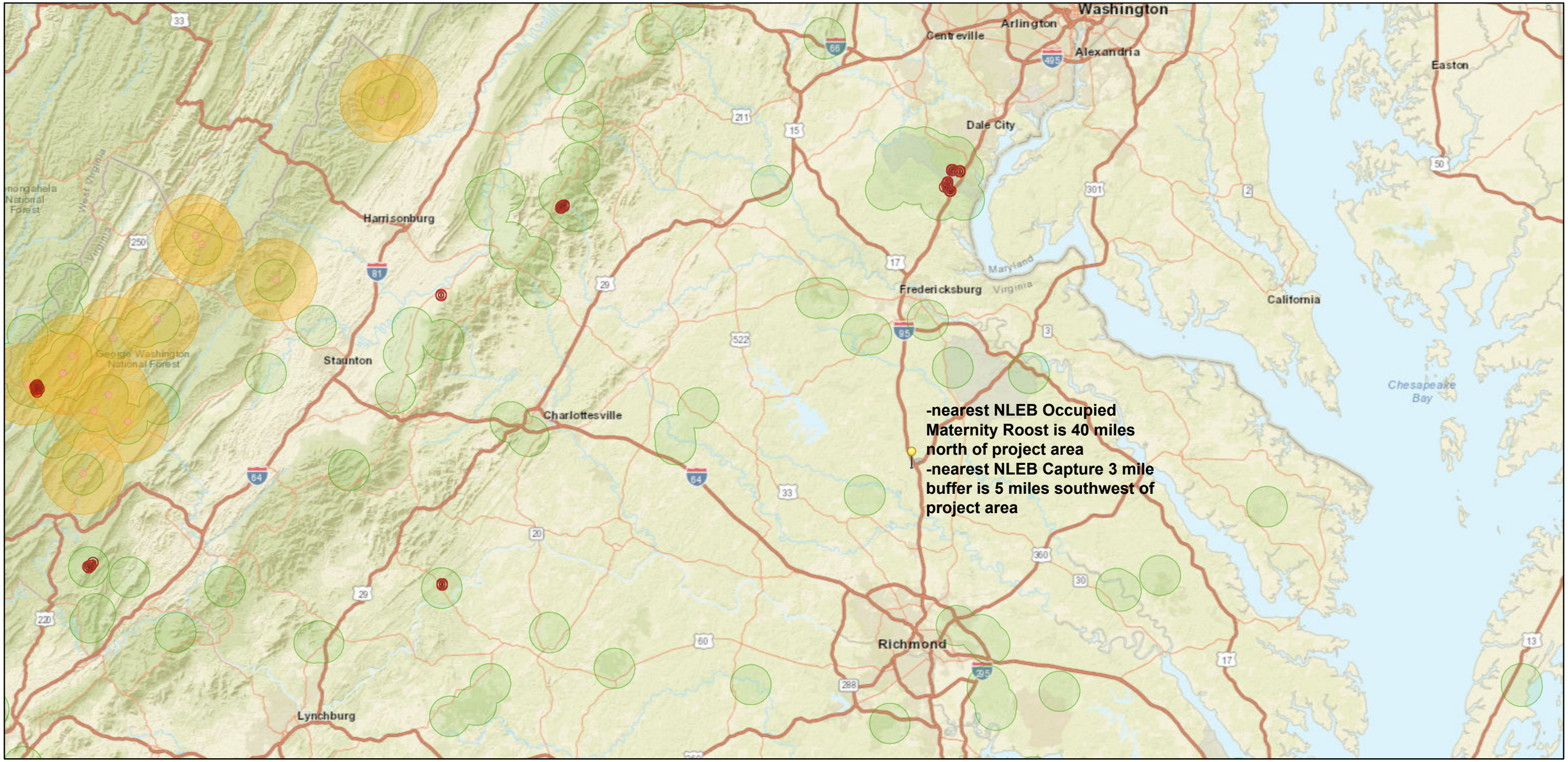
0 15 30 60 km

Esri, HERE, Garmin, FAO, USGS, NGA, EPA, NPS

Dept. Game and Inland Fisheries

Esri, HERE, Garmin, FAO, USGS, NGA, EPA, NPS |

NLEB Locations and Roost Trees - Carmel Church



12/12/2023, 2:44:05 PM

- NLEB Known Occupied Maternity Roost (Summer Habitat)
- NLEB Roost Tree 150-Foot Buffer
- NLEB Hibernaculum Half Mile Buffer
- NLEB Hibernaculum 5.5 Mile Buffer
- NLEB Capture 3 Mile Buffer

1:1,155,581

0 10 20 40 mi

0 15 30 60 km

Esri, HERE, Garmin, NGA, USGS, NPS

VA Dept. Game & Inland Fisheries
Virginia Geographic Information Network (VGIN), and the Census and Localities and Towns submitting data to the project | Esri, HERE, Garmin, NGA, USGS, NPS |

From:	nhreview (DCR)
To:	Briana Cooney
Cc:	Hypes, Rene (DCR); Weber, Joseph (DCR)
Subject:	Re: 0642267, Golden-Mars
Date:	Thursday, May 23, 2024 9:58:13 AM
Attachments:	image002.png image003.png image.png image.png

EXTERNAL MESSAGE

Briana,

Thanks for your patience with this. I've reiterated your questions in blue, with answers below.

I was reviewing the SCS shapefile you all sent, and I noticed that there are pieces of the SCS that are now developed. Have there been any studies of this area recently? Are you able to tell me when this SCS area was created or last modified?

- Our **Chief of Biodiversity Information and Conservation Tools** said that there does seem to be areas of the SCS that were developed since it was created. Much of the SCS is still intact, however, and perhaps even more important for maintaining water quality for NHR.
- It looks like the SCS was last modified 7/6/2023. Stream Conservation Sites do not represent protected areas, but waterways and terrestrial areas that contribute to the habitat quality of the documented resource. These areas will affect the water quality of the Yellow lampmussel habitat regardless of their current land use.

I also noticed that the natural heritage resource associated with this SCS is the Yellow lampmussel; however, in my database searches, I haven't seen a documented occurrence of this species within the SCS or study area. Do you have additional information on the presence of this species?

- Generally we do not share the location of our documented resources, only the associated SCS or Conservation Site. Looking at my data, the Yellow lampmussel **is documented within the SCS**. The documented locations are in Broad Run, the main branch of the SCS in the northern portion. The other stream areas included in the SCS are upstream of documented occurrences and changes to the water quality within the SCS will impact the documented resource.
- I can't really comment on the lack of the Yellow lampmussel in the databases without knowing which ones you used. It would not be found in DWR or USFWS databases as it is not a listed species. NHDE (*Natural Heritage Database Explorer*) only shows documented occurrences to Tier 3 users, which is only available to our conservation partners.

I've also noticed in this project and previous projects that some ecological cores identified are less than 100 acres, and the VDCR letter states: "Ecological Cores are areas of at least 100 acres of continuous interior…" Should we continue to study cores that are under 100 acres?

- The cores are found in Virginia Natural Landscape Assessment Ecological Cores and Habitat Fragments data layer. It looks like the feature in question is a habitat fragment, the link above can give you some more information about Cores and Habitat Fragments.
- From our Chief of Biodiversity Information and Conservation Tools: "**Smaller areas of continuous interior cover (i.e., 10 to 99 acres) called Habitat Fragments support Ecological**

Cores and provide similar functions and values. Both feature types are discussed on the website.

- Ecological Cores and Habitat Fragments are ranked by Ecological Integrity based on variables including rare species habitats, habitat diversity, resilience, and water quality, to reflect the wide range of important benefits and ecosystem services they provide. Brief descriptions of Ecological Integrity rankings are:
- C1 – Outstanding: These cores tend to be large in area, of deepest interior, of greatest water quality protections, highest in habitat diversity and rich in rare species, including species listed as threatened or endangered. Of all Ecological Cores in the Commonwealth 1% are ranked as C1.
- C2 – Very High: These cores have all or many of the same characteristics and values as C1 cores, though to a lesser extent. About 2.5% of all cores in the Commonwealth are ranked C2.
- C3 – High, C4 – Moderate, and C5 – General: These cores, as well as **habitat fragments**, have some of the same quantifiable values and characteristics as higher-ranked cores, though much reduced due to their having substantially less interior area and smaller area overall.
-
- There are no Habitat Fragments ranked above C3. "

- Due to Habitat Fragments ability to provide important ecological functions and values, we do still recommend avoiding impacts and when impacts can not be avoided to keep them to the edge of the fragment/core. We only recommend a formal impact analysis for C1 and C2 Cores, which never include fragments.

Hopefully this information is helpful. I have Cc'd Joe Weber our Chief of Biodiversity Information and Conservation Tools and Rene' Hypes our Project Review Coordinator. Let me know if you have anymore questions or if any of the information here needs clarification.

Thank you,

Nicki Gustafson *(she/her)*
Project Review Assistant
Division of Natural Heritage
Virginia Department of Conservation and Recreation
600 E. Main Street, 24th Floor
Richmond, VA 23219
804-625-3979 | nicki.gustafson@dcr.virginia.gov

From: nhreview (DCR) <nhreview@dcr.virginia.gov>
Sent: Tuesday, May 21, 2024 11:48 AM
To: Briana Cooney <Briana.Cooney@erm.com>
Subject: Re: 0642267, Golden-Mars

Briana,

Thanks for you for reaching out again. We passed your question on to our Data Management Division when we received your email. They do the modeling for the Ecological Cores and the Stream Conservation Sites and we wanted to be sure we were giving you accurate information. I will circle back with them and see if they have more information for you. Thank you for your patience with this.

Best,

Nicki Gustafson *(she/her)*
Project Review Assistant
Division of Natural Heritage
Virginia Department of Conservation and Recreation
600 E. Main Street, 24th Floor
Richmond, VA 23219
804-625-3979 | nicki.gustafson@dcr.virginia.gov

From: Briana Cooney <Briana.Cooney@erm.com>
Sent: Tuesday, May 21, 2024 11:37 AM
To: nhreview (DCR) <nhreview@dcr.virginia.gov>
Subject: RE: 0642267, Golden-Mars

Hello!

I just wanted to follow up on my email below. Is someone able to address my questions? Thanks!

ERM
Sustainability is our business

Briana Cooney
Senior Consultant, Scientist
She/Her/Hers

Minneapolis
612-347-7114

erm.com

401-309-7028

From: Briana Cooney <briana.cooney@erm.com>
Sent: Wednesday, May 8, 2024 1:47 PM
To: nhreview (DCR) <nhreview@dcr.virginia.gov>
Subject: RE: 0642267, Golden-Mars

Hello!

I'm hoping to get a little more clarity on a couple things so I can study these areas effectively.

I was reviewing the SCS shapefile you all sent, and I noticed that there are pieces of the SCS that are now developed. Have there been any studies of this area recently? Are you able to tell me when this SCS area was created or last modified? I also noticed that the natural heritage resource associated with this SCS is the Yellow lampmussel; however, in my database searches, I haven't seen a documented occurrence of this species within the SCS or study area. Do you have additional information on the presence of this species?



I've also noticed in this project and previous projects that some ecological cores identified are less than 100 acres, and the VDCR letter states: "Ecological Cores are areas of at least 100 acres of continuous interior…" Should we continue to study cores that are under 100 acres?

Thanks for your insight!

Briana Cooney
Senior Consultant, Scientist
She/Her/Hers

Minneapolis
612-347-7114
401-309-7028

erm.com

From: nhreview (DCR) <nhreview@dcr.virginia.gov>
Sent: Friday, March 15, 2024 5:39 PM
To: Briana Cooney <briana.cooney@erm.com>
Subject: 0642267, Golden-Mars

EXTERNAL MESSAGE

Ms. Cooney,

Please find attached the DCR-DNH comments, shapefile, data agreement and invoice for the above referenced project. The comments are in pdf format and can be printed for your records. Also species rank information is available at http://www.dcr.virginia.gov/natural-heritage/help for your reference.

Along with our comments there is an invoice for our services. Please submit a copy of the invoice with payment to the Treasurer of Virginia, Department of Conservation and Recreation, Finance, 600 East Main Street, 24th Floor Richmond, VA 23219. Payment is due within 30 days of the invoice date. Late payment may result in the suspension of project review service for future projects. **To pay the invoice by credit card, please click here for the DCR credit card payment portal weblink or copy http://www.dcr.virginia.gov/payment-verification into your browser. It will take approximately 24 hours for the invoice to be available for payment in the online system.**

Please send a confirmation e-mail upon receipt of our comments. Thank you for the opportunity to provide this information.

Rene' Hypes
Environmental Review Coordinator
Virginia Department of Conservation and Recreation
Division of Natural Heritage
600 E. Main Street, Richmond, VA 23219
804-371-2708
rene.hypes@dcr.virginia.gov

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APPENDIX F VISUAL SIMULATIONS

Carmel Church
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

KOP 001

Welcome Way Dr

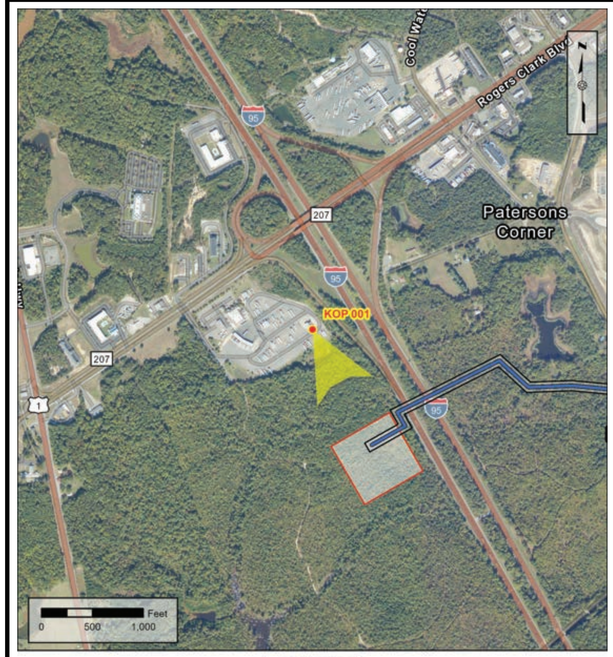
Route: 1
Date: 07/24/24
Time: 9:35 am
Viewing Direction: Southeast
Distance to closest feature 0.23 miles



EXISTING CONDITIONS



YELLOW: PARTIALLY OR FULLY HIDDEN PROJECT INFRASTRUCTURE



Legend

- KOP View Direction
- Route 1
- Right-of-Way

Note: Project components illustrated are based on proposed preliminary designs
The images contained on this page show the proposed project within a wider landscape context and are not representative of scale and distance when viewed from the actual view point.

Carmel Church
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

KOP 001

Interstate 95

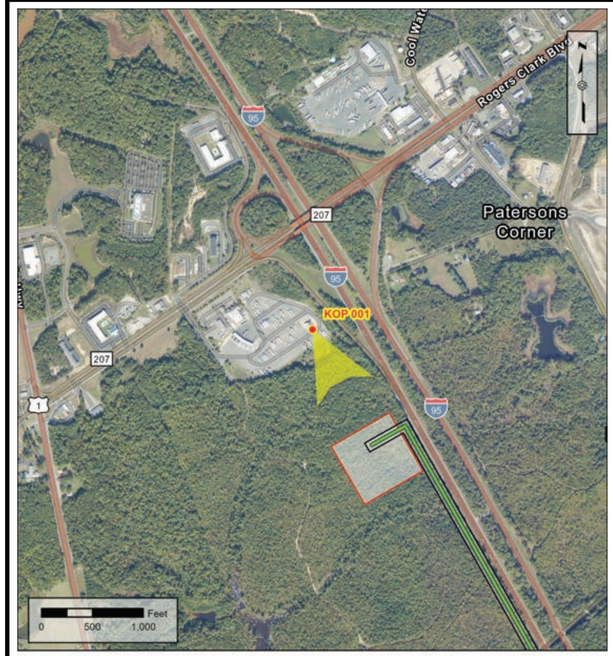
Route: 2
Date: 07/24/24
Time: 9:35 am
Viewing Direction: Southeast
Distance to closest feature: 0.23 miles



EXISTING CONDITIONS



YELLOW: PARTIALLY OR FULLY HIDDEN PROJECT INFRASTRUCTURE



Legend

- KOP View Direction
- Route 2
- Right-of-Way

Note: Project components illustrated are based on proposed preliminary designs
The images contained on this page show the proposed project within a wider landscape context and are not representative of scale and distance when viewed from the actual view point.

Carmel Church
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

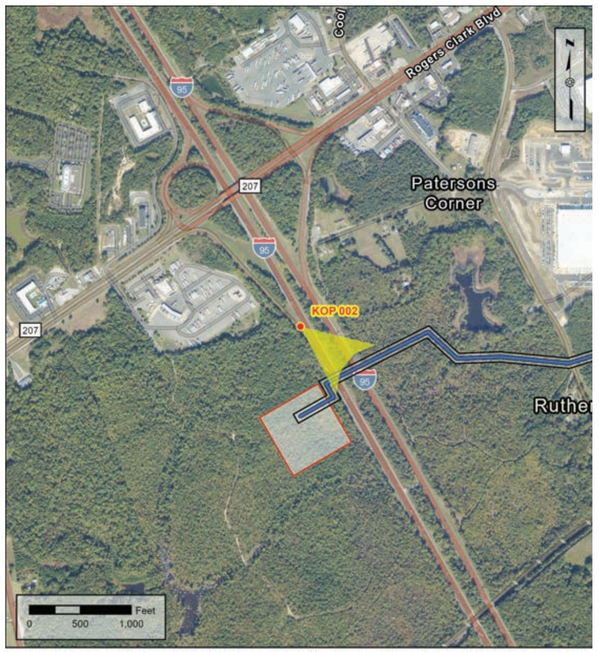
KOP 002

Interstate 95

Route: 1
Date: 07/26/24
Time: 11:44 am
Viewing Direction: Southeast
Distance to closest feature: 0.2 miles







Legend

- KOP View Direction
- Route 1
- Right-of-Way

Note: Project components illustrated are based on proposed preliminary designs
The images contained on this page show the proposed project within a wider landscape context and are not representative of scale and distance when viewed from the actual view point.

Carmel Church
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

KOP 002

Interstate 95

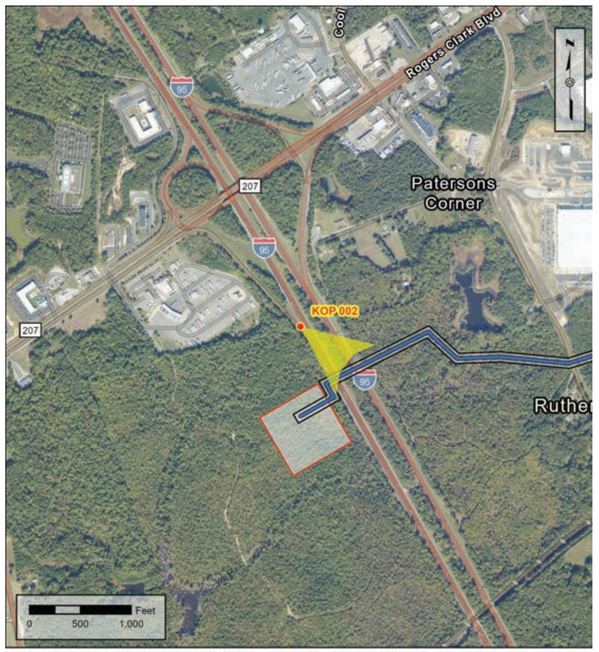
Route: 1
Date: 07/26/24
Time: 11:44 am
Viewing Direction: Southeast
Distance to closest feature: 0.2 miles

EXISTING CONDITIONS



YELLOW: PARTIALLY OR FULLY HIDDEN PROJECT INFRASTRUCTURE





Legend

- KOP View Direction
- Route 1
- Right-of-Way

Note: Project components illustrated are based on proposed preliminary designs
The images contained on this page show the proposed project within a wider landscape context and are not representative of scale and distance when viewed from the actual view point.

Carmel Church
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

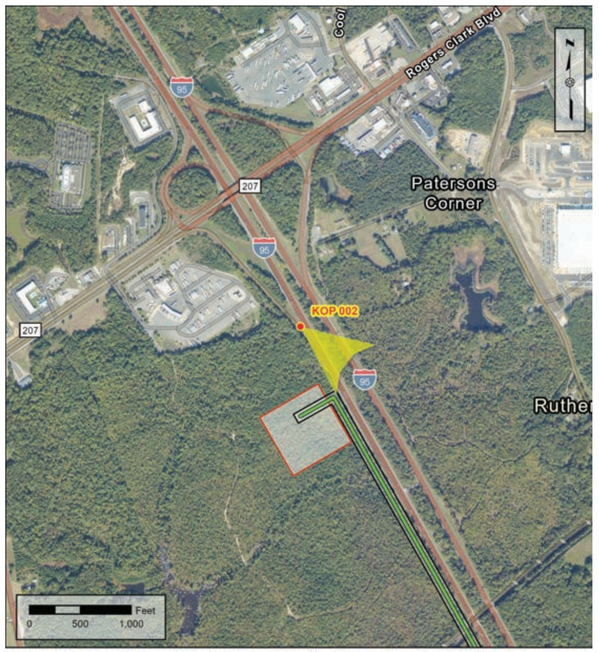
KOP 002

Interstate 95

Route: 2
Date: 07/26/24
Time: 11:44 am
Viewing Direction: Southeast
Distance to closest feature: 0.2 miles







Legend

- KOP View Direction
- Route 2
- Right-of-Way

Note: Project components illustrated are based on proposed preliminary designs
The images contained on this page show the proposed project within a wider landscape context and are not representative of scale and distance when viewed from the actual view point.

Carmel Church
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

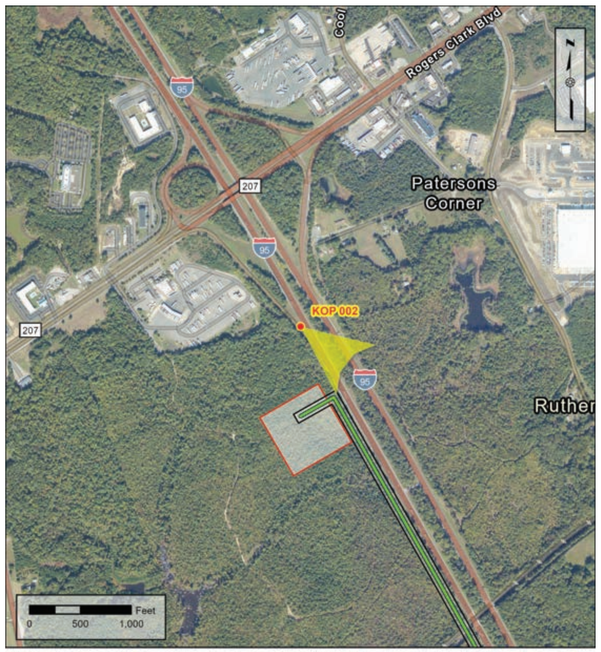
KOP 002

Interstate 95

Route: 2
Date: 07/26/24
Time: 11:44 am
Viewing Direction: Southeast
Distance to closest feature: 0.2 miles

EXISTING CONDITIONS

YELLOW: PARTIALLY OR FULLY HIDDEN PROJECT INFRASTRUCTURE



Legend

- KOP View Direction
- Route 2
- Right-of-Way

Note: Project components illustrated are based on proposed preliminary designs
The images contained on this page show the proposed project within a wider landscape context and are not representative of scale and distance when viewed from the actual view point.

Carmel Church
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

KOP 005

Ruther Glen Rd

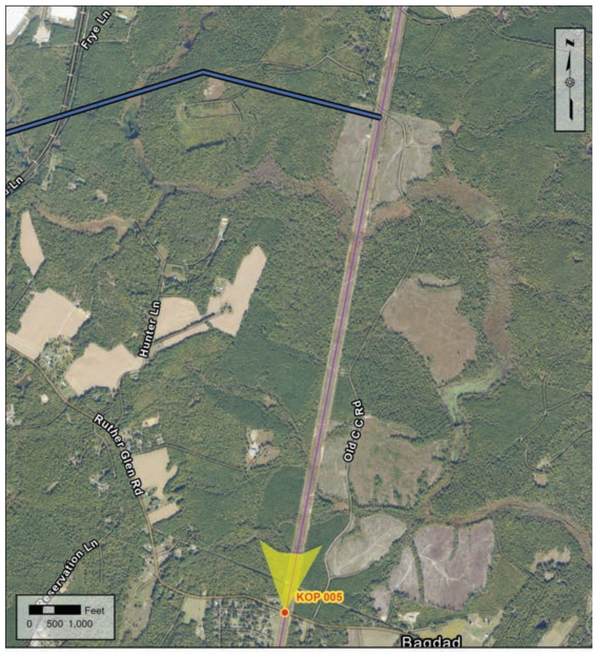
Route: 1
Date: 07/24/24
Time: 11:23 am
Viewing Direction: North
Distance to closest feature: 1.8 miles

EXISTING CONDITIONS



PROPOSED CONDITIONS





Legend

- KOP View Direction
- Existing Dominion Transmission Line
- Route 1
- Right-of-Way

Note: Project components illustrated are based on proposed preliminary designs
The images contained on this page show the proposed project within a wider landscape context and are not representative of scale and distance when viewed from the actual view point.

Carmel Church
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

KOP 005

Ruther Glen Rd

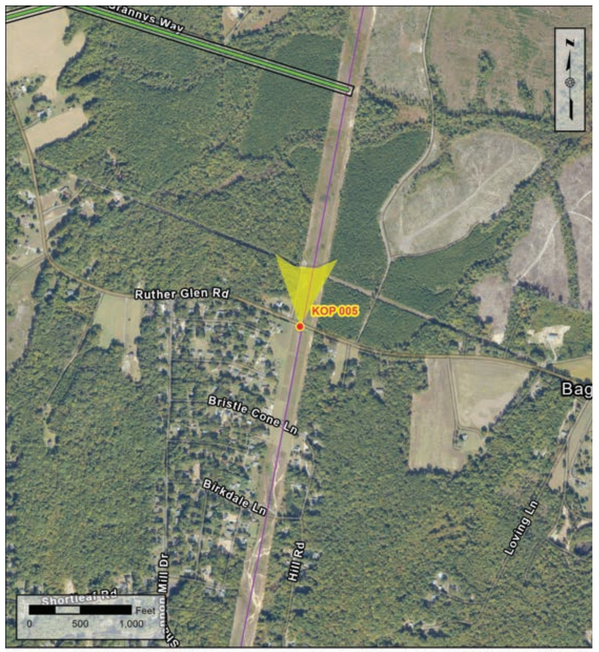
Route: 2
Date: 07/24/24
Time: 11:23 am
Viewing Direction: North
Distance to closest feature: 0.4 miles



EXISTING CONDITIONS



PROPOSED CONDITIONS



Legend

- KOP View Direction
- Existing Dominion Transmission Line
- Route 2
- Right-of-Way

Note: Project components illustrated are based on proposed preliminary designs
The images contained on this page show the proposed project within a wider landscape context and are not representative of scale and distance when viewed from the actual view point.

Carmel Church
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

KOP 006

Ruther Glen Rd

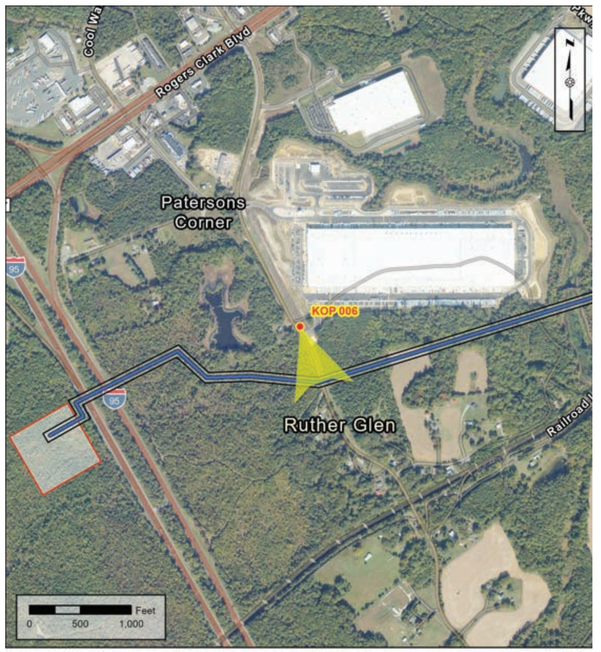
Route: 1
Date: 07/24/24
Time: 10:10 am
Viewing Direction: South
Distance to closest feature: 576 ft



EXISTING CONDITIONS



PROPOSED CONDITIONS



Legend

- KOP View Direction
- Route 1
- Right-of-Way

Note: Project components illustrated are based on proposed preliminary designs
The images contained on this page show the proposed project within a wider landscape context and are not representative of scale and distance when viewed from the actual view point.

Carmel Church
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

KOP 006

Ruther Glen Rd

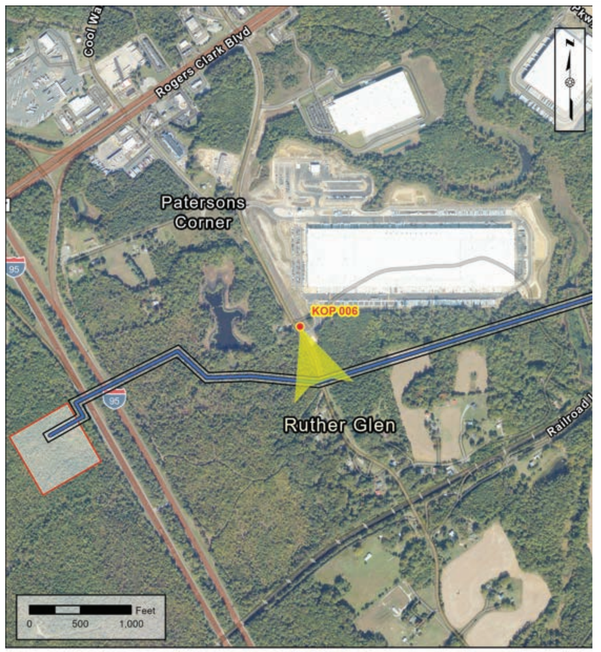
Route: 1
Date: 07/24/24
Time: 10:10 am
Viewing Direction: South
Distance to closest feature: 576 ft



EXISTING CONDITIONS



YELLOW: PARTIALLY OR FULLY HIDDEN PROJECT INFRASTRUCTURE



Legend

- KOP View Direction
- Route 1
- Right-of-Way

Note: Project components illustrated are based on proposed preliminary designs
The images contained on this page show the proposed project within a wider landscape context and are not representative of scale and distance when viewed from the actual view point.

Carmel Church
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

KOP 008B

Old CC Rd

Route: 1
Date: 07/24/24
Time: 1:06 pm
Viewing Direction: West
Distance to closest feature: 142 ft

EXISTING CONDITIONS

PROPOSED CONDITIONS



Legend

- KOP View Direction
- Existing Dominion Transmission Line
- Route 1
- Right-of-Way

Note: Project components illustrated are based on proposed preliminary designs
The images contained on this page show the proposed project within a wider landscape context and are not representative of scale and distance when viewed from the actual view point.

Carmel Church
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

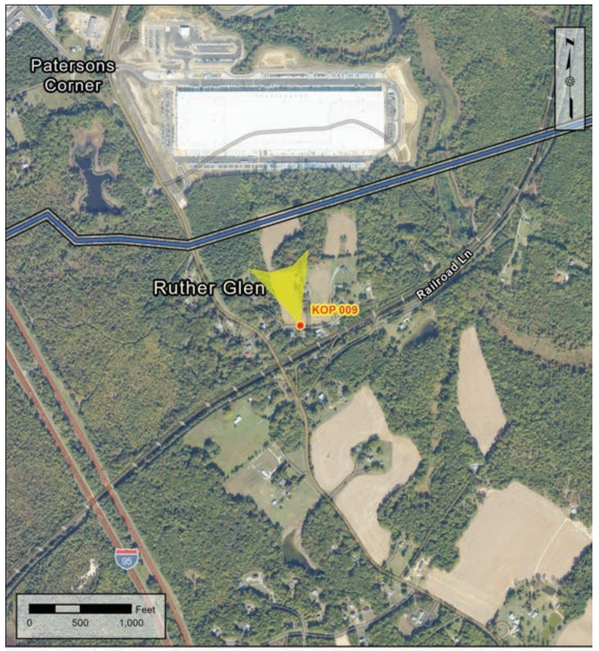
KOP 009

Chesterfield Rd

Route: 1
Date: 07/24/24
Time: 10:30 am
Viewing Direction: North
Distance to closest feature: 0.2 miles







Legend

- KOP View Direction
- Route 1
- Right-of-Way

Note: Project components illustrated are based on proposed preliminary designs
The images contained on this page show the proposed project within a wider landscape context and are not representative of scale and distance when viewed from the actual view point.

Carmel Church
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

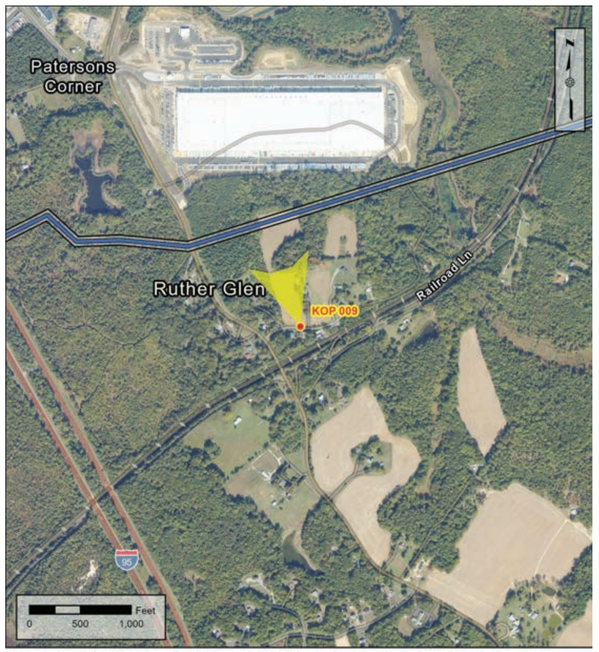
KOP 009

Chesterfield Rd

Route: 1
Date: 07/24/24
Time: 10:30 am
Viewing Direction: North
Distance to closest feature: 0.2 miles







Legend

- KOP View Direction
- Route 1
- Right-of-Way

Note: Project components illustrated are based on proposed preliminary designs
The images contained on this page show the proposed project within a wider landscape context and are not representative of scale and distance when viewed from the actual view point.

Carmel Church
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

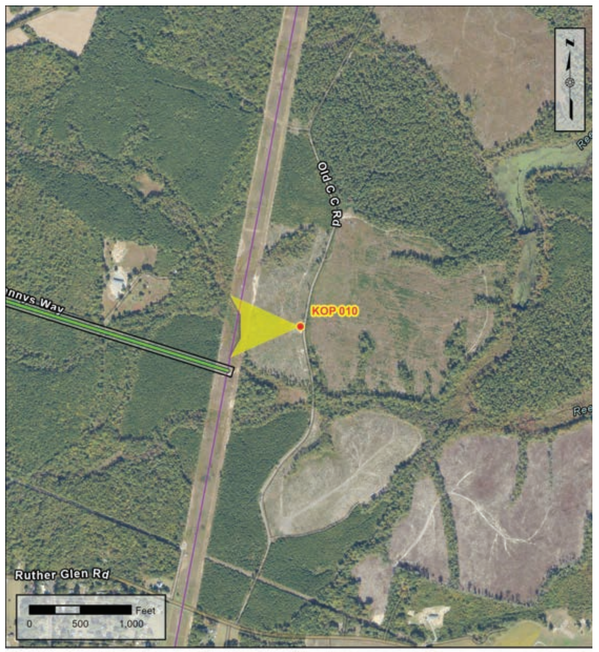
KOP 010

Old CC Rd

Route: 2
Date: 07/24/24
Time: 11:42 am
Viewing Direction: Southwest
Distance to closest feature: 834 ft







Legend

- KOP View Direction
- Existing Dominion Transmission Line
- Route 2
- Right-of-Way

Note: Project components illustrated are based on proposed preliminary designs
The images contained on this page show the proposed project within a wider landscape context and are not representative of scale and distance when viewed from the actual view point.





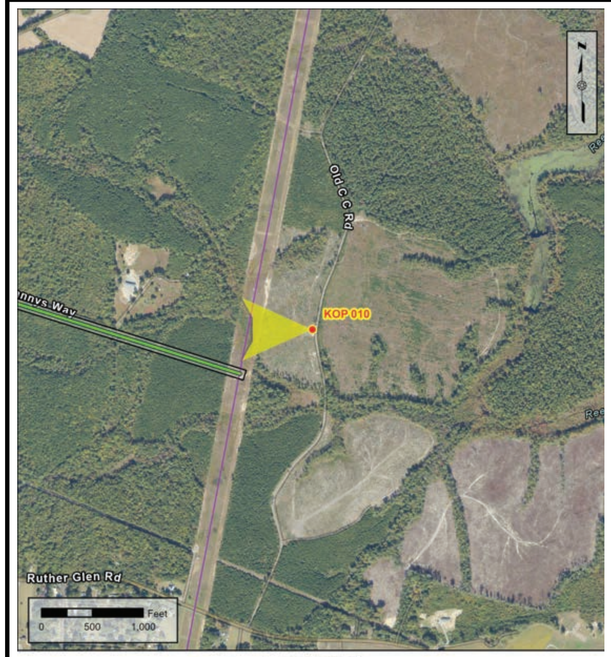
Carmel Church
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

KOP 010

Old CC Rd

Route: 2
Date: 07/24/24
Time: 11:42 am
Viewing Direction: Southwest
Distance to closest feature: 834 ft



Note: Project components illustrated are based on proposed preliminary designs
The images contained on this page show the proposed project within a wider landscape context and are not representative of scale and distance when viewed from the actual view point.

Carmel Church
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

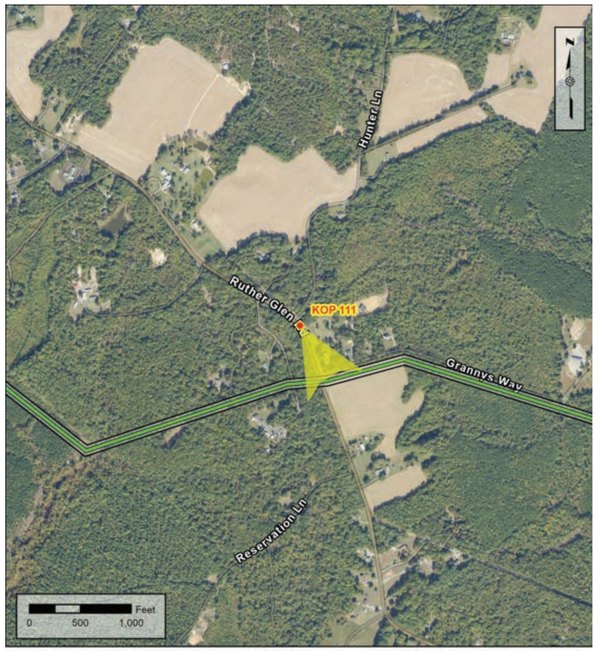
KOP 111

Ruther Glen Rd

Route: 2
Date: 09/03/24
Time: 2:03 pm
Viewing Direction: Southeast
Distance to closest feature: 604 ft







Legend

- KOP View Direction
- Route 2
- Right-of-Way

Note: Project components illustrated are based on proposed preliminary designs
The images contained on this page show the proposed project within a wider landscape context and are not representative of scale and distance when viewed from the actual view point.

Carmel Church
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

KOP 111

Ruther Glen Rd

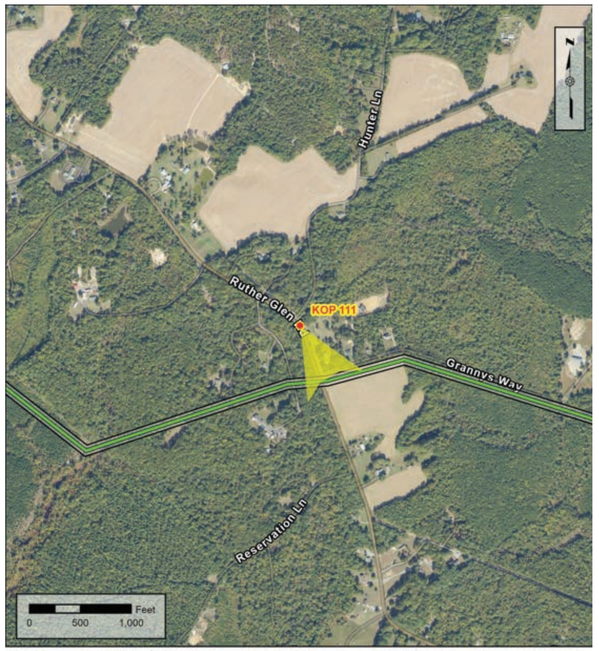
Route: 2
Date: 09/03/24
Time: 2:03 pm
Viewing Direction: Southeast
Distance to closest feature: 604 ft



EXISTING CONDITIONS



YELLOW: PARTIALLY OR FULLY HIDDEN PROJECT INFRASTRUCTURE



Legend

- KOP View Direction
- Route 2
- Right-of-Way

Note: Project components illustrated are based on proposed preliminary designs
The images contained on this page show the proposed project within a wider landscape context and are not representative of scale and distance when viewed from the actual view point.

Carmel Church
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

KOP 112

Ruther Glen Rd

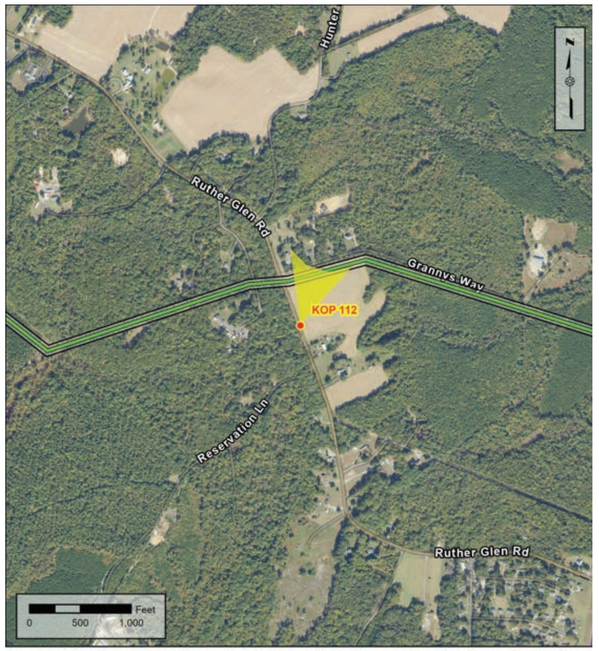
Route: 2
Date: 09/03/24
Time: 2:33
Viewing Direction: Northeast
Distance to closest feature: 453 ft



EXISTING CONDITIONS



PROPOSED CONDITIONS



Legend

- KOP View Direction
- Existing Dominion Transmission Line
- Route 2
- Right-of-Way

Note: Project components illustrated are based on proposed preliminary designs
The images contained on this page show the proposed project within a wider landscape context and are not representative of scale and distance when viewed from the actual view point.

APPENDIX G STAGE 1 PRE-APPLICATION ANALYSIS OF CULTURAL RESOURCES

Carmel Church 230 kV Electric Transmission Line Project

Pre-Application Analysis

PREPARED FOR

Dominion Energy

DATE
11 December 2024

REFERENCE
0715013



SIGNATURE PAGE

Carmel Church 230 kV Electric Transmission Line Project

Pre-Application Analysis

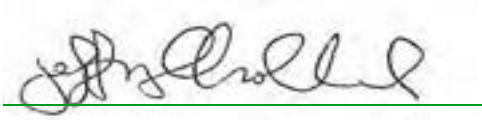
0715013



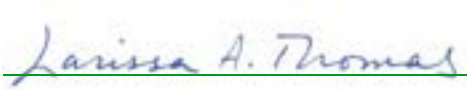
Megan Wiginton
Senior Architectural Historian



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ACRONYMS AND ABBREVIATIONS

3D	three dimensional
ABPP	American Battlefield Protection Program
CMOS	Complementary Metal–Oxide–Semiconductor
CWSAC	Civil War Sites Advisory Commission
ERM	Environmental Resources Management
ESRI	Environmental Systems Research Institute
GNSS	Global Navigation Satellite System
ISO	International Organization for Standardization
JPEG	Joint Photographic Experts Group format
KOP	Key Observation Point
kV	kilovolt
MP	milepost
NHL	National Historic Landmark
NPS	National Park Service
NRHP	National Register of Historic Places
PBR	Physically Based Rendering
PDF	Portable Document Format
PotNR	Potential National Register Area
RAW	an unprocessed image
REC	Rappahannock Electric Cooperative
ROW	Right-of-Way
SCC	State Corporation Commission
SLR	Single-Lens Reflex
USGS	United States Geological Survey
UTM	Universal Transverse Mercator
V-CRIS	Virginia Cultural Resource Information System
VDHR	Virginia Department of Historic Resources
VDOT	Virginia Department of Transportation
VLR	Virginia Landmarks Register

EXECUTIVE SUMMARY

This report presents the findings of a pre-application analysis conducted for Dominion Energy Virginia's Carmel Church 230 kilovolt (kV) Electric Transmission Line Project (Project) in Caroline County, Virginia. For this Project, the Company is proposing to construct and operate:

- A new, double circuit, overhead 230 kV transmission line (Carmel Church Line #256) in new right-of-way that will cut the Dominion's existing Ladysmith CT – Four Rivers Line #256 (Line #256) and connect to the proposed Carmel Church Switching Station.
- A new 230 kV delivery point switching station in Caroline County, Virginia, which will provide interconnection to REC to serve existing and planned development in the area.

Two potential routes were evaluated for the Carmel Church transmission line. This pre-application analysis assesses and compares potential impacts on previously recorded historic and archaeological resources in relation to each route. Environmental Resources Management (ERM) conducted the analysis on behalf of Dominion Energy Virginia to assist in the development of a feasible project design that minimizes impacts to historic resources. The pre-application analysis is a required study for transmission line projects regulated by the State Corporation Commission (SCC). The study was completed in accordance with the Virginia Department of Historic Resources (VDHR's) *Guidelines for Assessing Impacts of Proposed Electric Transmission Lines and Associated Facilities on Historic Resources in the Commonwealth of Virginia* (VDHR 2008) (Guidelines).

No previously recorded archaeological sites were identified within the right-of-way of the routes. Five previously recorded historic resources meeting criteria specified in the Guidelines fall within study tiers defined by the VDHR for identifying architectural resources along and near transmission line routes (Table 1). The likely impacts on individual historic resources associated with each route are presented in the table below.

Route 1 passes near three historic resources and intersects one historic resource meeting the criteria specified in the Guidelines. Route 2 passes near four historic resources and intersects one historic resource. ERM recommends that Route 1 would have No Impact on two of the identified resources, a Minimal Impact on one resource, and a Moderate Impact on the fourth resource. Route 2 would have No Impact on three historic resources, a Minimal Impact on one, and a Moderate Impact on one historic resource. Because both Routes 1 and 2 would create a Minimal Impact on one resource and a Moderate Impact on another resource, the routes would have an equal level of impact on known historic resources.

Dominion would construct the proposed Carmel Church line entirely within new right-of-way, measuring approximately 100 feet wide. Dominion would use weathered steel monopoles with heights ranging from 85 to 135 feet and and an average height of 109 or 111 dependent on the selected route, excluding foundation based on preliminary conceptual design, and subject to change based on final engineering. Each line structure would support two circuits. Structures would be installed at approximately 500- to 700-foot intervals along the Project's right-of-way.

TABLE 1 EXECUTIVE SUMMARY OF PROJECT IMPACTS TO CONSIDERED HISTORIC RESOURCES IN THE STUDY AREA OF THE ROUTE ALTERNATIVES

	Route Alternatives	
Considered Resource	**Route 1**	**Route 2**
016-5097	Minimal	No Impact
016-5165	No Impact	No Impact
042-0123	No Impact	No Impact
500-0001	Moderate	Moderate
American Indian Society Parcel	-	Minimal

Source: VCRIS (2024)

1. INTRODUCTION

This report presents the findings of a pre-application analysis conducted for Dominion Energy Virginia's 230 kilovolt (kV) Carmel Church Electric Transmission Line Project (Project) in Caroline County, Virginia. For this Project, the Company is proposing to construct and operate:

- A new, double circuit, overhead 230 kV transmission line (Carmel Church Line #256) in new right-of-way that will cut the Dominion's existing Ladysmith CT – Four Rivers #256 (Line #256) and connect to the proposed Carmel Church Switching Station.
- A new 230 kV delivery point switching station in Caroline County, Virginia, which will provide interconnection to Rappahannock Electric Cooperative (REC) to serve the Washington DC South development, which includes data centers.

Two potential routes were evaluated for the proposed Carmel Church Lines, each of which cut into the proposed Carmel Church switching station (Figure 1). The pre-application analysis assesses potential impacts on previously recorded historic and archaeological resources relative to each route. ERM conducted the pre-application analysis on behalf of Dominion Energy Virginia to assist in the development of a feasible Project design that minimizes impacts on historic resources. The study was completed in accordance with the Virginia Department of Historic Resources' (VDHR's) *Guidelines for Assessing Impacts of Proposed Electric Transmission Lines and Associated Facilities on Historic Resources in the Commonwealth of Virginia* (VDHR 2008) (Guidelines).

1.1 ROUTE ALTERNATIVES

Two routes are under consideration for the Carmel Church line, Route 1 and Route 2, are depicted as Figure 1.

1.1.1 ROUTE 1

Route 1 taps Dominion's existing Line #256 and connects to the proposed Carmel Church Switching Station that is located at the northern end of the Washington DC South development. The tap location is situated approximately 120 feet south of the crossing of Line #256 and Old CC Road. Route 1 extends west from the tap location, primarily within forested land, to span Taylor Drive and navigate north of the City of Richmond Police Department's Outdoor Range Facility property. This part of Route 1 is also in the Planned Innovation, Research, and Technology (PIRT) District for Caroline County. Approximately 1.2 miles west of the tap point, Route 1 crosses portions of Reedy Creek, a Columbia Natural Gas easement, and a CSX Railroad line. Continuing west for about 1.12 miles, Route 1 passes behind existing industrial development and enters forested property held by Washington DC South. The route enters the proposed Carmel Church Switching Station directly beyond the crossing of Interstate 95 (I-95).

Route 1 measures approximately 2.38 miles. The right-of-way for this alternative (28.57 acres) and the proposed Carmel Church Switching Station site (10 acres) would encompass a combined 38.57 acres.

1.1.2 ROUTE 2

Route 2 taps Dominion's existing Line #256 and connects to the proposed Carmel Church Switching Station that is located at the northern end of the Washington DC South development. Tapping Line #256 approximately 0.45 mile north of the existing transmission corridor's crossing of Ruther Glen Road, Route 2 travels northwest through forested land for about 0.7 mile to parallel Granny's Way to the south and span Ruther Glen Road. Route 2 continues west for about 0.5 mile between residential parcels and through forested land before veering northwest onto property held by Washington DC South. After crossing onto the developer's property, Route 2 spans I-95 and then continues north paralleling the western edge of I-95 for approximately 1 mile. Route 2 crosses a Columbia Natural Gas easement and a CSX Railroad line before connecting into the Carmel Church Switch Station.

Route 2 measures approximately 2.69 miles. The right-of-way for this alternative (32.28 acres) and the proposed Carmel Church Switching Station site (10 acres) would encompass a combined 42.28 acres.

1.2 MANAGEMENT RECOMMENDATIONS

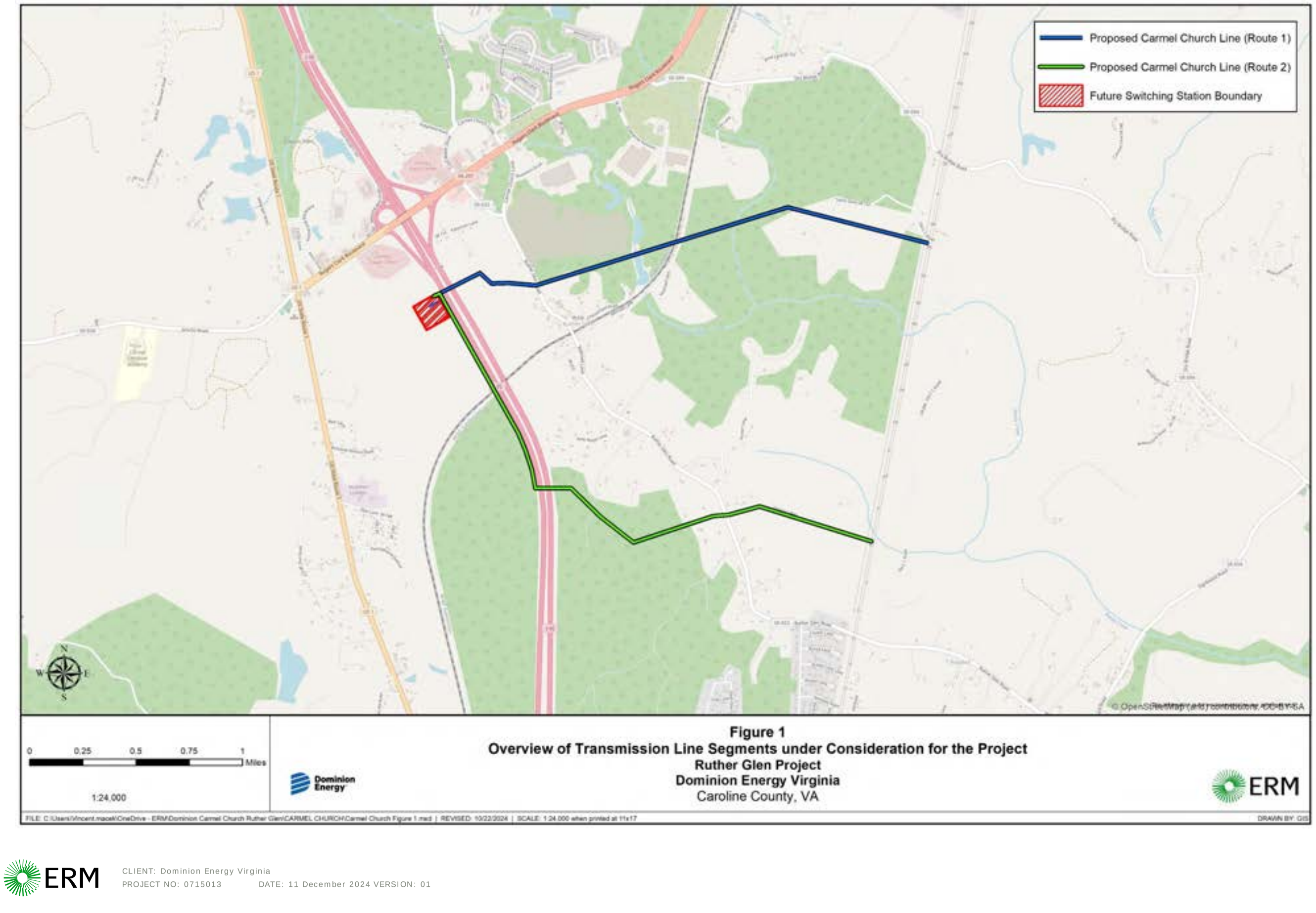
No previously recorded archaeological sites were identified within what would be the right-of-way for either route.

Five previously recorded historic architectural resources meeting criteria specified in the Guidelines fall within the study tiers defined by the VDHR for identifying architectural resources along and near transmission line routes (see Table 1). In addition to four previously recorded historic architectural resources documented in the Virginia Cultural Resource Information System (V-CRIS), one locally significant resource was identified within the study tiers defined by the VDHR. This resource is a parcel of land owned by the American Indian Society of Washington DC as a location to perform ceremonies. Route 1 passes near three historic resources and intersects one historic resource. Route 2 passes near four and intersects one historic resource.

For the Carmel Church line, ERM recommends both Routes 1 and 2 would have a Moderate Impact on the Richmond, Fredericksburg and Potomac Railroad Historic District (500-0001). ERM is recommending Route 1 would have No Impact on two and a Minimal Impact on one historic resource. Route 2 would have No Impact on three and a Minimal Impact on one historic resource.

Based on the above discussion, the two routes would have an equal level of impact on historic resources. Neither route alternative intersects archaeological sites. Routes 1 and 2 would pose the same Moderate Impact to the Richmond, Fredericksburg and Potomac Railroad Historic District and No Impact to certain other resources. Route 1 would create a Minimal Impact to one resource, the Ruther Glen Rosenwald School. Route 2 would create a Minimal Impact to the American Indian Society Parcel. More information about each resource and the nature of potential impacts associated with the two route alternatives are found in the sections that follow.

FIGURE 1 OVERVIEW OF TRANSMISSION LINE ROUTES UNDER CONSIDERATION FOR THE PROJECT



2. RECORDS REVIEW

2.1 DATA COLLECTION APPROACH

ERM conducted an analysis of potential cultural resource impacts for the alternative routes under consideration in accordance with the VDHR Guidelines. For each route, this analysis identified and considered the following previously recorded resources.

- National Historic Landmarks (NHLs) within a 1.5 mile-radius of each centerline;
- NRHP-listed properties, NHLs, battlefields, and historic landscapes within a 1.0-mile radius of each centerline;
- NRHP-eligible and NRHP-listed properties, NHLs, battlefields, and historic landscapes within a 0.5 mile radius of each centerline; and
- All of the above qualifying resources as well as archaeological sites within the right-of-way for each alternative route.

Data on previously recorded cultural resources within each study tier was obtained from the V-CRIS. ERM additionally collected information by contacting several possibly interested parties (Caroline County Historical Society, Hanover County Historic Society, Hanover County Black Heritage Society, Virginia Department of Transportation [VDOT], VDHR, Northern Virginia Conservation Trust, Preservation Virginia, Virginia Genealogical Society, Virginia Museum of History and Culture, Woodfork Genealogy, and American Battlefield Trust) to find locally significant resources within a 1.0-mile radius of each proposed route centerline.

Along with the records review, ERM conducted field assessments of the considered aboveground resources along each alternative route in accordance with the Guidelines. Digital photographs of each historic resource and views to the proposed transmission line were taken. Photo simulations were then prepared to assess the potential for visual impacts from the new transmission infrastructure on the resources.

2.2 ARCHAEOLOGICAL RESOURCES

Crossings of archaeological sites were considered a constraint in this study due to the potential for an electric transmission line to impact archaeological deposits in these areas (for example, due to transmission structure placement, tree clearing, or heavy equipment traffic within a site). However, no known archaeological sites were identified within the right-of-way for either alternative transmission line route.

2.3 HISTORIC RESOURCES

The following discussion summarizes the known historic resources in the vicinity of each alternative route based on the VDHR's tiered study model defined in the Guidelines. The locations of the considered historic resources and the alternative routes are shown on Figure 2. Individual maps for each proposed alternative are provided in Attachment 1.

Resources located within what would be the right-of-way of a route may be subject to both direct impacts from placement of the line across the property as well as visual impacts from changes to

the viewshed introduced by the new transmission line structures and conductors. Resources in the 0.5-mile tier would not be directly impacted, but would likely be visually impacted, unless topography, vegetation, or the built environment obscures the view to the transmission line. At a distance of over 0.5 mile, it becomes less likely that a resource would be within line-of-sight of the proposed transmission line. Beyond 1.0 mile, it becomes even less likely that a given resource would be within line-of-sight of a transmission line.

The nature of the impacts, while estimated in this study with the assistance of photo simulations, would depend on the final Project design in which the exact placement and height of transmission structures are determined. The purpose of the simulations and associated assessments in this report are to provide data on likely impacts and to compare those impacts to support the selection of a preferred route.

Once a route is certified by the SCC, that route would be subject to a full historic architectural survey in which additional (as of yet, unrecorded) historic properties could be identified and Project impacts assessed. The survey area would be defined based on the design height of the transmission line structures, topography, tree cover, and other factors impacting line-of-sight from architectural resources to the selected route.

2.3.1 ROUTE 1

The considered resources that lie within the VDHR tiers for Route 1 are presented in Table 2 and depicted in Attachment 1, Sheet 1. These four considered resources were subjected to field reconnaissance and a preliminary assessment of impacts, discussed in the next chapter.

TABLE 2 HISTORIC RESOURCES IN THE VDHR TIERS FOR ROUTE 1

Buffer (Miles)	Resource Category	Resource Number	Description
0.0 to 0.5	Locally Significant	016-5097	Ruther Glen Rosenwald School
	National Register - Eligible	016-5165	Excelsior Industry of Caroline County Historic District
	National Register - Potentially Eligible	042-0123	North Anna Battlefield
0.0 (within ROW)	National Register- Eligible	500-0001	Richmond, Fredericksburg and Potomac Railroad Historic District

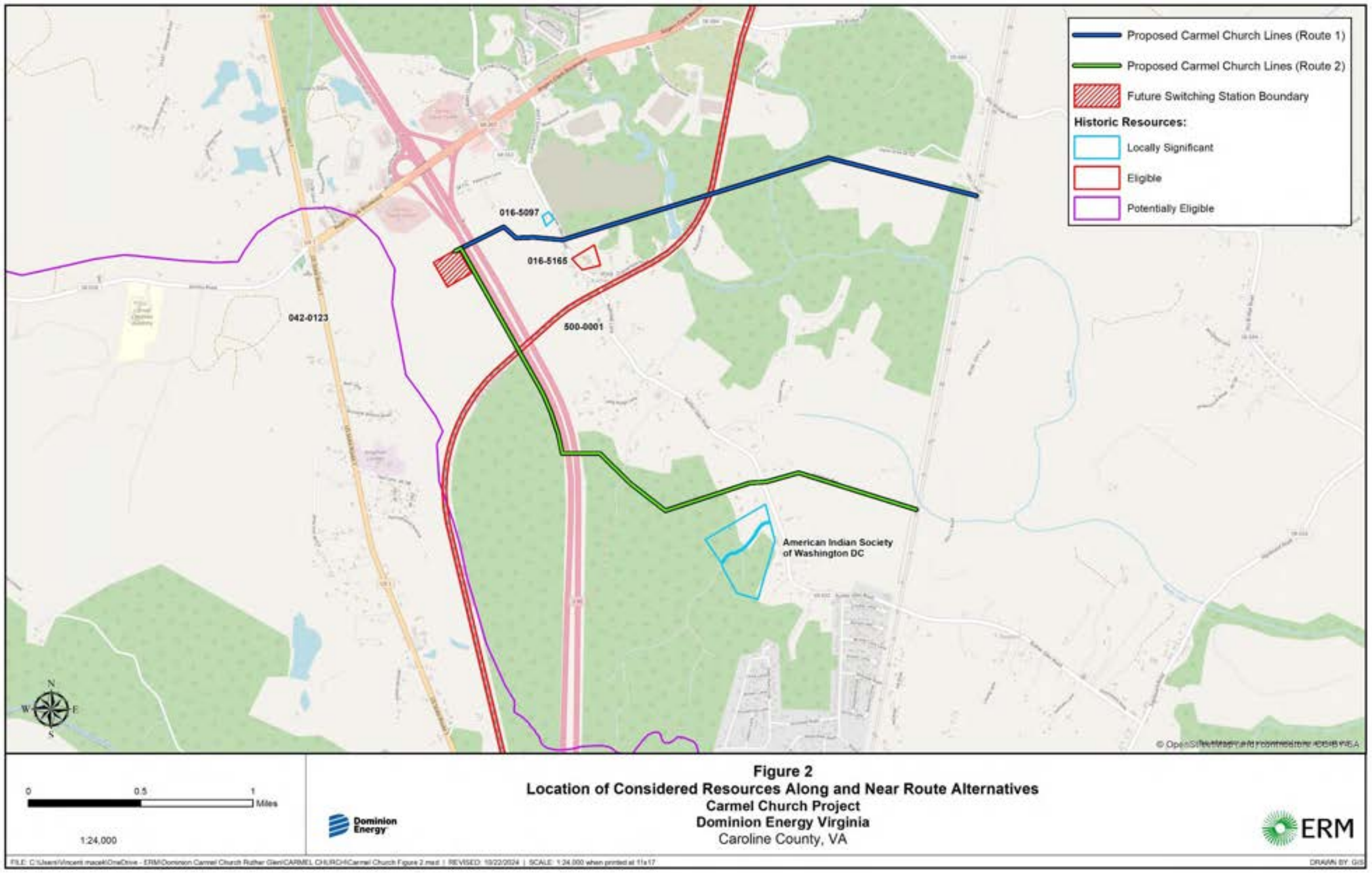
2.3.2 ROUTE 2

The considered resources that lie within the VDHR tiers for Route 2 are presented in Table 3 and depicted in Attachment 1, Sheet 1. These five considered resources were subjected to field reconnaissance and a preliminary assessment of impacts, discussed in the next chapter.

TABLE 3 HISTORIC RESOURCES IN THE VDHR TIERS FOR ROUTE 2

Buffer (Miles)	Resource Category	Resource Number	Description
0.0 to 0.5	Locally Significant	N/A	American Indian Society of Washington DC
		016-5097	Ruther Glen Rosenwald School
	National Register - Eligible	016-5165	Excelsior Industry of Caroline County Historic District
	National Register - Potentially Eligible	042-0123	North Anna Battlefield
0.0 (within ROW)	National Register- Eligible	500-0001	Richmond, Fredericksburg and Potomac Railroad Historic District

FIGURE 2 LOCATION OF CONSIDERED HISTORIC RESOURCES ALONG AND NEAR ALTERNATIVE ROUTES



3. PREVIOUS SURVEYS

There has been one previous cultural resource survey (CE-206) covering a portion of Route 1. Six prior surveys have been conducted within 1.0 mile; however, those do not intersect either Route 1 or Route 2 (Table 4). Information on these previous surveys, including VDHR survey number, report title, report authors, and report date, is provided in Table 5. The extent of the previous survey coverage is depicted in Attachment 2.

TABLE 4 CULTURAL RESOURCE SURVEYS COVERING PORTIONS OF THE ALTERNATIVE ROUTES

VDHR Survey #	Title	Authors	Date
CE-027	Phase I Archaeological Investigations of Spratt Recycling, Inc. Property, (Schwab Tract), Swans Corner, Caroline County, Virginia	Alain C. Outlaw, Martha W. McCartney, Carol D. Tyrer	1992
CE-042	Archaeological Survey, Interstate 95/Route 207 Interchange, Caroline County, Virginia	Lee Tippett, Megan Rupnik	2005
CE-163	Phase I Cultural Resource Identification Survey of the Footprint of Development for the Proposed Coolwater Drive Warehouse, Caroline County, Virginia	Darby O'Donnell	2015
CE-181	M.C. Dean – Caroline County Center for Innovation and Industry, Caroline County, Virginia: Phase I Cultural Resources Investigation	David Carroll, Jeremy Smith	2018
CE-206	Phase I Cultural Resource Identification Survey of the 70-acre Flint Tract, Caroline County, Virginia	Darby O'Donnell, Charles Strang Selden	2021
CE-210	Phase I Cultural Resource Survey of the M.C. Dean Southern Water Line Route, Caroline County, Virginia	Patrick L. Johnson, Jonathan Valalik	2022
CF-202	Phase II Archaeological Evaluation of the DeSear Farmstead Site (44CF594), Chesterfield County, Virginia	Donald G. Jones, Matthew R. Laird, Kimberly S. Zawacki, David M. Givens	2000

4. STAGE I PRE-APPLICATION ANALYSIS FINDINGS

4.1 METHODS FOR ANALYSIS

Fieldwork for the pre-application analysis was conducted by Secretary of the Interior Qualified architectural historian MacKenzie Carroll between September 2–5, 2024. The fieldwork involved photographing five resources requiring visual assessment according to the Guidelines and examining potential line-of-sight views from each resource toward the alternative routes. For resources where property owner approval was granted for historic resource documentation, photographs were taken toward the proposed transmission line(s) from the property at the most prominent view of the landscape. When such permission was not available, photographs were taken from the public right-of-way (typically a road) nearest to the resource facing toward the applicable route(s).

Panoramic photographs were taken from each resource, with an effort to capture the direction with the clearest, most unobstructed view toward the applicable route. The precise location of the photograph was captured with a mobile tablet device connected to a sub-meter accurate Global Navigation Satellite System (GNSS) receiver, the Trimble R1. The locations where photographs were taken were noted as Simulation Points (SP). Site visits to the SPs were prioritized based on their location relative to the resource, so that viewpoints east of the resource were visited in the morning and viewpoints west of the resource were visited in the afternoon. This helped ensure, where possible, that the sun was behind the photographer at the time the viewpoint photography was captured. Additionally, minor adjustments to position were made to obtain as clear a view to the site center as possible, avoiding trees, landscaping, or built obstructions. Tablets recorded the center bearing, angle of view, altitude, and camera lens height. Upon receipt of the viewpoint location information, the viewpoints were plotted onto open source mapping from the Environmental Systems Research Institute (ESRI) using the Universal Transverse Mercator (UTM) 18N coordinate system.

The process of taking panoramas included setting up the tripod and camera. The camera was placed on the panoramic head in a landscape orientation where its lens height was confirmed and set at 1.5 meters (note: a portrait camera orientation was sometimes used in situations where the viewpoint is very close to a development so that the top of the development is not cut off by the image boundaries). The tripod head and camera combination were then leveled. With the camera's viewfinder centered on the perceived site center, exposure and focus settings were taken. These were then fixed manually on the camera so that they could not be inadvertently altered. The head was rotated 90 degrees to the left where the first frame of the 360-degree sequence was then taken. Each subsequent frame was taken using a 50 percent overlap of the previous frame until the full 360-degree sequence was captured. The camera was then removed from the tripod and a viewpoint location photograph was captured showing the tripod in its position.

The following camera and tripod configuration was used:

- Camera body: Nikon D800 professional specification digital SLR (full frame CMOS sensor)
- Camera lens: Nikkor AF 50mm f1.8 prime

- Tripod: Manfrotto 055MF4 with Manfrotto 438 ball leveler
- Panoramic head: Manfrotto 303SPH

The following camera settings were used for all photography:

- Camera mode: Manual Priority
- ISO: 100
- Aperture: f13
- Image format: RAW

After the photos were complete, they were uploaded to a server to begin the simulation/visualization process. The single-frame photographs were opened in Adobe Photoshop CC 2022 where they were checked, and any camera sensor dust spots were removed before being saved as high-resolution JPEG images. If required, discrete color and tonal adjustments were made to each frame before they were saved. The single-frame photographs were stitched together in PTGui Pro version 12.11 professional photographic stitching software using cylindrical projection settings. The camera locations were plotted in Global Mapper version 23.1. Digital models of the transmission line structures were provided by Dominion, then cleaned up and textured in Autodesk 3DS Max 2021. The transmission structures along each route were rendered in Vray version 5.2 from each SP camera location. 3D imagery was produced at the field of view using camera matching. Renderings for each route and each tower combination were then exported for use as an overlay.

Detailed, correctly dimensioned 3D computer models of the transmission structures along each route were generated using Autodesk 3DS Max 2021 and iToo RailClone. The virtual 3D model of the structures was created using real-world measurements and elevation drawings provided by the Company (see Attachment 3). These were textured using Vray PBR materials to simulate the weathering steel texture. The detailed, textured models were rendered to a digital image using a simulated physical camera and a sun and sky simulation lighting model in the computer software consistent with conditions within the original viewpoint photography.

Photomontages were produced by overlaying the rendered image on the photograph, using known control points and the wireline imagery showing the tower columns at the correct height and distance. Final adjustments were then made to the brightness and contrast of the rendered images to match them to the photograph. Final photomontages were prepared from each viewpoint for each route. These were then opened in Adobe Photoshop CC 2022 where minor changes were made such as placing relevant tree/building/hedge screening or telegraph wires over the proposed development renders where necessary. Finally, the final images were cropped to the proportions required for the visual simulation figures, and the visualization figures were prepared in Adobe InDesign CC2022 and exported in a PDF format.

4.2 ASSESSMENT OF POTENTIAL IMPACTS

The assessment of potential Project impacts on individual resources made use of the visual assessment findings and categorized the level of impacts by severity according to the following scale devised by VDHR:

- **None**–Project is not visible from the resource.
- **Minima**l–Viewsheds have existing transmission lines, there would be only a minor change in height, and/or other views are partially obscured by topography or vegetation.
- **Moderate**–Viewsheds have more expansive views of the transmission line, more dramatic changes in height are proposed, and/or the overall visibility of the Project would be greater.
- **Severe**–Existing viewshed contains no transmission line, the view to the Project would be relatively unobstructed, the new transmission line would introduce a significant change to the setting of historic properties, and/or a dramatic change in the height of an existing transmission line would take place in close proximity to historic properties.

4.3 HISTORIC RESOURCE DESCRIPTIONS

4.3.1 016-5097, RUTHER GLEN ROSENWALD SCHOOL

The Ruther Glen Rosenwald School (016-5097) is located in a rural area of Caroline County, east of Interstate 95. The school is located on the west side of Ruther Glen Road/Route 652, approximately a half mile north of Chesterfield Road/Route 620. The building sits on a 1.1-acre parcel.

016-5097 is one of nine schools in Caroline County that were partially funded by the Rosenwald Fund, which provided communities with matching grants to construct schools for African American children in the segregated South. The resource consists of a one-story frame building, which was later converted into the dwelling by the time it was reviewed by the VDHR staff in 2014 (Appendix 4, Figure 1; VDHR 2014). They described the school as a circa 1920 single-story, square building with a side-gabled roof and an inset one-bay corner porch that sheltered the primary entrance. To the right of the porch are two large replacement windows. A one-story addition was added off the rear.

The school was constructed at a cost of $1,556, of which $500 was provided by the Rosenwald Fund and the remainder was contributed by the local African American community. It uses Plan No. 1 from the newly developed plans of director Samuel L. Smith, following the move of the school-building program from the Tuskegee Institute to Fisk University in 1920. Plan No. 1 was designed as a one-teacher school, one of the most common sizes for rural African American schools. The building was to be constructed facing east or west only to allow the bands of windows on the front and rear to take advantage of natural light. The plan consisted of a recessed corner porch, a large 22-foot by 30-foot classroom, a smaller 10-foot by 14-foot industrial room, and two cloak rooms. The plan did not include restrooms, which would have been located outside (History South 2024; McClure 2020; VDHR 2014).

The Ruther Glen Rosenwald School was reported to VDHR in 2003, but has not been formally surveyed. In 2014, a staff record was established based on a Google street view that confirmed the location and continued existence of the resource. 016-5097 has not been given a formal NRHP determination, however the VDHR staff has recommended additional research be completed. ERM has categorized it as locally significant for the purposes of the Carmel Church Project due to ties to the local African American community. 016-5097 lies within the half-mile study tier for both route alternatives.

4.3.2 016-5165, EXCELSIOR INDUSTRY OF CAROLINE COUNTY HISTORIC DISTRICT

016-5165, the Excelsior Industry of Caroline County Historic District, consists of four noncontiguous properties along the tracks of the Richmond, Fredericksburg & Potomac (RF&P) Railroad associated with the early twentieth century manufacture of excelsior in Caroline County. These four resources are scatted throughout the county, with two located within the community of Ruther Glen (016-5105 and 016-5106), only one (016-5150) of which is located within the study tiers for this Project. The remaining two are located in Milford and Penola. Excelsior, also known as wood wool, is a product composed of wood shavings or coils that was used for a variety of purposes, including furniture and mattress padding and packing material (Attachment 4, Figure 2). Originally a brand name, the term came to be applied to the product generally. George P. Lyon established the first excelsior mill in Caroline County in the village of Woodford on the RF&P Railroad in 1896. The vast pine forests of the county provided an ample supply of raw material for excelsior production. His success led to the opening of additional mills, sometimes in association with existing lumber mills, and by 1924, Caroline County had the largest number of mills in the state. The industry became Caroline County's largest in the 1920s and contributed significantly to the local economy (Barile et al. 2018a).

The high fire risk from the highly combustible wood wastes made excelsior mills virtually uninsurable, and many were lost to fires. The Lyon Mill in Woodford burned in three consecutive years at the beginning of the twentieth century, but was rebuilt each time, indicating the market for its product. However, after World War II, the availability of other products with the capabilities of excelsior, including synthetic fibers, resulted in a sharp decline in production. When the Woodford Excelsior Mill was again destroyed by fire in 1950, it did not reopen. Nevertheless, as late as the 1970s, two of the top five manufacturers in the country had mills in Caroline County, including Taylor Fiber, Inc. of Ruther Glen. Although the remnants of excelsior mills and their associated structures in Caroline County represent only a small fraction of the once ubiquitous features of the industry, the remaining buildings are an important reminder of the importance of the now defunct enterprises that dotted the county's landscape (Barile et al. 2018a).

Excelsior Mill #1 (016-5105), near the intersection of Ruther Glen Road (Route 652) and Chesterfield Road (Route 620), was constructed about 1919 as the Caroline Excelsior Company by Thomas H. Chewning and Herman L. Taylor. Chewning's brother Clarence purchased a one-third share soon after. In 1956, the Chewning brothers sold their shares to Taylor, who passed the operation to his son, H. Ashton Taylor, in 1960. The younger Taylor, who had been working in his father's business for many years, renamed the company Taylor Fiber, Inc. The company produced excelsior and "kindred products," and by 1977 was one of only 12 facilities in the country still in operation. The company employed 30 people in 1982. The mill finally closed in 1988 (Barile et al. 2018a).

016-5105 consists of six buildings of varying materials and function, as well as a ca. 1950 conical waste burner. The burner is a sheet metal clad frame on a concrete foundation. The top is open and vents and an access door are located near the base. A funnel-shaped attachment was used to blow sawdust and other mill waste into the burner, which gravitated toward the center due to a cyclone effect. Two large frame warehouses are located on the property, along with a frame tool shed and machine shop and a concrete-block warehouse. The buildings all appear to date to

between 1950 and 1970. The buildings are all vacant and in a deteriorating condition. A house that was once located to the west of the mill complex has been demolished.

The site of Excelsior Mill #2 (016-1506) is located at the eastern terminus of Chesterfield Road in Ruther Glen. The T. Hunter sawmill and lumber yard was established on the property in 1901 and was purchased after Hunter's death in 1911 by Cora Blanton, whose husband, Thomas, operated the adjacent Ruth Glen Excelsior Company. The company expanded onto the new property and operated until 1956, when it was shut down through a lawsuit filed by the owners of Excelsior Mill #1 (Taylor Fibers, Inc.), which claimed to operate under the name of Ruther Glen Excelsior Company (Barile et al. 2018a).

016-5106 consists of three buildings and a conical waste burner. The burner is similar to the one at Excelsior Mill #1 described above and appears to date to about 1950. The three buildings are warehouses, the largest of which is constructed of concrete block with a flat roof. A frame warehouse clad in corrugated metal is located to the west of the larger building. The third warehouse could not be accessed at the time of the survey. The buildings are all vacant and in a deteriorating condition.

Excelsior Industry of Caroline County MPD was determined eligible for the NRHP in 2018 (VDHR 2018). 016-5165 lies within the half-mile study tier for both route alternatives.

4.3.3 043-0123, NORTH ANNA BATTLEFIELD

043-0123, North Anna Battlefield, is located in northern Hanover and southern Caroline counties (Attachment 4, Figures 3 through 6). The resource represents the site of a pivotal engagement between Robert E. Lee's Army of Northern Virginia and George Meade's Army of the Potomac. The battle was part of Grant's Overland Campaign to take Richmond in the Spring of 1864. After heavy losses at the battles of Wilderness and Spotsylvania Courthouse, Grant's once superior numbers had dwindled, but he had managed to push Lee back to the south side of the North Anna River, where the Confederate commander entrenched. Lee's right, under General Longstreet, guarded the Richmond, Fredericksburg and Potomac Railroad crossing and the Chesterfield bridge over the North Anna River on the Telegraph Road. On the Confederate left was A. P. Hill's 3rd Corps near Jericho Mill (American Battlefield Trust 2024b; National Park Service [NPS] 2024).

On May 23rd, 1864, Hancock's Union Corps advanced on the Chesterfield bridge where Henagan's brigade was stationed in a small redoubt on the north side of the river. Greatly outnumbered, Henagan retreated across the river. Meanwhile, at Jerico Mill, Warren's V Corps crossed the river unopposed, only to be met with an attack by Hill's corps, which nearly overwhelmed the Union forces. Warren managed to hold his position, however, and remained on the south side of the river. During the night, Lee withdrew his flanks to create an "inverted V" with its point at Ox Ford on the North Anna River. The heavily fortified line would require Grant to divide his forces on either side of the river, which Lee hoped would allow him to throw the majority of his force against one side of line and crush one of Grant's corps (American Battlefield Trust 2024a; NPS 2024).

On the 24th, Grant took the bait, assuming the fallback on the Confederate right was a retreat, and sent Hancock's corps across the river, where they engaged in a fierce firefight with Confederate skirmishers. However, an ailing Lee failed to order an all-out attack in time, and

before a blow could be dealt, Meade realized his vulnerable position and ordered Hancock to halt and entrench. After two days in front of the Confederate defenses, Grant determined he could not gain sufficient advantage for an attack, and again opted for a flanking maneuver, withdrawing across the river on the night of the 26th and shifting southeast to Totopotomoy Creek. Lee followed, leaving his carefully constructed defenses at the North Anna River (American Battlefield Trust 2024a; NPS 2024).

Resource 042-0123 has been determined potentially eligible for the NRHP for its association with the events of the North Anna Battlefield ([VDHR 2007). The boundaries of the resource are represented by the Civil War Sites Advisory Commission (CWSAC) Study Area boundary defined for its 1993 report and subsequent revisions (American Battlefield Protection Program [ABPP] 2009; CWSAC 1999). The Study Area includes all of the areas traversed by the armies prior to, during, and following the battle. Within the Study Area, the CWSAC also delineated the Potential National Register Area (PotNR) that retains sufficient integrity to be considered for preservation, and the Core Area, where the principal fighting took place. The Core Area is about a mile to the south of Route 2 of the Project. U.S. Route 1 runs to the west of the route alternative and follows roughly the route of the historic Telegraph Road. Hancock's corps took this road south toward the crossing of the North Anna River at the Chesterfield Bridge, where they encountered Henagan's brigade in the redoubt beginning the battle. U.S. 1 is not within the PotNR area, and the Project area is tangential to the main area of the battle.

The North Anna Battlefield was determined potentially eligible for the NRHP in 2007 (VDHR 2023). 042-0123 lies within the half-mile study tier for both route alternatives.

4.3.4 500-0001, RICHMOND, FREDERICKSBURG, AND POTOMAC RAILROAD HISTORIC DISTRICT

500-0001, the Richmond, Fredericksburg and Potomac (RF&P) Railroad Historic District, consists of the former RF&P Railroad (now part of CSX) and associated secondary resources such as bridges, culverts, and stations (Attachment 4, Figure 7). The railroad was completed between Richmond and Fredericksburg in 1837 and was extended in 1842 to Aquia Creek, where it connected with steamboat service on the Potomac River. Plans were made to extend the line to Alexandria in the 1850s, but the project was interrupted by the Civil War. The resource played an important role in the war, as both armies sought to control the line for use in transporting troops and supplies, while preventing the enemy from doing the same. At the end of the war, the line was in ruins but was quickly rebuilt. The line between Fredericksburg and Alexandria was completed in 1872 by the Alexandria and Fredericksburg Railroad Company. The two lines prospered in the late nineteenth century and were combined under a single management structure through a holding company called the Richmond-Washington Company in 1901 (Barile et al. 2018b).

In 1903, the entire line between Richmond and Washington, D.C. was double-tracked, and its switching yards near Richmond and Washington, D.C. were expanded. The company weathered the Depression through its real estate holdings, which came to represent the most significant portion of its operations into the second half of the twentieth century. After World War II, the RF&P made additional improvements to its line, including grade reductions, curve straightening,

and structural improvements to accommodate additional weight on its tracks. However, as a small regional railroad, the company relied on passenger service over freight, and rail travel continued to decline as automobiles became the dominant form of transportation. The construction of I-95 along a parallel route to the line in the late 1950s further eroded passenger traffic on the line. In the 1970s, Amtrak took over the RF&P's passenger service and the company reorganized as primarily a real estate management entity. In 1991, CSX Transportation acquired the railroad, which continues to operate. The Virginia Railway Express (VRE) provides weekday passenger service between Richmond and Washington, D.C. (Barile et al. 2018b).

The RF&P Railroad Historic District was determined eligible for the NRHP under Criterion A for its significance in the economic and transportation history of the region through which it passes and the development of the cities along its route. 500-0001 is intersected by both route alternatives and would be intersected by their right-of-way.

4.3.5 AMERICAN INDIAN SOCIETY PARCEL

The American Indian Society of Washington DC is located at 25401 Reservation Lane in Ruther Glen on a 45-acre parcel to the west of Ruther Glen Road (Attachment 4, Figure 8). The parcel consists of forested land. To the east of the resource are residential dwellings and an agricultural field.

The society is a membership-based group based in Washington D.C., created to fill the need for a central organization representing different Tribal Nations. The society was formally organized in August 1966 with the goal to promote, protect, and share Indigenous cultures as well as provide community education (AISDC 2024). The American Indian Society actively uses the property for ceremonial purposes.

The American Indian Society of Washington DC is not a recorded resource in V-CRIS. ERM is considering the parcel a locally significant resource due to its use as a ceremonial location. The parcel is located approximately 550 feet south of Route 2.

4.4 HISTORIC RESOURCES FINDINGS FOR ROUTE 1

The impacts to each resource in the Route 1 study tiers are discussed below. Photo simulations are provided in Attachment 5.

4.4.1 016-5097, RUTHER GLEN ROSENWALD SCHOOL

The Ruther Glen Rosenwald School is located approximately 500 feet to the north of Route 1, which uses greenfield alignment (Attachment 5, Figure 1). The area between the resource and the route consists primarily of dense woodland, but is cleared along Ruther Glen Road, which would be crossed by Route 1 near MP 1.9.

One simulation (KOP 006) was prepared for this resource from a vantage point on the east side of Ruther Glen Road, across the street from the resource, looking south towards Route 1 (Attachment 5, Figure 2). The density of the woodlands to the south would likely obstruct line of sight from the resource to Route 1 except when looking south from the resource's easternmost boundary along Ruther Glen Road. As seen in the simulation, the tree clearing that would take

place along the new right-of-way would be somewhat visible where the proposed line crosses Ruther Glen Road, and conductors would be seen spanning the road. No structures would be visible from the KOP. The resource is surrounded by dense woods to the south, west, and east, obscuring sight lines to Route 1 except along the road. Existing electric distribution lines have already added a similar modern element to the landscape along the resource's east side.

Due to the viewshed change to the resource from limited vantage points looking south, ERM recommends that Route 1 would have a **Minimal Impact** on the Rosenwald School.

4.4.2 016-5165, EXCELSIOR INDUSTRY OF CAROLINE COUNTY HISTORIC DISTRICT

One (016-5106) of the four associated resources that comprise the Excelsior Industry of Caroline County Historic District is located within the study tier for Route 1. It is situated approximately 350 feet south of MP 1.9 for Route 1 (Attachment 5, Figure 3). The area between the resource and the route contains residential dwellings situated within dense woodland. One simulation (KOP 008H) was prepared from the northwest corner of this resource on the west side of Ruther Glen Road (Attachment 5, Figure 4). As shown by the simulation, there would be no view to the route due to the existing vegetation. Therefore, ERM recommends there would be **No Impact** on this resource from Route 1.

4.4.3 042-0123, NORTH ANNA BATTLEFIELD

The North Anna Battlefield easternmost boundary is located approximately 0.31 miles to the west of where Route 1 cuts into the proposed switching station (Attachment 5, Figures 5 and 7). The area between the resource and route contains high traffic roadways—Rogers Clark Boulevard and Jefferson Davis Highway—and heavily forested land. Two simulations were prepared for this resource, one located at the northeast intersection of Rogers Clark Boulevard (KOP 001H; Attachment 5, Figures 6) and the other from Jefferson Davis Highway (KOP 002H; Attachment 5, Figure 8). In both locations, the simulations show that the resource would not have a view of the route due to the distance and density of vegetation. Therefore, ERM recommends there would be **No Impact** on the North Anna Battlefield from Route 1.

4.4.4 500-0001, RICHMOND, FREDERICKSBURG, AND POTOMAC RAILROAD HISTORIC DISTRICT

The Richmond, Fredericksburg, and Potomac Railroad Historic District is intersected by Route 1 at Frye Lane between MP 1.2 and 1.3 (Attachment 5, Figure 9). The area surrounding this intersection point consists of dense woodland.

Only one simulation (KOP 005H) was prepared for this resource due to the limited points of intersection from public rights-of-way. The KOP was taken approximately 955 feet southwest from where the route crosses the railroad looking north towards Route 1 (Attachment 5, Figure 10). From this location, the new transmission line structures and conductors would be visible through tree breaks and during leaf-off seasons. The route would add modern transmission infrastructure (structures and conductors) to a viewshed where it does not currently exist. However, in regard to the resource as a whole, the route would only intersect approximately 125 feet of the resource, which spans miles on either side of this intersection, and the landscape along the length of the

resource has already been altered by other modern development, such as highways and commercial buildings. As you leave the point of intersection and move farther along the resource's southern or northern alignment, the likelihood of the route's visibility is greatly diminished due to the dense vegetation and distance.

Although Route 1 would add a highly visible modern element to a small portion of the resource and physically cross a section of the right-of-way with overhead lines, the larger viewshed of the resource would not be significantly altered. However, since it does intersect the resource, ERM recommends there would be a **Moderate Impact** on the Richmond, Fredericksburg, and Potomac Railroad Historic District from Route 1.

4.5 HISTORIC RESOURCES FINDINGS FOR ROUTE 2

The impacts to each resource in the Route 2 study tiers are discussed below. Photo simulations are provided in Attachment 5.

4.5.1 016-5097, RUTHER GLEN ROSENWALD SCHOOL

The Ruther Glen Rosenwald School is located approximately 0.37 miles northeast of Route 2 (Attachment 5, Figure 11). The area between the resource and the route contains dense woodlands and an interstate highway. One simulation (KOP 006) was prepared for this resource, taken on the east side of Ruther Glen Road, across the street from the resource, looking southwest towards Route 2 (Attachment 5, Figure 12). There would be no view to the route due to vegetation and distance. Therefore, ERM recommends there would be **No Impact** on this resource from Route 2.

4.5.2 016-5165, EXCELSIOR INDUSTRY OF CAROLINE COUNTY HISTORIC DISTRICT

One (016-5105) of the four associated resources that comprise the Excelsior Industry of Caroline County Historic District is located within the study tiers for Route 2. It is situated approximately 0.39 miles east of MP 2.5 for Route 2 (Attachment 5, Figure 13). The area between the resource and the route contains a few residential dwellings along Ruther Glen Road, backed by woodlands to the west. One simulation (KOP 008H) was prepared for this resource, taken from the northwest corner of the resource's boundary on Ruther Glen Road (Attachment 5, Figure 14). There would be no view to the route due to vegetation and distance. Therefore, ERM recommends there would be **No Impact** on this resource from Route 2.

4.5.3 042-0123, NORTH ANNA BATTLEFIELD

The North Anna Battlefield easternmost boundary is located approximately 0.31 miles to the west of where Route 2 cuts into the proposed switching station (Attachment 5, Figures 15 and 17). The area between the resource and route contains high traffic roadways—Rogers Clark Boulevard and Jefferson Davis Highway—and heavily wooded land. Two simulations were prepared for this resource, one located at the northeast intersection of Rogers Clark Boulevard (KOP 001H; Attachment 5, Figures 16) and the other from Jefferson Davis Highway (KOP 002H; Attachment 5, Figure 18). In both locations, the simulations show that the resource would not have a view of the route due to the distance and density of vegetation. Therefore, ERM recommends there would be **No Impact** on the North Anna Battlefield from Route 2.

4.5.4 500-0001, RICHMOND, FREDERICKSBURG, AND POTOMAC RAILROAD HISTORIC DISTRICT

The Richmond, Fredericksburg, and Potomac Railroad Historic District is intersected by Route 2 between MP 2.2 and 2.3 (Attachment 5, Figure 19). The area surrounding this intersection point consists of dense woodland on the east and western sides. Interstate 95 crosses the resources by bridge closest to MP 2.2. The proposed route parallels the interstate from the switching station to around MP 1.7 before turning east then southeast.

Only one simulation (KOP 009) was prepared for this resource due to the limited points of intersection and safety concerns from public rights-of-way. The KOP was taken approximately 0.5 mile northeast of Route 2 and approximately 200 feet to the north of the resource along Chesterfield Road (Attachment 5, Figure 20). From this location, the new transmission line structures and lines would not be visible due to the dense vegetation and distance. Although this simulation shows no line of sight to the route, the resource would be intersected by Route 2. Although the interstate highway has already altered the viewshed in the immediate vicinity, the route would add modern transmission infrastructure (structures and conductors) to a viewshed where it does not currently exist. However, in regard to the resource as a whole, the route would only intersect approximately 107 feet of the resource, which spans for miles on either side of this point. The landscape encompassing the resource has already been altered by other modern developments, such as highways and commercial buildings. As you leave the point of intersection and move farther along the resource's alignment, the likelihood of the route's visibility is greatly diminished due to the dense vegetation, distance, and positioning of the route perpendicular to the resource.

Although Route 2 would add a highly visible modern element to a small portion of the resource and physically cross a section of the right-of-way with overhead lines, the larger viewshed of the resource would not be significantly altered by the route. However, since it does intersect the resource, ERM recommends there would be a **Moderate Impact** on the Richmond, Fredericksburg, and Potomac Railroad Historic District from Route 2.

4.5.5 AMERICAN INDIAN SOCIETY PARCEL

The American Indian Society Parcel is located approximately 560 feet south from Route 2 (Attachment 5, Figure 21). The area between the resource and the route is a combination of scattered residential development, agricultural land, and small stands of trees.

One simulation (KOP 112) was prepared for this resource, and was taken 151 feet southeast of the parcel's northeast corner along Ruther Glen Road (Attachment 5, Figure 22). As shown by the simulation, the route alternative is visible crossing Ruther Glen Road and traversing the agricultural field located to the northeast from the resource's entrance point. The parcel's north and east boundary consists predominantly of dense woods. The approximate 100-foot buffer of woods to the east of the parcel's boundary along Ruther Glen Road, and the dense expanse of woods to the north would likely screen the route from view at most vantage points inside the parcel. However, since the proposed route would cross an open field to the northeast of the resource, it would be visible from the entry point of the parcel as depicted in KOP 112.

Although the viewshed of the resource would be altered by the proposed route, there is an existing transmission line running along the east side of Ruther Glen Road adding a modern element to the parcel's viewshed. Due to the change in its current viewshed, ERM recommends that Route 2 would have a **Minimal Impact** on the American Indian Society Parcel

4.6 ARCHAEOLOGICAL RESOURCES WITHIN THE RIGHT-OF-WAY FOR THE ROUTE ALTERNATIVES

No previously recorded archaeological sites were identified within the right-of-way of the routes.

5. CONCLUSION AND RECOMMENDATIONS

As part of the effort to evaluate potential impacts from alternative routes associated with the Project, the pre-application analysis gathered information on archaeological and historic resources that qualify for consideration according to the VDHR Guidelines for transmission line projects.

No known archaeological sites are located in the right-of-way of the transmission line routes reviewed in this study.

Five aboveground historic resources fall within the VDHR study tiers for the alternative routes under consideration. A comparison of the resources impacted and the degree of impact from each route is presented in Table 5. The specific resources affected by each alternative are covered in the subsections that follow.

TABLE 5 COMPARISON OF PROJECT IMPACTS ON HISTORIC RESOURCES IN THE STUDY AREAS OF THE ALTERNATIVE ROUTES

Route Alternative	Number of Considered Resources in Each Impact Category				
	None	Minimal	Moderate	Severe	Total
Route 1	2	1	1	0	4
Route 2	3	1	1	0	5

Final assessments of Project impacts will be dependent on the completion of identification-phase archaeological and historic structure surveys along the route selected by the SCC, followed by review of survey results by VDHR and other consulting parties. For any resources where the agencies concur in a finding of moderate or severe impact, the Company will propose treatments to avoid, minimize, or mitigate those impacts. Treatment options for archaeological sites could include selective structure placement to avoid direct impacts on sites, minor route adjustments to avoid crossing sites, or archaeological data recovery. Treatment options for aboveground historic resources could include detailed site documentation, historic research, and historic preservation studies; preparation of digital media or museum-type exhibits on sites for public interpretation; installation of historic markers or signs; installation of vegetative screening; or contributions to historical preservation organizations or specific preservation projects. Additional mitigations could be identified through consultation with VDHR and other consulting parties.

5.1 ROUTE 1

Four previously recorded historic resources meet the criteria specified in the Guidelines within the VDHR study tiers for Route 1 (Table 6). The route would have No Impact on two historic resources, a Minimal Impact on one, and a Moderate Impact on one.

TABLE 6 IMPACTS ON HISTORIC RESOURCES IN THE VDHR STUDY TIERS FOR CARMEL CHURCH ROUTE 1

Buffer (miles)	Resource Category	Resource Number	Description	Impact
0.0 to 0.5	Locally Significant	016-5097	Rosenwald School	Minimal
	National Register - Eligible	016-5165	Excelsior Industry of Caroline County Historic District	None
	National Register – Potentially Eligible	042-0123	North Anna Battlefield	None
0.0 (within ROW)	National Register - Eligible	500-0001	Richmond, Fredericksburg and Potomac Railroad Historic District	Moderate

5.2 ROUTE 2

Five previously recorded historic resources meet the criteria specified in the Guidelines within the VDHR study tiers for Route 2 (Table 7). The route would have No Impact on three historic resources, a Minimal Impact on one, and a Moderate Impact on one.

TABLE 7 IMPACTS ON HISTORIC RESOURCES IN THE VDHR STUDY TIERS FOR CARMEL CHURCH ROUTE 2

Buffer (miles)	Resource Category	Resource Number	Description	Impact
0.0 to 0.5	Locally Significant	N/A	American Indian Society of Washington DC	Minimal
		016-5097	Rosenwald School	None
	National Register - Eligible	016-5165	Excelsior Industry of Caroline County Historic District	None
	National Register – Potentially Eligible	042-0123	North Anna Battlefield	Moderate
0.0 (within ROW)	National Register – Eligible	500-0001	Richmond, Fredericksburg and Potomac Railroad Historic District	None

5.3 FUTURE INVESTIGATIONS

The next stage of assessing impacts on cultural resources will be to conduct an identification-phase field survey to identify and assess resources along the specific route selected by the SCC that could be impacted by the Project. Survey will be conducted in accordance with the following guidelines:

- Guidelines for Assessing Impacts of Proposed Electrical Transmission Lines and Associated Facilities on Historic Resources in the Commonwealth of Virginia (VDHR 2008);
- Guidelines for Conducting Historic Resources Survey in Virginia (VDHR 2017);

- National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation (National Park Service [NPS] 1995).

The survey teams will be led by individuals meeting the Secretary of the Interior's professional qualifications standards for archaeology and architectural history, respectively. Teams will traverse the length of the Project corridor, revisiting previously recorded resources and documenting additional as-of-yet unrecorded resources in the survey area defined in the Guidelines for the Project design. The archaeological survey will adhere to VDHR survey standards (VDHR 2017) and will entail systematic coverage of the approved route. All material culture, including artifacts and features, that could be 50 years old or older will be recorded. Sites will be delineated within the proposed right-of-way and investigations will include subsurface testing sufficient to inform recommendations of potential eligibility for the NRHP under Criterion D. Each site will be fully documented with appropriate mapping, digital photography, and artifact collection/analysis. Site forms will be prepared for V-CRIS submittal along with full descriptions in the technical report. The historic architectural survey will likewise adhere to VDHR standards. While the NPS Bulletin 15 (NPS 1995) defines a historic property as a resource that is 50 years or older, for the purposes of this Project, survey will include those 45 years or older to accommodate the length of time needed to complete the permitting phase for the Project. Furthermore, the survey will also record those resources that may have reached significance prior to the 50 (45) year age in accordance with NPS guidance if they are integral parts of districts or have merit to be considered eligible for the NRHP on their own. Digital photographs will be taken to record resources' overall appearance and details. Sketch maps will be drawn depicting the relationship of dwellings to outbuildings and associated landscape features. Additional information on the structures' appearance and integrity will be recorded to assist in making recommendations of NRHP eligibility. Historic maps, aerial photographs, and tax assessor data will be consulted to assist in dating the resources. Resources identified in the field effort will be reported to the VDHR, VCRIS numbers will be obtained, and shapefiles and database information will be provided. Sufficient information will be collected to make recommendations for each identified historic resource regarding eligibility for listing on the NRHP and to assess Project impacts.

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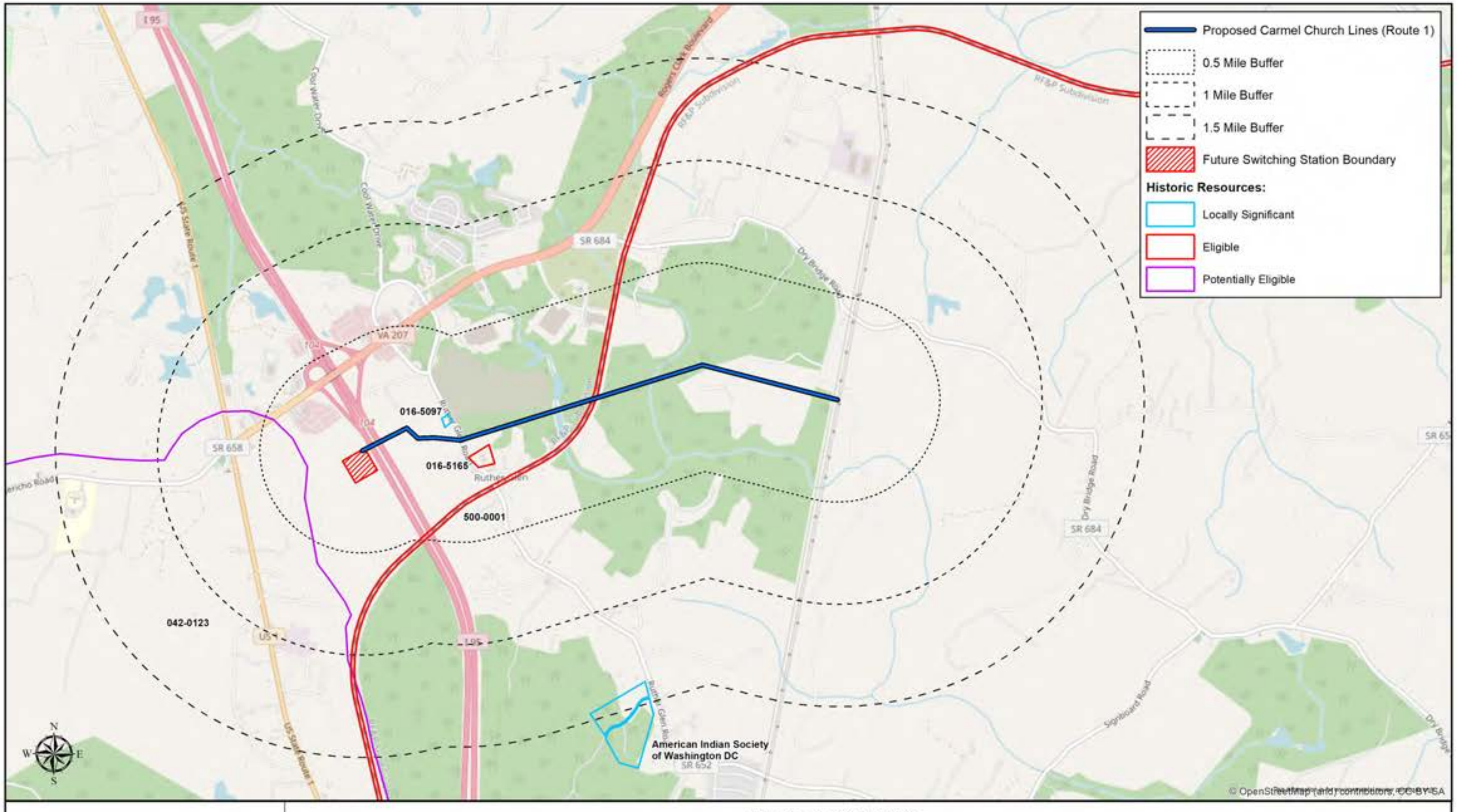
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2014 Architectural Survey Form, 016-5097. On file, VDHR, Richmond, Virginia.

2017 Guidelines for Conducting Historic Resources Survey in Virginia. Accessed February 2024. Retrieved from: https://www.dhr.virginia.gov/wp-content/uploads/2023/05/SurveyManual_2017.pdfeyManual_2017.pdf (virginia.gov).

2018 Architectural Survey Form, 016-5165. On file, VDHR, Richmond, Virginia.

ATTACHMENT 1 LOCATIONS OF CONSIDERED HISTORIC RESOURCES ASSOCIATED WITH PROPOSED PROJECT



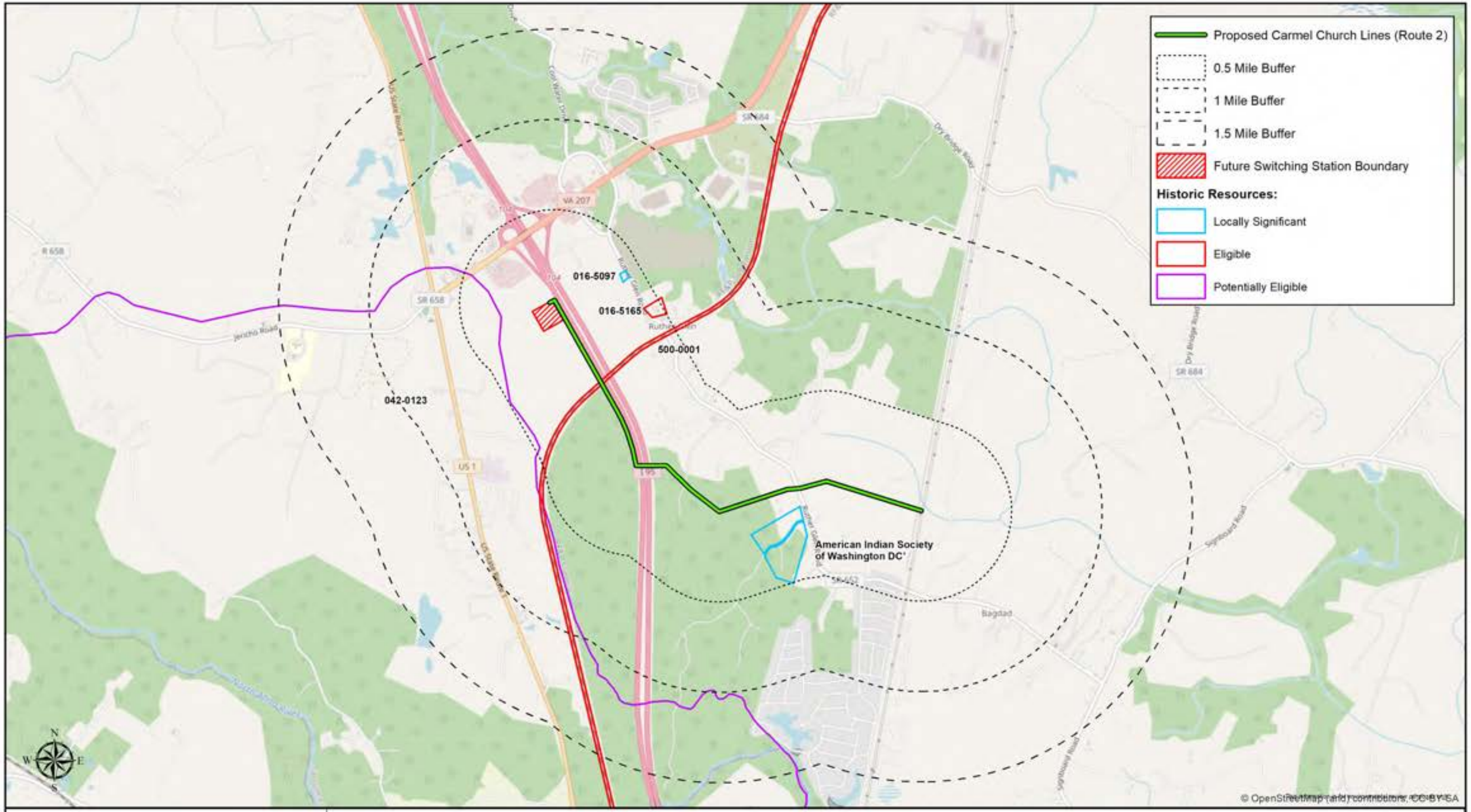
Attachment 1, Sheet 1
Location of Considered Resources Associated with Proposed Project Alternatives - Proposed Carmel Church Lines (Route 1)
Carmel Church Project
Dominion Energy Virginia
Caroline County, VA

Dominion Energy

ERM

FILE: C:\Users\Vincent.macek\OneDrive - ERM\Dominion Carmel Church Ruther Glen\CARMEL CHURCH\Carmel Church Attachmt 1 Sheet 1.mxd | REVISED: 10/22/2024 | SCALE: 1:28,000 when printed at 11x17

DRAWN BY: GIS



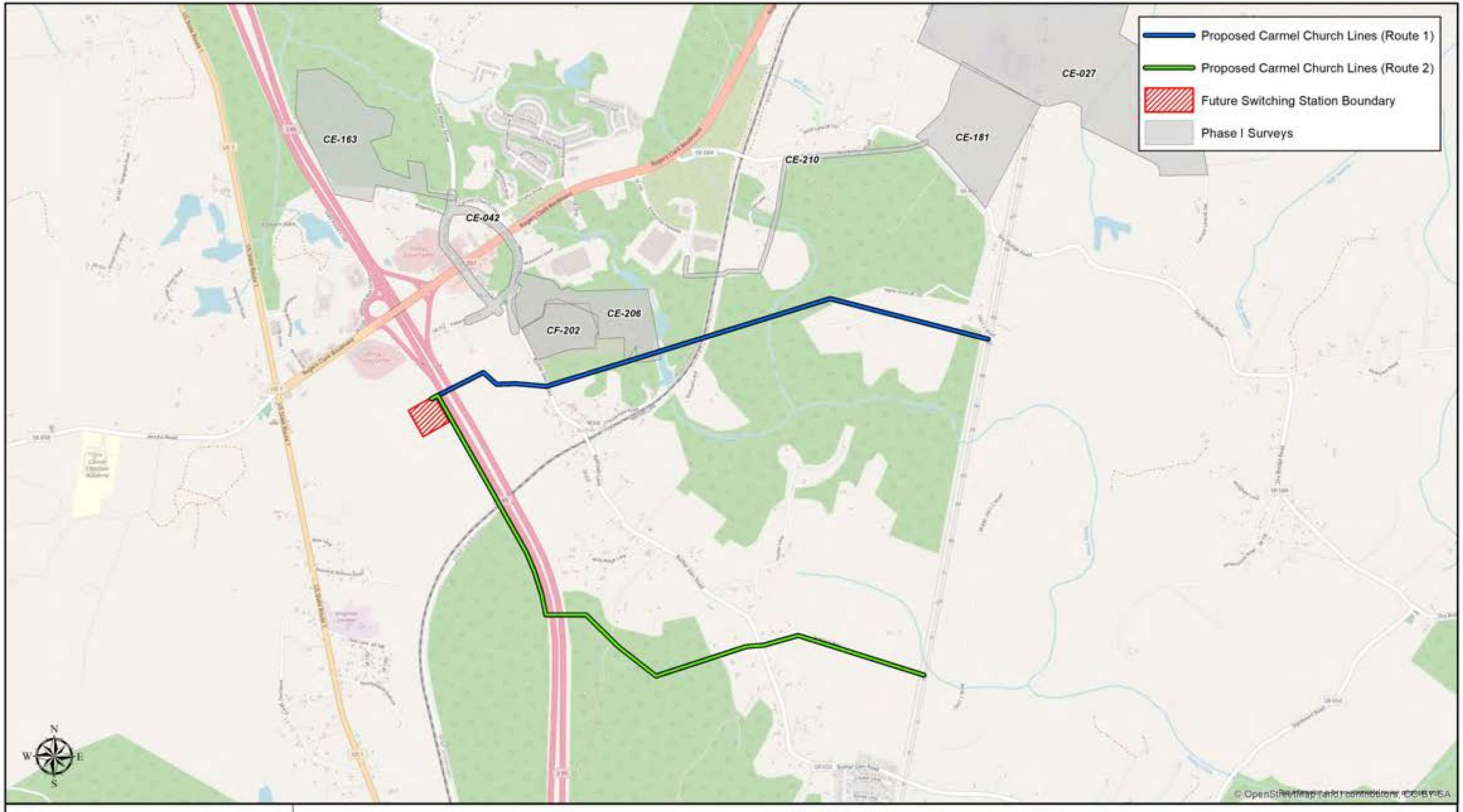
0 0.5 1 1.5 Miles

1:32,000

Attachment 1, Sheet 2
Location of Considered Resources Associated with Proposed Project Alternatives - Proposed Carmel Church Lines (Route 2)
Carmel Church Project
Dominion Energy Virginia
Caroline County, VA

FILE: C:\Users\Vincent.macek\OneDrive - ERM\Dominion Carmel Church Ruther Glen\CARMEL CHURCH\Carmel Church Attachmt 1 Sheet 2.mxd | REVISED: 10/22/2024 | SCALE: 1:32,000 when printed at 11x17 DRAWN BY: GIS

ATTACHMENT 2 CULTURAL RESOURCES SURVEYS COVERING PORTIONS OF ROUTES



Attachment 2
Locations of Phase I Surveys Associated with Proposed Project Alternatives
Carmel Church Project
Dominion Energy Virginia
Caroline County, VA

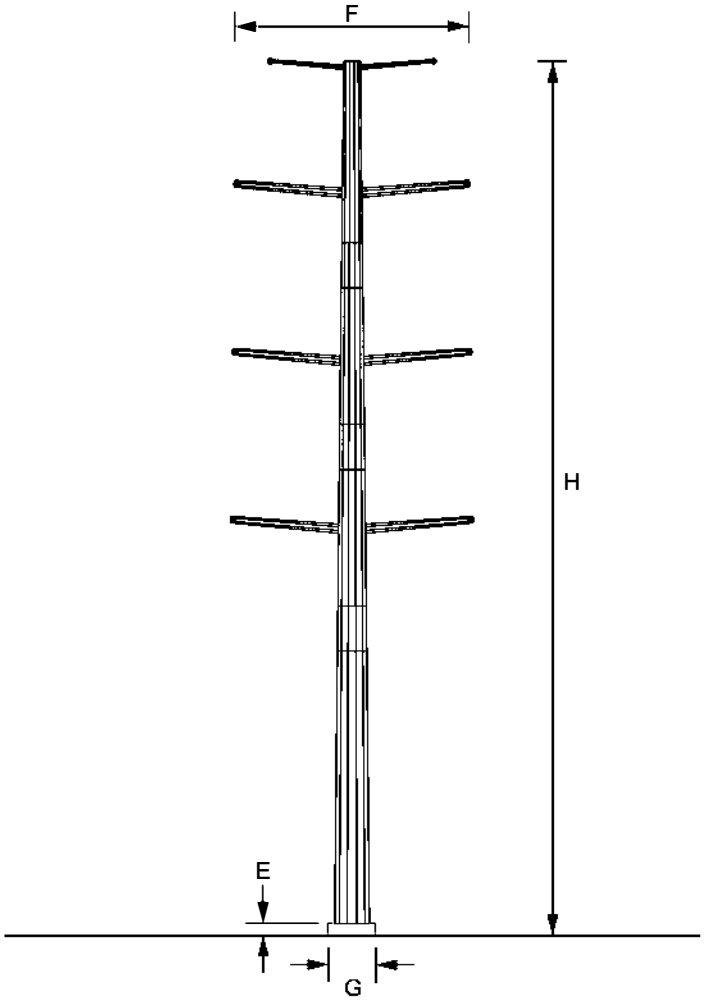
Dominion Energy

ERM

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ATTACHMENT 3 TYPICAL DESIGN AND LAYOUT



TYPICAL DC ENGINEERED MONOPOLE DOUBLE DEADEND STRUCTURE

A. STRUCTURE MAPPING	N/A
B. RATIONALE FOR STRUCTURE TYPE:	MINIMIZES RIGHT OF WAY ACQUISITION
C. LENGTH OF R/W (STRUCTURE QTY):	2.40 MILES (6 STRUCTURES) - SEE NOTE 1
D. STRUCTURE MATERIAL:	WEATHERING STEEL
RATIONALE FOR STRUCTURE MATERIAL:	MATCH CURRENT STANDARDS8 AND EXISTING STRUCTURES IN THE AREA
E. FOUNDATION MATERIAL: AVERAGE FOUNDATION REVEAL:	CONCRETE SEE NOTE 2
F. AVERAGE WIDTH AT CROSSARM:	26'
G. AVERAGE WIDTH AT BASE:	SEE NOTE 3
H. MINIMUM STRUCTURE HEIGHT (SEE NOTE 4): MAXIMUM STRUCTURE HEIGHT (SEE NOTE 4): AVERAGE STRUCTURE HEIGHT (SEE NOTE 4):	90' 115' 108'
I. AVERAGE SPAN LENGTH (RANGE):	507' - SEE NOTE 4
J. MINIMUM CONDUCTOR-TO-GROUND:	25.5' (AT MAXIMUM OPERATING TEMPERATURE)

NOTES:
1. ROW LENGTH & STRUCTURE QUANTITY ARE EXCLUSIVE OF COMPANY-OWNED SUBSTATION PROPERTIES
2. MINIMUM FOUNDATION REVEAL SHALL BE 1.5'
3. FOUNDATION DIAMETER SHALL BE BASED ON GEOTECHNICAL FINDINGS DURING FINAL ENGINEERING
4 THE SPAN LENGTHS ASSOCIATED WITH THIS STRUCUTRE TYPE ARE THE AHEAD SPANS

THE INFORMATION CONTAINED ON THIS DRAWING IS CONSIDERED PRELIMINARY IN NATURE AND IS SUBJECT TO CHANGE BASED ON FINAL DESIGN

Dominion Energy
Dominion Energy
5000 Dominion Blvd.
Glen Allen, VA 23060

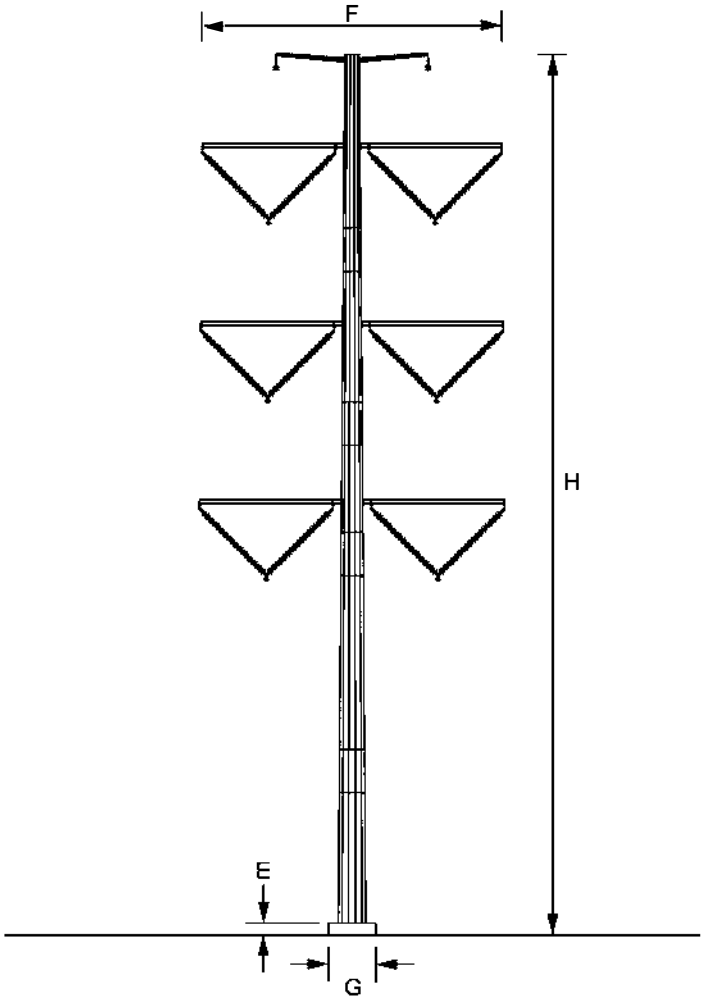
LINES 2410, 2422 (ROUTE 1)

TYPICAL DC ENGINEERED MONOPOLE DOUBLE DEADEND STRUCTURE

ATTACHMENT NO.

II.B.3.d

DRAWN BY: SDH



TYPICAL DC ENGINEERED MONOPOLE SUSPENSION STRUCTURE (V-STRING)

A. STRUCTURE MAPPING	N/A
B. RATIONALE FOR STRUCTURE TYPE:	MINIMIZES RIGHT OF WAY ACQUISITION; V-STRING INCREASES CLEARANCES AND OPTMIZES EXISTING ROW USAGE
C. LENGTH OF R/W (STRUCTURE QTY):	2.40 MILES (14 STRUCTURES) - SEE NOTE 1
D. STRUCTURE MATERIAL:	WEATHERING STEEL
RATIONALE FOR STRUCTURE MATERIAL:	MATCH CURRENT STANDARDS8 AND EXISTING STRUCTURES IN THE AREA
E. FOUNDATION MATERIAL: AVERAGE FOUNDATION REVEAL:	CONCRETE SEE NOTE 2
F. AVERAGE WIDTH AT CROSSARM:	34.5'
G. AVERAGE WIDTH AT BASE:	SEE NOTE 3
H. MINIMUM STRUCTURE HEIGHT (SEE NOTE 4): MAXIMUM STRUCTURE HEIGHT (SEE NOTE 4): AVERAGE STRUCTURE HEIGHT (SEE NOTE 4):	100' 135' 111'
I. AVERAGE SPAN LENGTH (RANGE):	507' - SEE NOTE 4
J. MINIMUM CONDUCTOR-TO-GROUND:	25.5' (AT MAXIMUM OPERATING TEMPERATURE)

NOTES:
1. ROW LENGTH & STRUCTURE QUANTITY ARE EXCLUSIVE OF COMPANY-OWNED SUBSTATION PROPERTIES
2. MINIMUM FOUNDATION REVEAL SHALL BE 1.5'
3. FOUNDATION DIAMETER SHALL BE BASED ON GEOTECHNICAL FINDINGS DURING FINAL ENGINEERING
4. THE SPAN LENGTHS ASSOCIATED WITH THIS STRUCUTRE TYPE ARE THE AHEAD SPANS

THE INFORMATION CONTAINED ON THIS DRAWING IS CONSIDERED PRELIMINARY IN NATURE AND IS SUBJECT TO CHANGE BASED ON FINAL DESIGN

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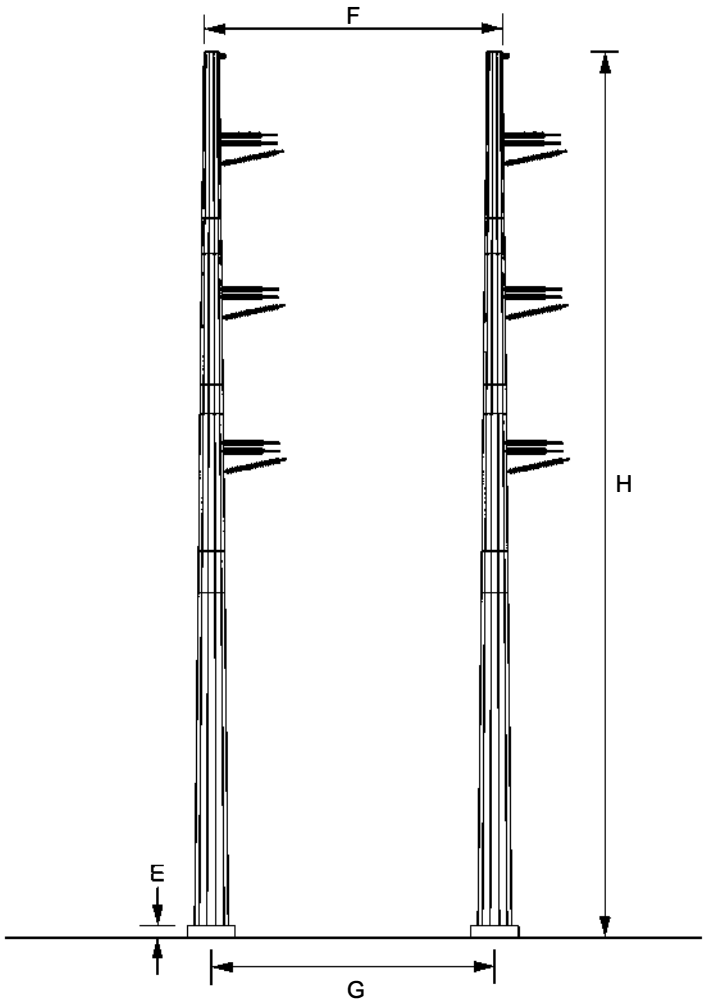
LINES 2410, 2422 (ROUTE 1)

TYPICAL DC ENGINEERED MONOPOLE SUSPENSION STRUCTURE (V-STRING)

ATTACHMENT NO.

II.B.3.e

DRAWN BY: SDH



TYPICAL DC ENGINEERED 2-POLE DOUBLE DEADEND STRUCTURE

A. STRUCTURE MAPPING	N/A
B. RATIONALE FOR STRUCTURE TYPE:	MINIMIZES RIGHT OF WAY ACQUISITION; 2-POLES USED FOR HEAVY ANGLES TO OPTIMIZE POLE/FOUNDATION SIZE AND COST
C. LENGTH OF R/W (STRUCTURE QTY):	2.40 MILES (3 STRUCTURES) - SEE NOTE 1
D. STRUCTURE MATERIAL:	WEATHERING STEEL
RATIONALE FOR STRUCTURE MATERIAL:	MATCH CURRENT STANDARDS AND EXISTING STRUCTURES IN THE AREA
E. FOUNDATION MATERIAL: AVERAGE FOUNDATION REVEAL:	CONCRETE SEE NOTE 2
F. AVERAGE WIDTH AT CROSSARM:	36'
G. AVERAGE WIDTH AT BASE:	SEE NOTE 3
H. MINIMUM STRUCTURE HEIGHT (SEE NOTE 4): MAXIMUM STRUCTURE HEIGHT (SEE NOTE 4): AVERAGE STRUCTURE HEIGHT (SEE NOTE 4):	100' 100' 100'
I. AVERAGE SPAN LENGTH (RANGE):	507' - SEE NOTE 4
J. MINIMUM CONDUCTOR-TO-GROUND:	25.5' (AT MAXIMUM OPERATING TEMPERATURE)

NOTES:
1. ROW LENGTH & STRUCTURE QUANTITY ARE EXCLUSIVE OF COMPANY-OWNED SUBSTATION PROPERTIES
2. MINIMUM FOUNDATION REVEAL SHALL BE 1.5'
3. FOUNDATION DIAMETER SHALL BE BASED ON GEOTECHNICAL FINDINGS DURING FINAL ENGINEERING
4. THE SPAN LENGTHS ASSOCIATED WITH THIS STRUCUTRE TYPE ARE THE AHEAD SPANS

THE INFORMATION CONTAINED ON THIS DRAWING IS CONSIDERED PRELIMINARY IN NATURE AND IS SUBJECT TO CHANGE BASED ON FINAL DESIGN

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Glen Allen, VA 23060

LINES 2410, 2422 (ROUTE 1)

TYPICAL DC ENGINEERED 2-POLE DOUBLE DEADEND STRUCTURE

ATTACHMENT NO.

II.B.3.f

DRAWN BY: SDH

ATTACHMENT 4 HISTORIC RESOURCE PHOTOS



Figure 1. 016-5097, Rosenwald School, View to the Southwest.



Figure 2. 016-5165, Excelsior Industry of Caroline County Historic District, View to the North.



Figure 3. 042-0123, North Anna Battlefield, on Roger Clark Boulevard, View to the Southeast.



Figure 4. 042-0123, North Anna Battlefield, on Roger Clark Boulevard, View to the South.



Figure 5. 042-0123, North Anna Battlefield, on Roger Clark Boulevard, View to the Southwest.



Figure 6. 042-0123, North Anna Battlefield, on Roger Clark Boulevard, View to the Southwest.



Figure 7. 500-0001, Richmond, Fredericksburg, and Potomac Railroad, View to the Northeast.



Figure 8. American Indian Society for Washington DC, View to the East.

ATTACHMENT 5 PHOTO SIMULATIONS

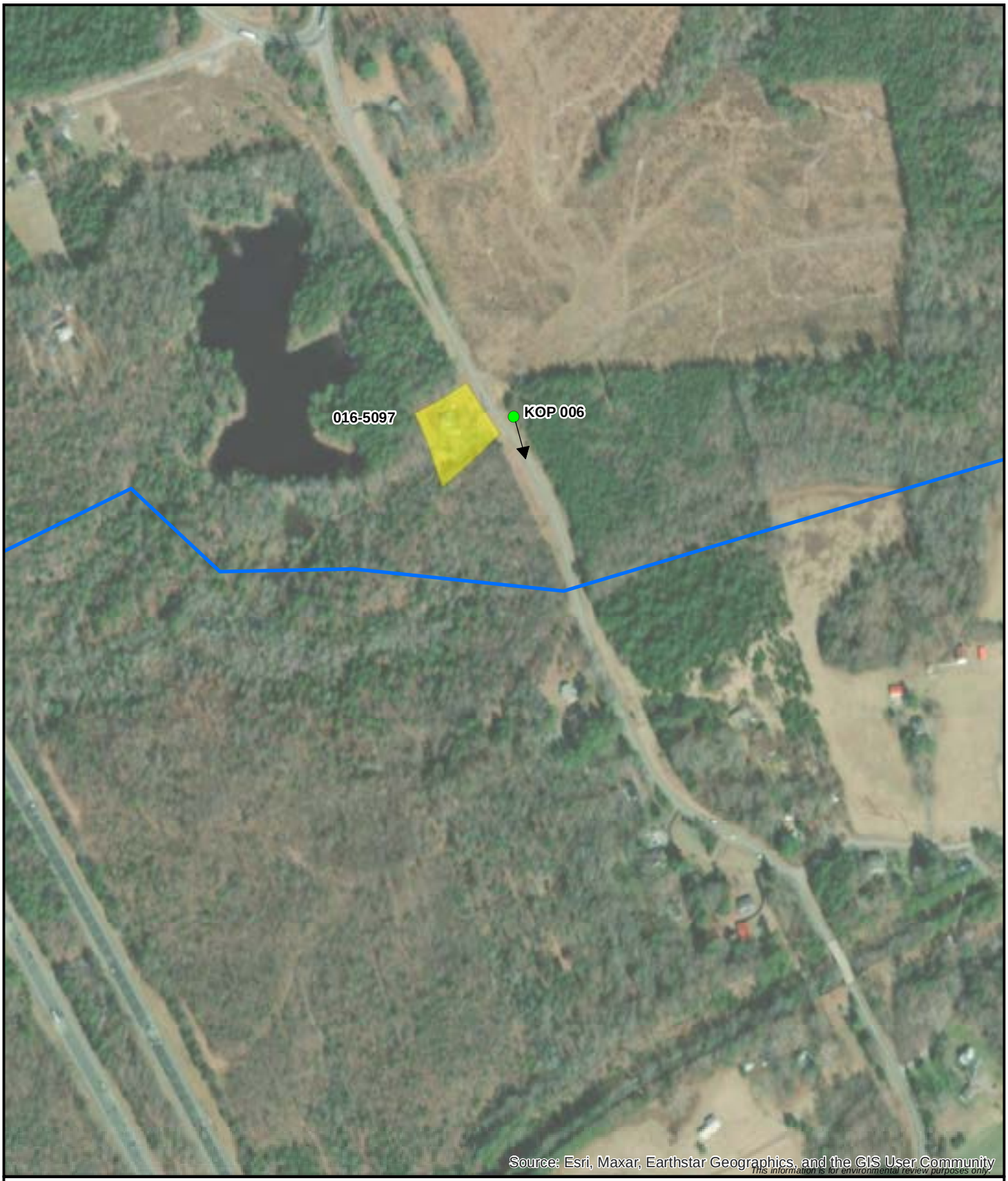


Figure 1. Aerial photograph depicting land use and photo view for 016-5097.



EXISTING CONDITIONS



PROPOSED CONDITIONS

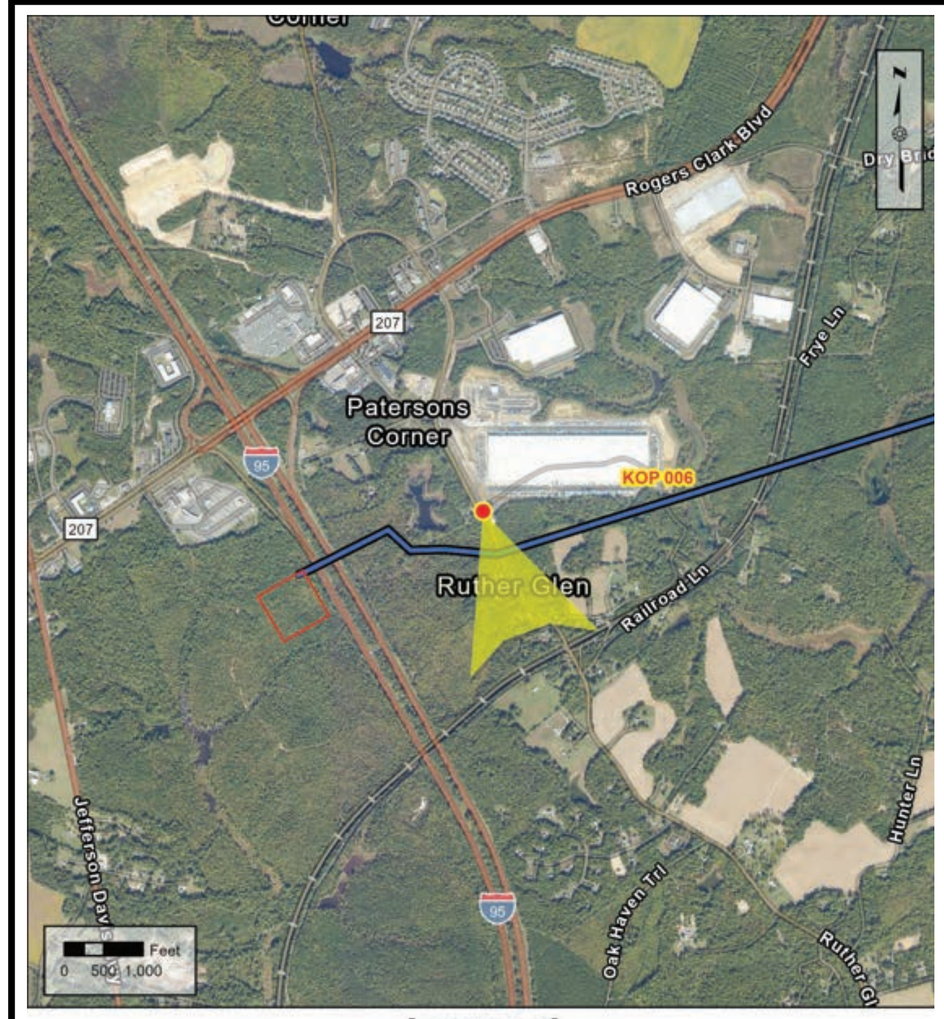
CARMEL CHURCH
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

KOP 006

Ladysmith Rd

Figure 2
Route: 1
Date:07/24/2024
Time: 10:10 am
Viewing Direction: Southeast
Distance to closest feature: 0.1 miles



Note: Project components illustrated are based on proposed preliminary designs
The images contained on this page show the proposed project within a wider landscape context and are not representative of scale and distance when viewed from the actual view point.



Figure 3. Aerial photograph depicting land use and photo view for 016-5165.



EXISTING CONDITIONS



PROPOSED CONDITIONS

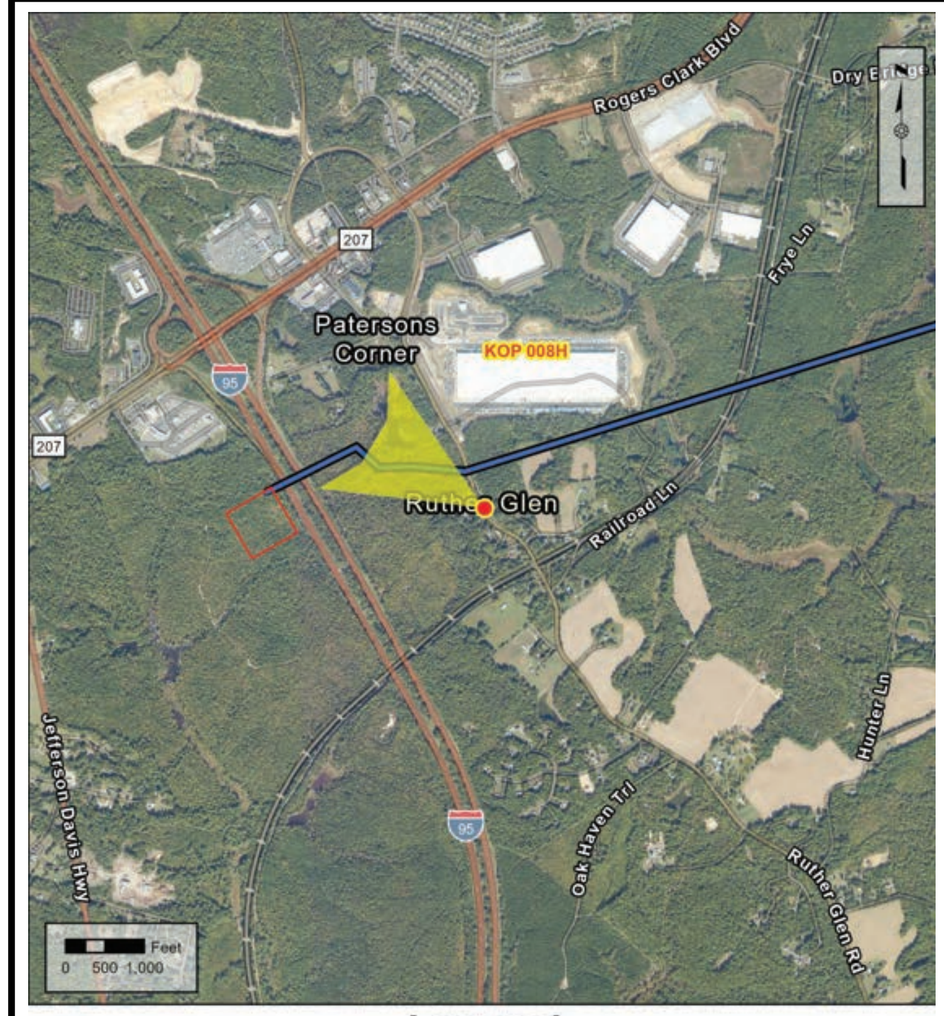
CARMEL CHURCH
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

KOP 008

Old C C Rd

Figure 4
Route: 1
Date:09/03/2024
Time: 1:15 pm
Viewing Direction: Northwest
Distance to closest feature: 0.1 miles



Note: Project components illustrated are based on proposed preliminary designs
The images contained on this page show the proposed project within a wider landscape context and are not representative of scale and distance when viewed from the actual view point.

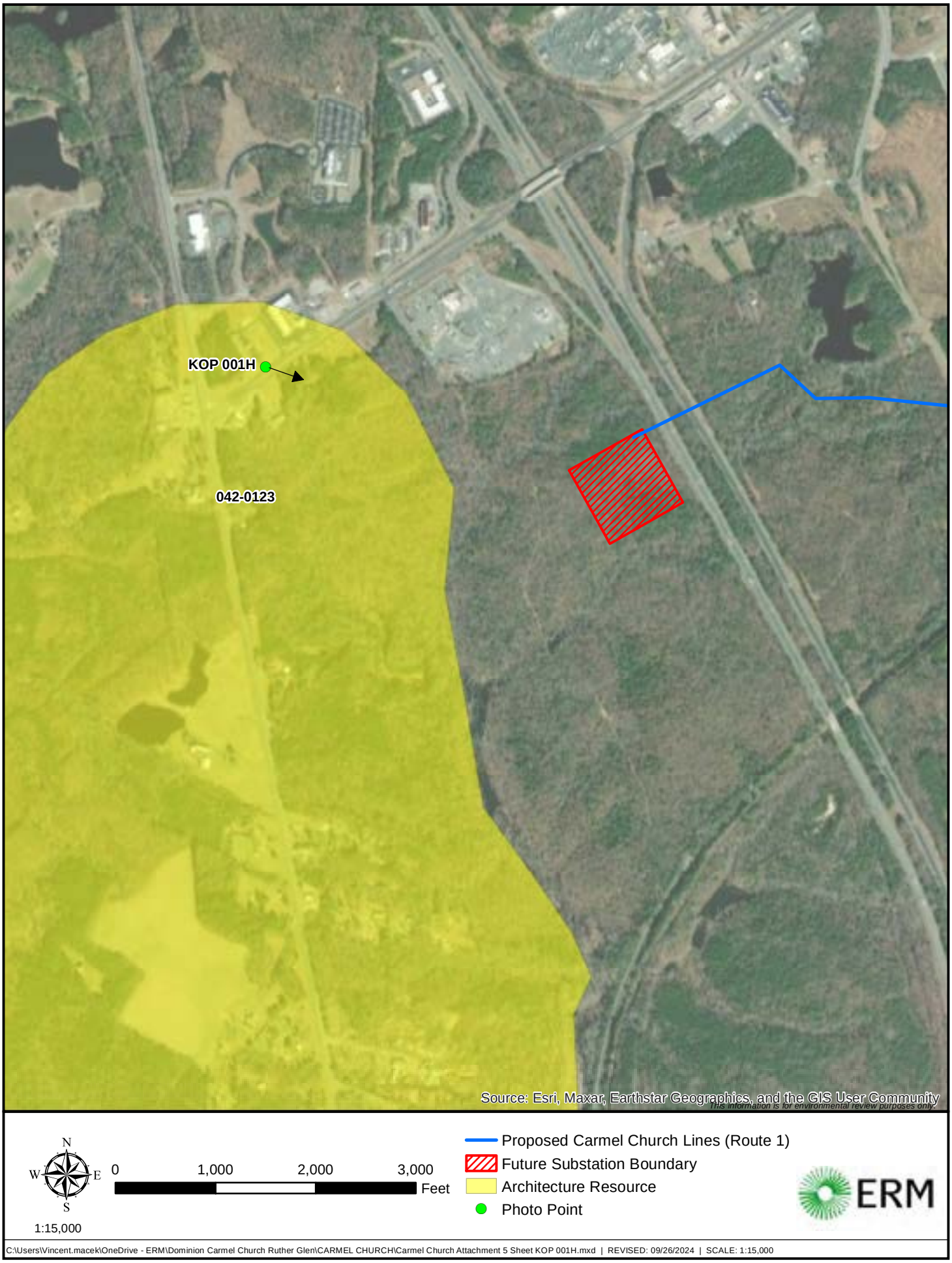


Figure 5. Aerial photograph depicting land use and photo view for 042-0123



EXISTING CONDITIONS



PROPOSED CONDITIONS

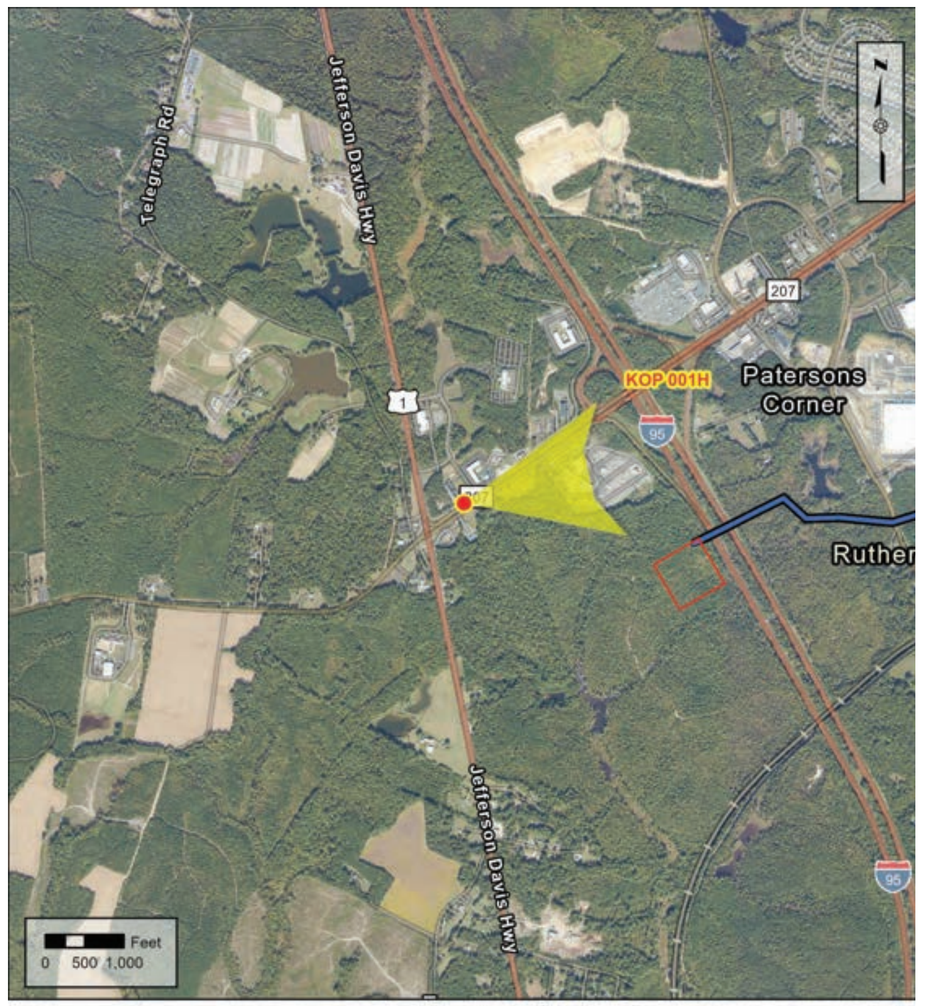
CARMEL CHURCH
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

KOP 001H

Rogers Clark Blvd

Figure 6
Route: 1
Date:09/03/2024
Time: 11:39 am
Viewing Direction: Southeast
Distance to closest feature: 0.6 miles



Note: Project components illustrated are based on proposed preliminary designs
The images contained on this page show the proposed project within a wider landscape context and are not representative of scale and distance when viewed from the actual view point.

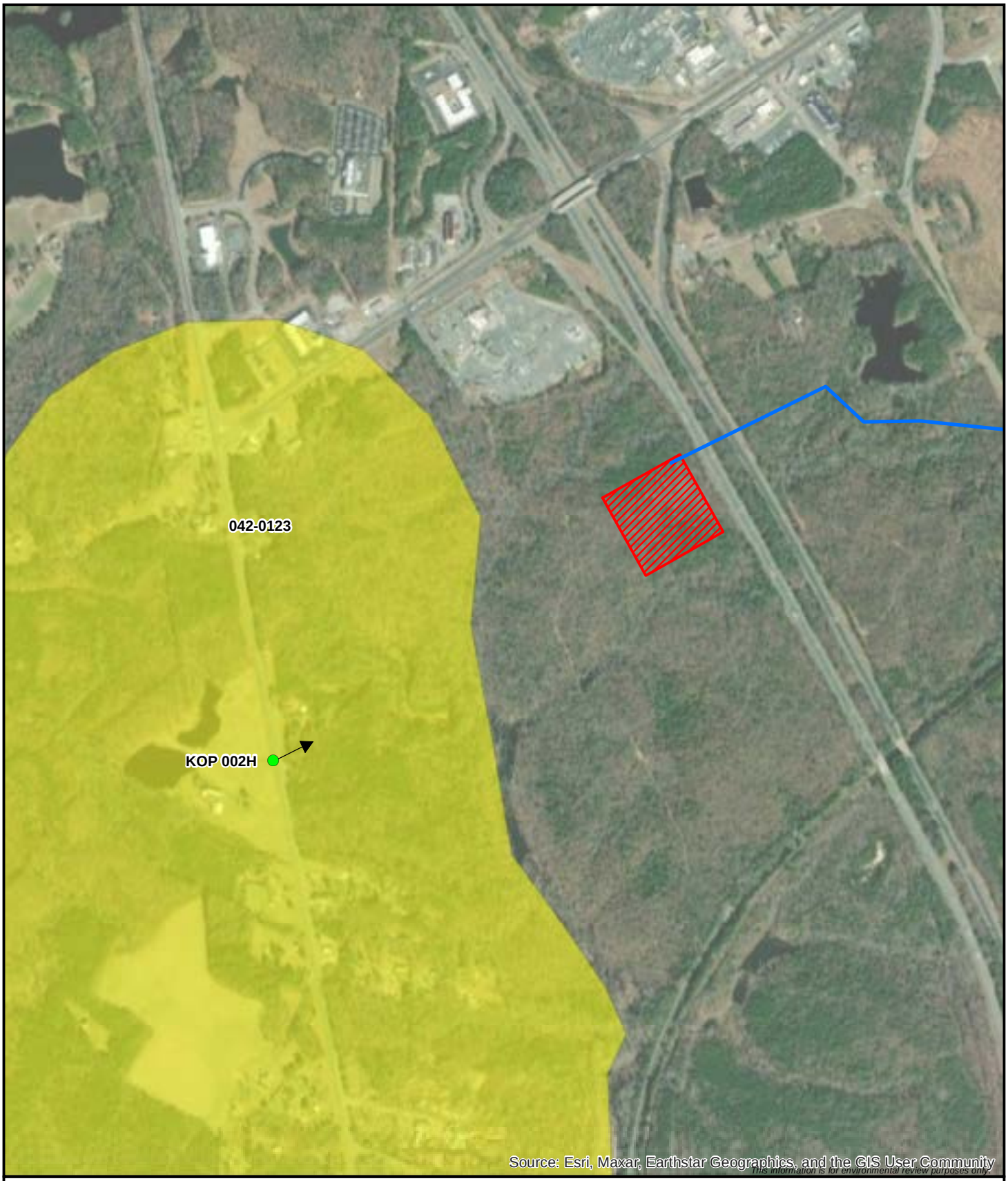


Figure 7. Aerial photograph depicting land use and photo view for 042-0123

CARMEL CHURCH
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

KOP 002H

Jefferson Davis Hwy

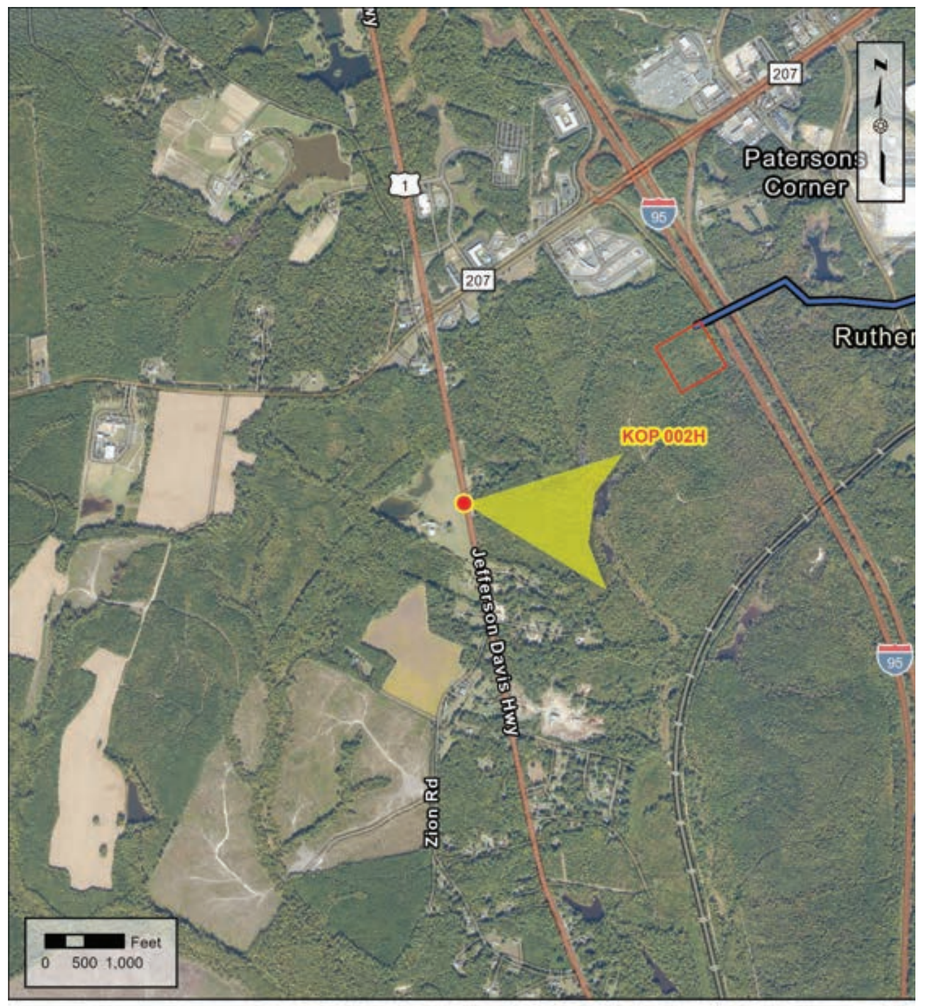
Figure 8
Route: 1
Date:09/03/2024
Time: 11:58 am
Viewing Direction: Southeast
Distance to closest feature: 0.7 miles



EXISTING CONDITIONS



PROPOSED CONDITIONS



Note: Project components illustrated are based on proposed preliminary designs
The images contained on this page show the proposed project within a wider landscape context and are not representative of scale and distance when viewed from the actual view point.



Figure 9. Aerial photograph depicting land use and photo view for 500-0001.



EXISTING CONDITIONS



PROPOSED CONDITIONS

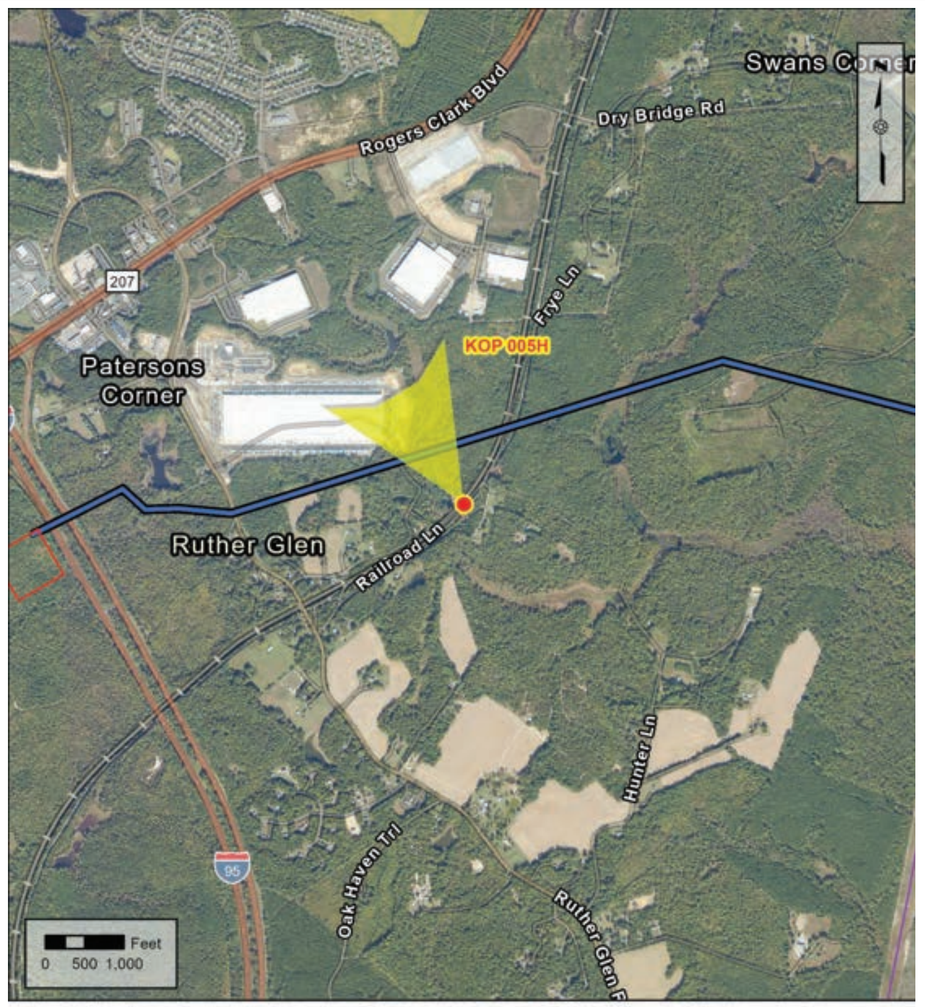
CARMEL CHURCH
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

KOP 005H

Railroad Ln

Figure 10
Route: 1
Date:09/03/2024
Time: 01:37 pm
Viewing Direction: Northwest
Distance to closest feature: 0.1 miles



Legend

- KOP View Direction
- Existing Dominion Transmission Line
- Route 1
- Right-of-Way
- Substation Boundary

Note: Project components illustrated are based on proposed preliminary designs
The images contained on this page show the proposed project within a wider landscape context and are not representative of scale and distance when viewed from the actual view point.



Figure 11. Aerial photograph depicting land use and photo view for 016-5097.



EXISTING CONDITIONS



PROPOSED CONDITIONS

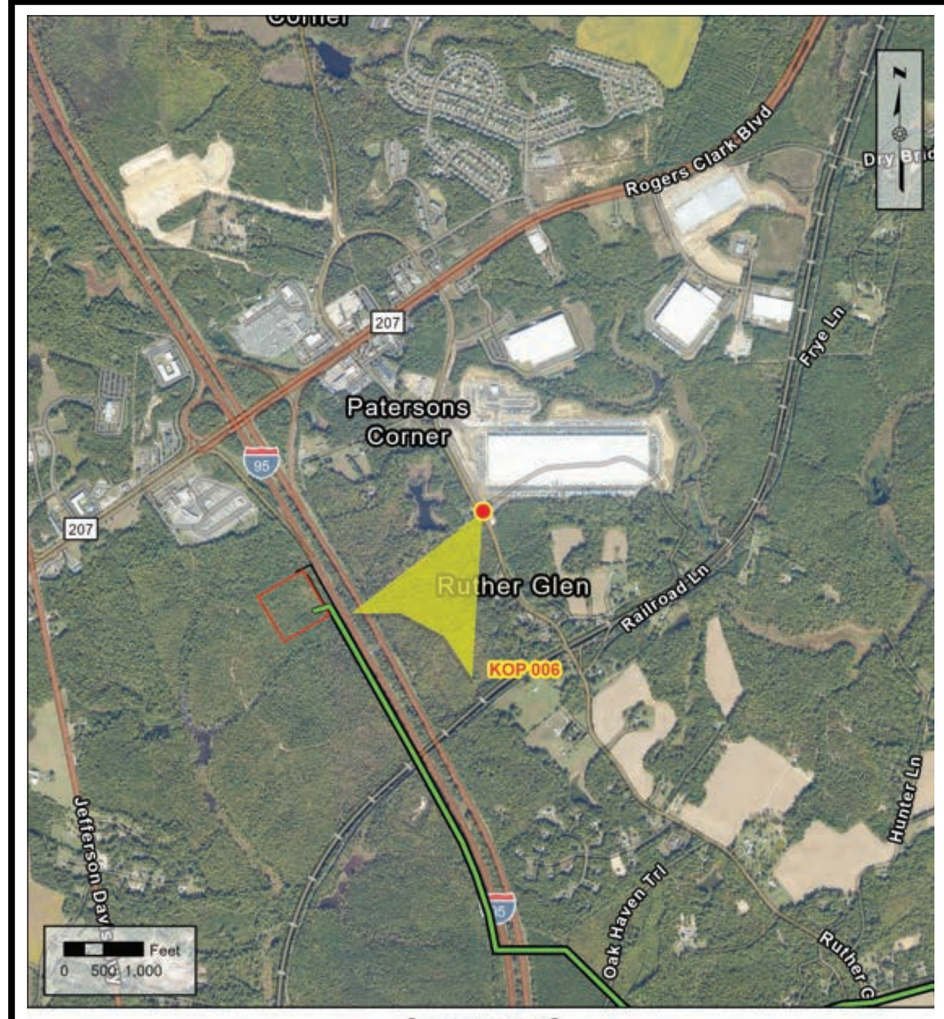
CARMEL CHURCH
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

KOP 006

Railroad Ln

Figure 12
Route: 2
Date:07/24/2024
Time: 10:10 am
Viewing Direction: Southwest
Distance to closest feature: 0.4 miles



Note: Project components illustrated are based on proposed preliminary designs
The images contained on this page show the proposed project within a wider landscape context and are not representative of scale and distance when viewed from the actual view point.



Figure 13. Aerial photograph depicting land use and photo view for 016-5165.

CARMEL CHURCH
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

KOP 008H

Ruther Glen Rd

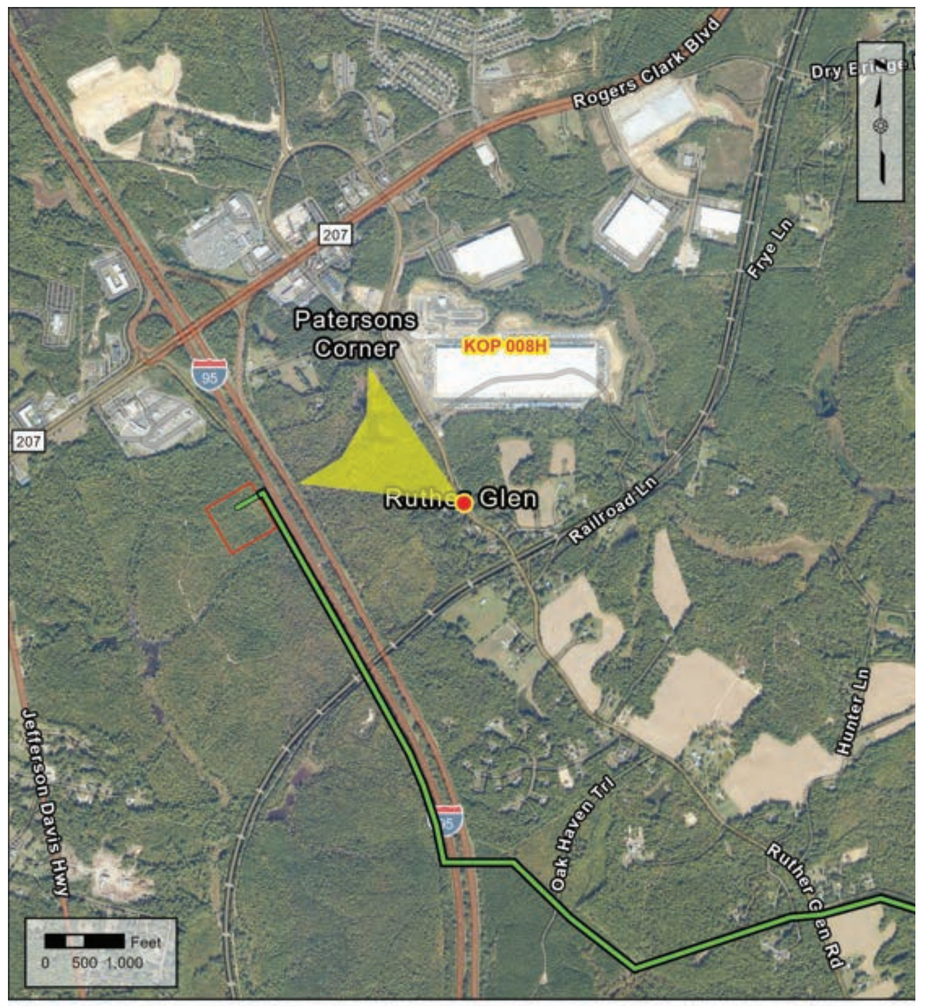
Figure 14
Route: 2
Date:09/03/2024
Time: 1:15 pm
Viewing Direction: Northwest
Distance to closest feature: 0.4 miles



EXISTING CONDITIONS



PROPOSED CONDITIONS



Legend

- KOP View Direction
- Route 2
- Route 2,Substation Boundary
- Route 2,100ft ROW

Note: Project components illustrated are based on proposed preliminary designs
The images contained on this page show the proposed project within a wider landscape context and are not representative of scale and distance when viewed from the actual view point.

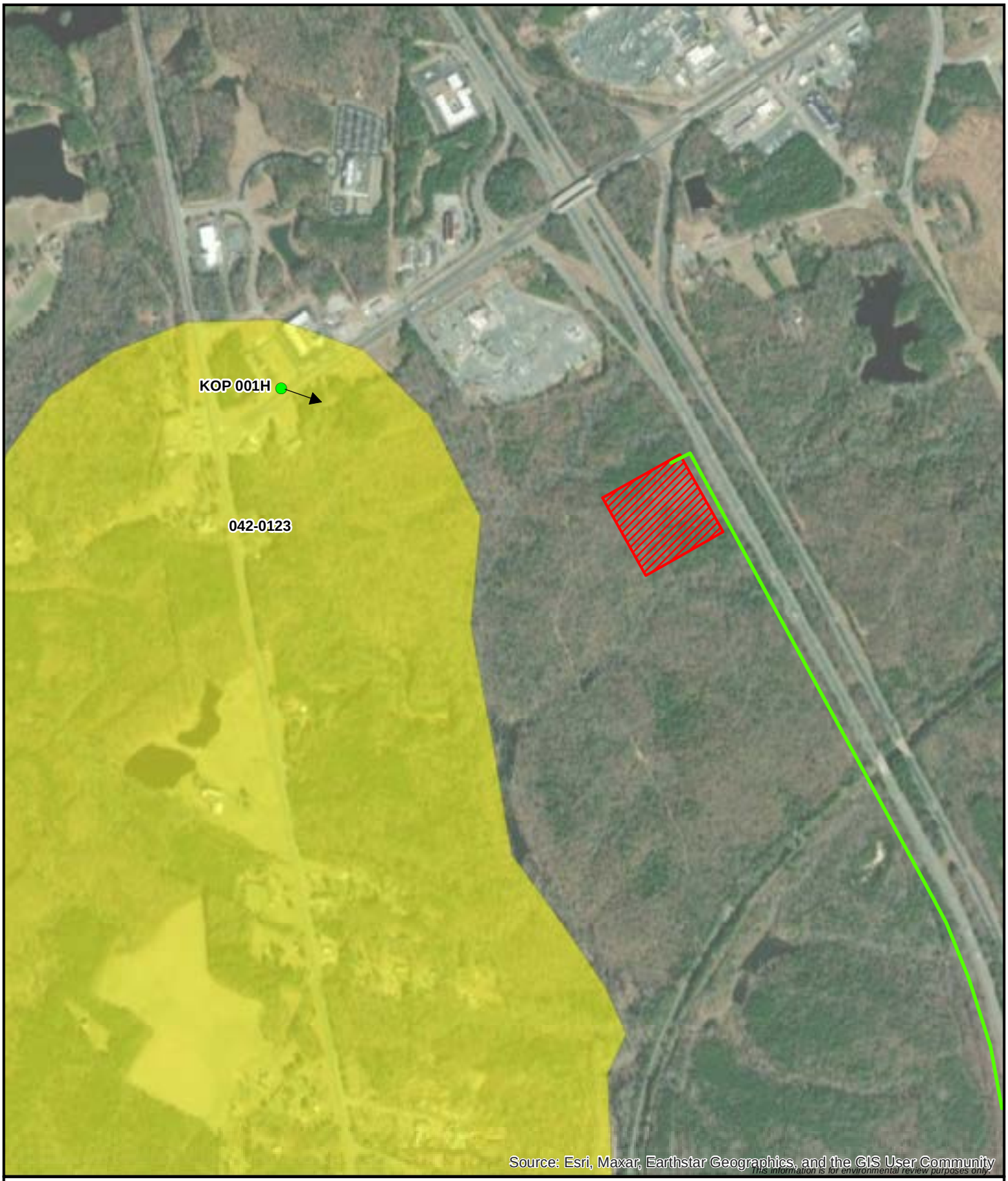


Figure 15. Aerial photograph depicting land use and photo view for 042-0123

CARMEL CHURCH
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

KOP 001H

Rogers Clark Blvd

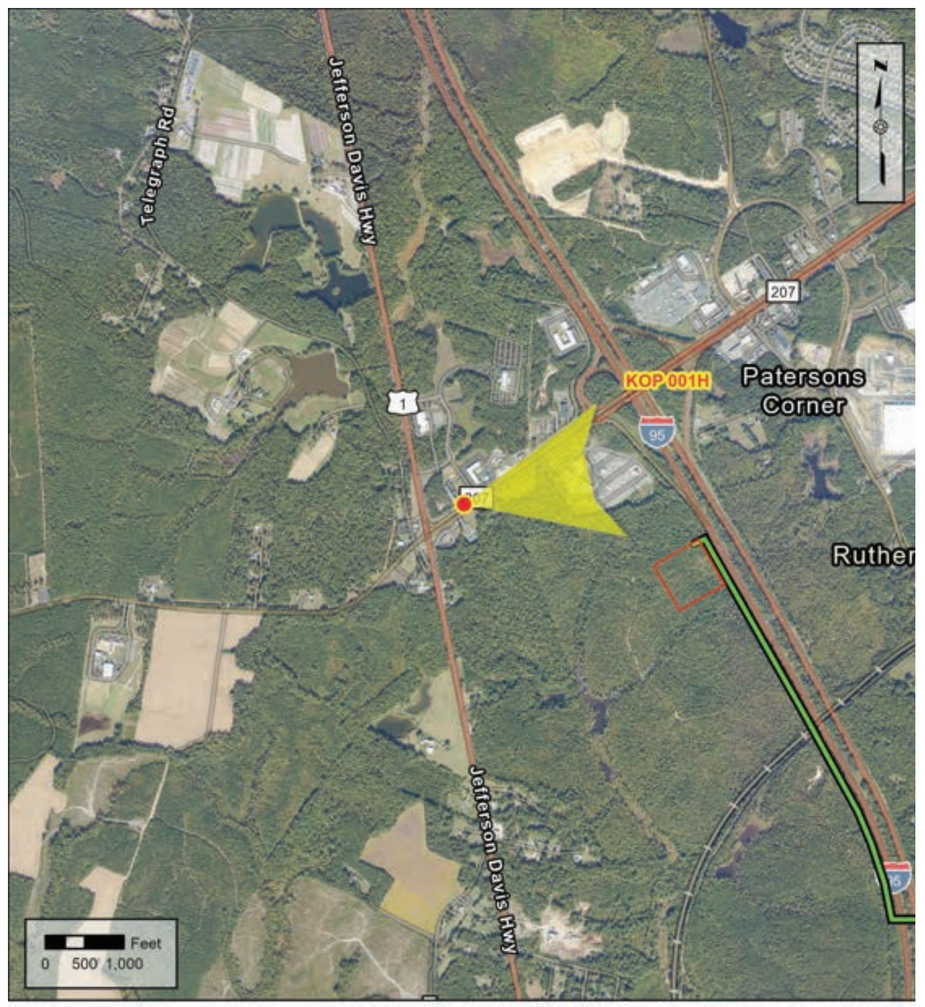
Figure 16
Route: 2
Date:09/03/2024
Time: 11:39 am
Viewing Direction: East
Distance to closest feature: 0.6 miles



EXISTING CONDITIONS



PROPOSED CONDITIONS



Note: Project components illustrated are based on proposed preliminary designs
The images contained on this page show the proposed project within a wider landscape context and are not representative of scale and distance when viewed from the actual view point.

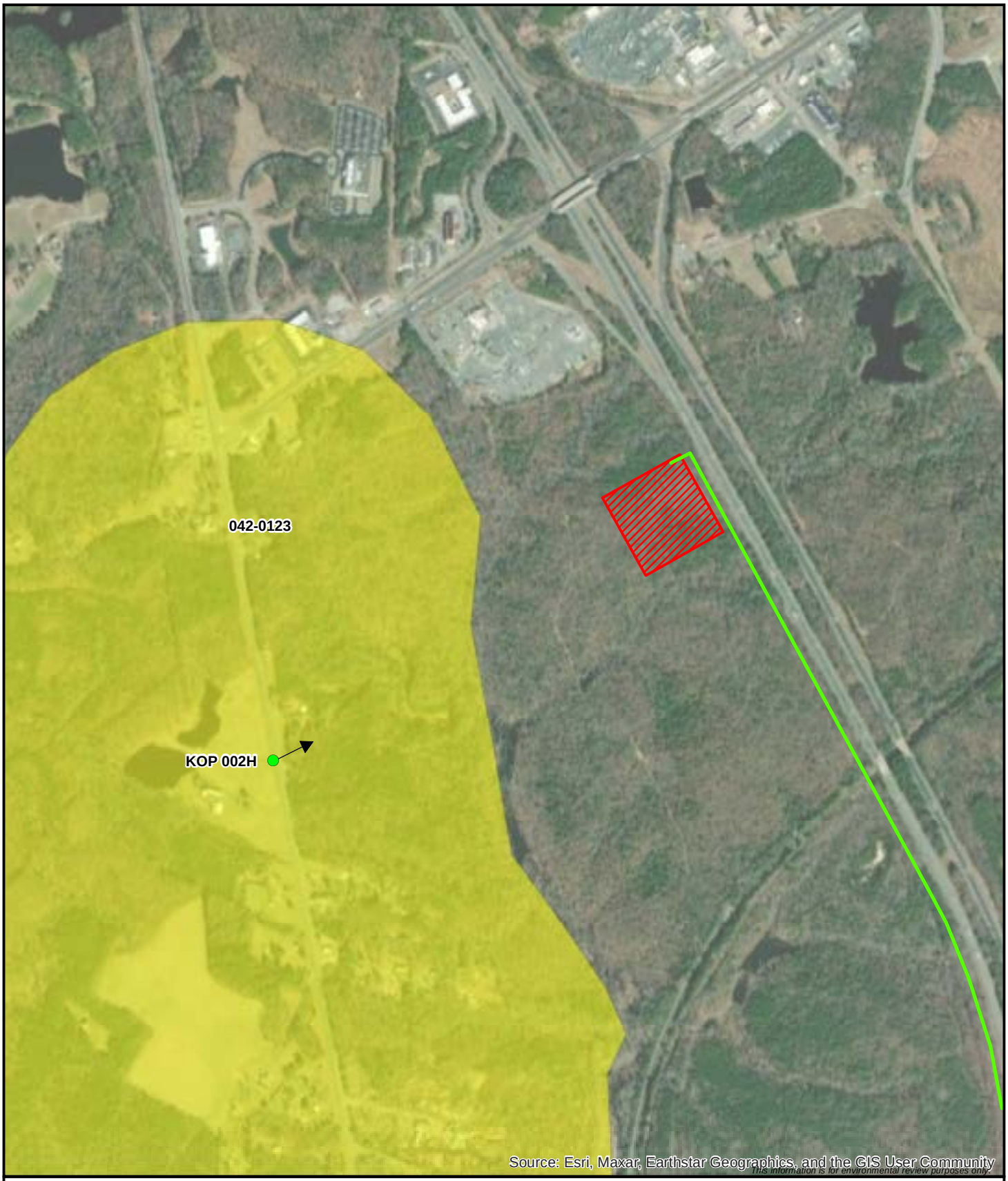


Figure 17. Aerial photograph depicting land use and photo view for 042-0123



EXISTING CONDITIONS



PROPOSED CONDITIONS

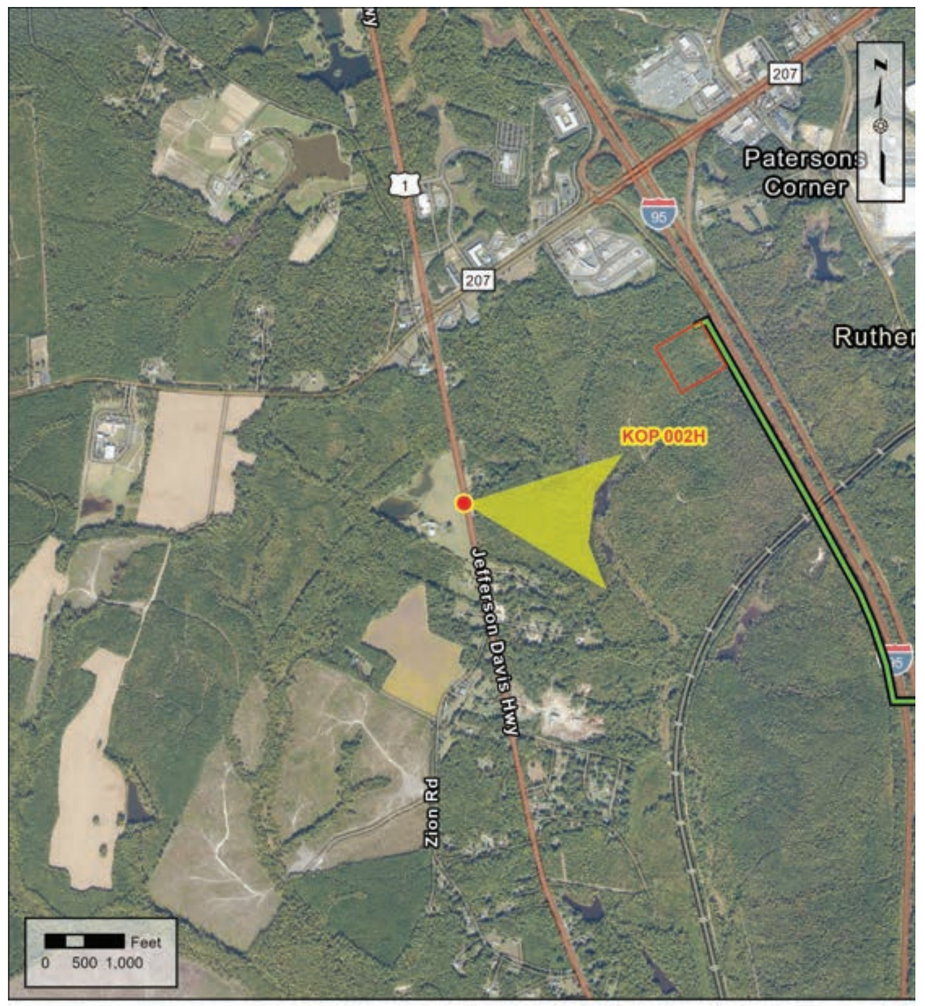
CARMEL CHURCH
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

KOP 002H

Jefferson Davis Hwy

Figure 18
Route: 2
Date:09/03/2024
Time: 11:58 am
Viewing Direction: East
Distance to closest feature: 0.7 miles



Note: Project components illustrated are based on proposed preliminary designs
The images contained on this page show the proposed project within a wider landscape context and are not representative of scale and distance when viewed from the actual view point.

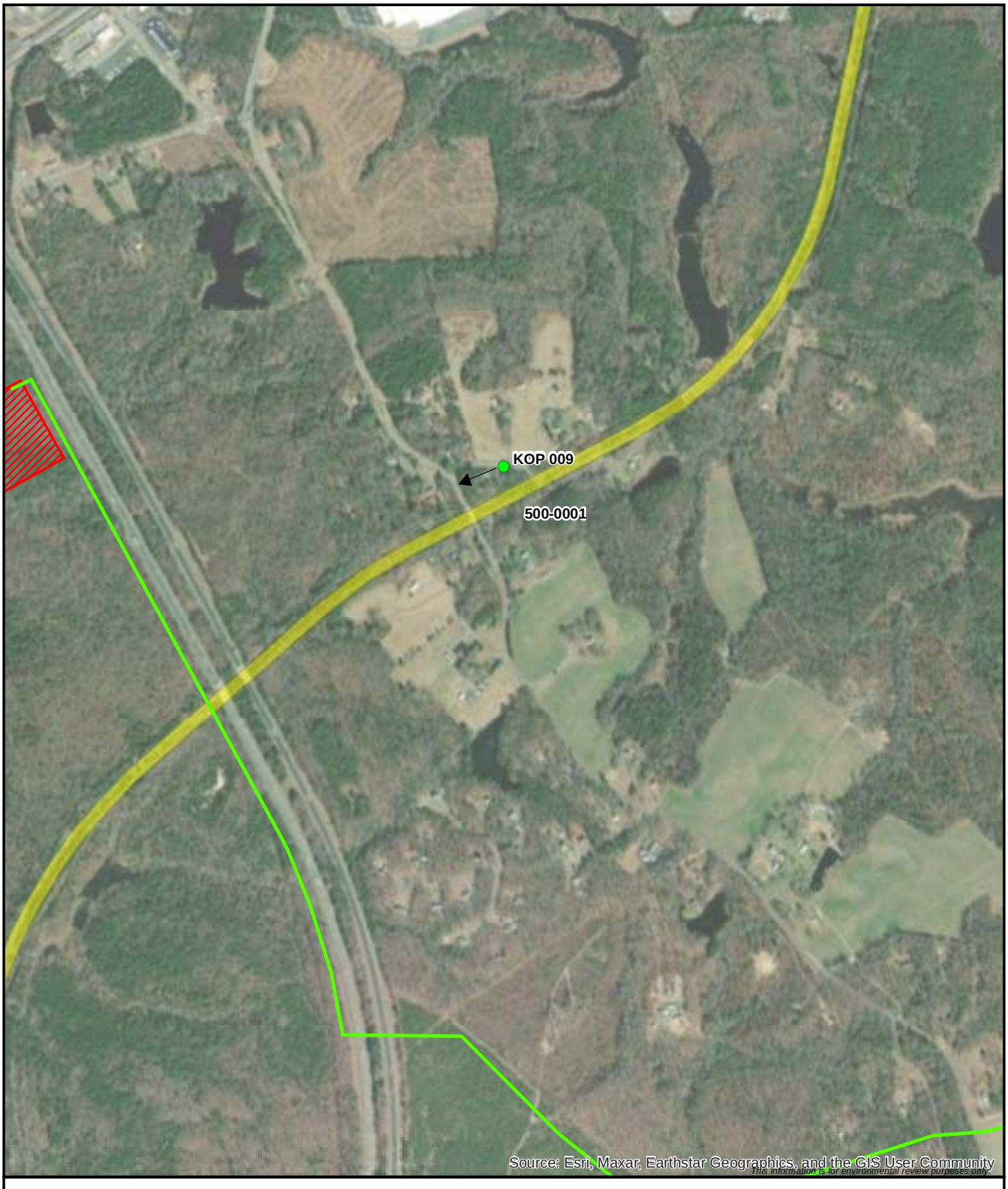


Figure 19. Aerial photograph depicting land use and photo view for 500-0001.

CARMEL CHURCH
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

KOP 009

Chesterfield Rd

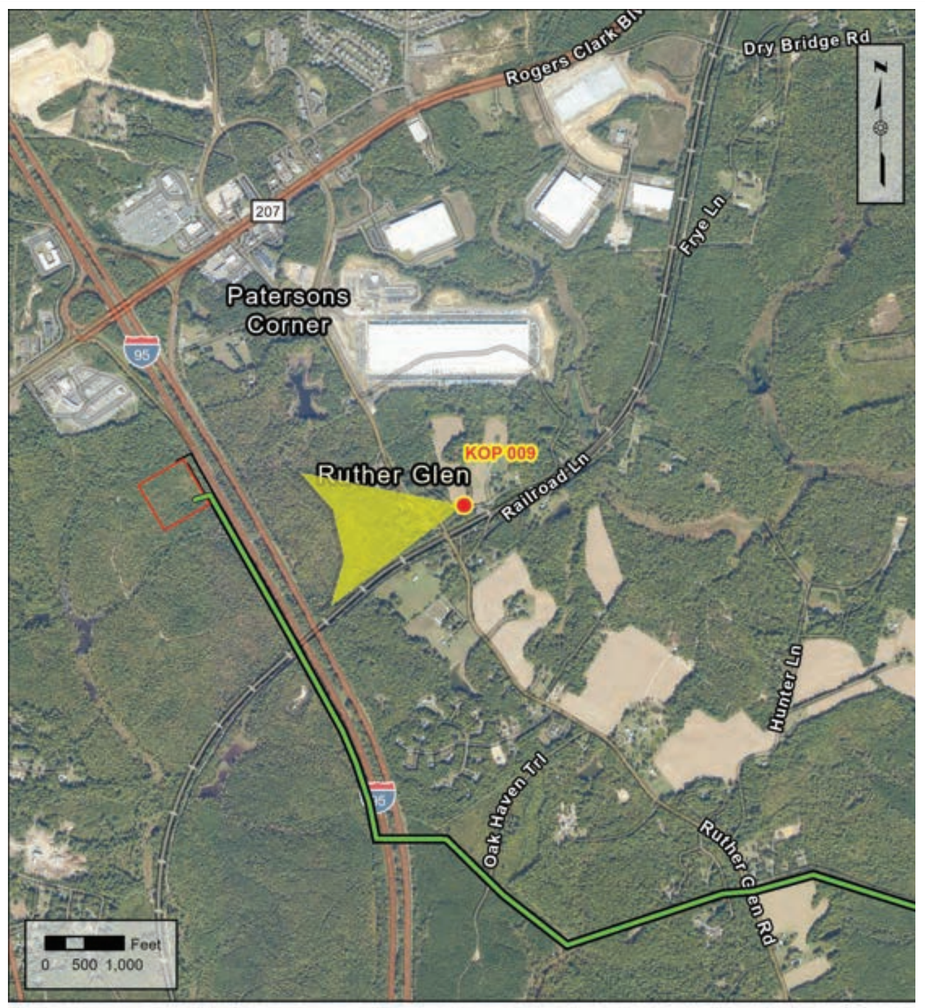
Figure 20
Route: 2
Date:07/24/2024
Time: 10:30 am
Viewing Direction: West
Distance to closest feature: 0.5 miles



EXISTING CONDITIONS



PROPOSED CONDITIONS



Legend

- KOP View Direction
- Route 2
- Right-of-Way
- Substation Boundary

Note: Project components illustrated are based on proposed preliminary designs
The images contained on this page show the proposed project within a wider landscape context and are not representative of scale and distance when viewed from the actual view point.

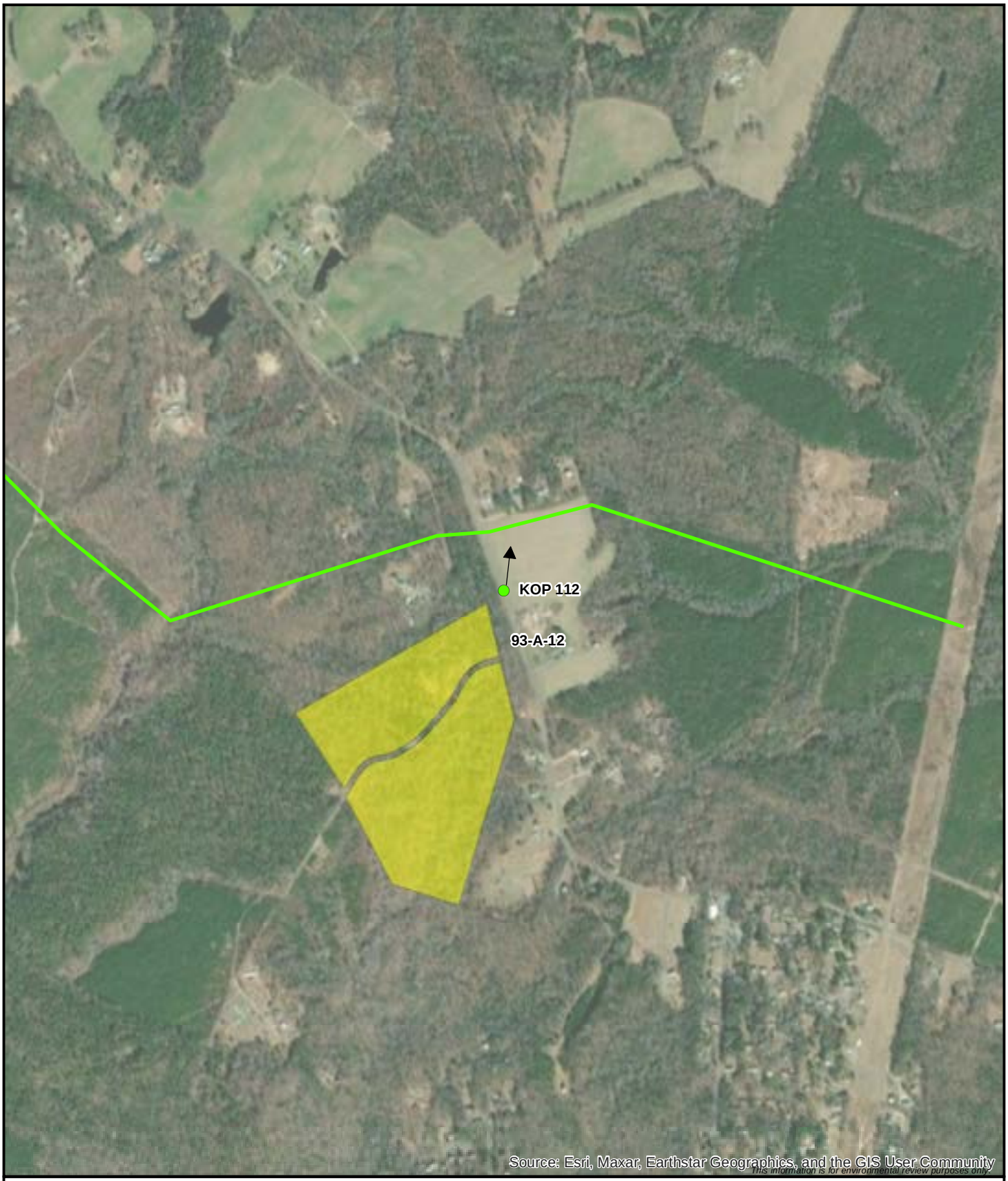


Figure 21. Aerial photograph depicting land use and photo view for 93-A-12.



EXISTING CONDITIONS



PROPOSED CONDITIONS

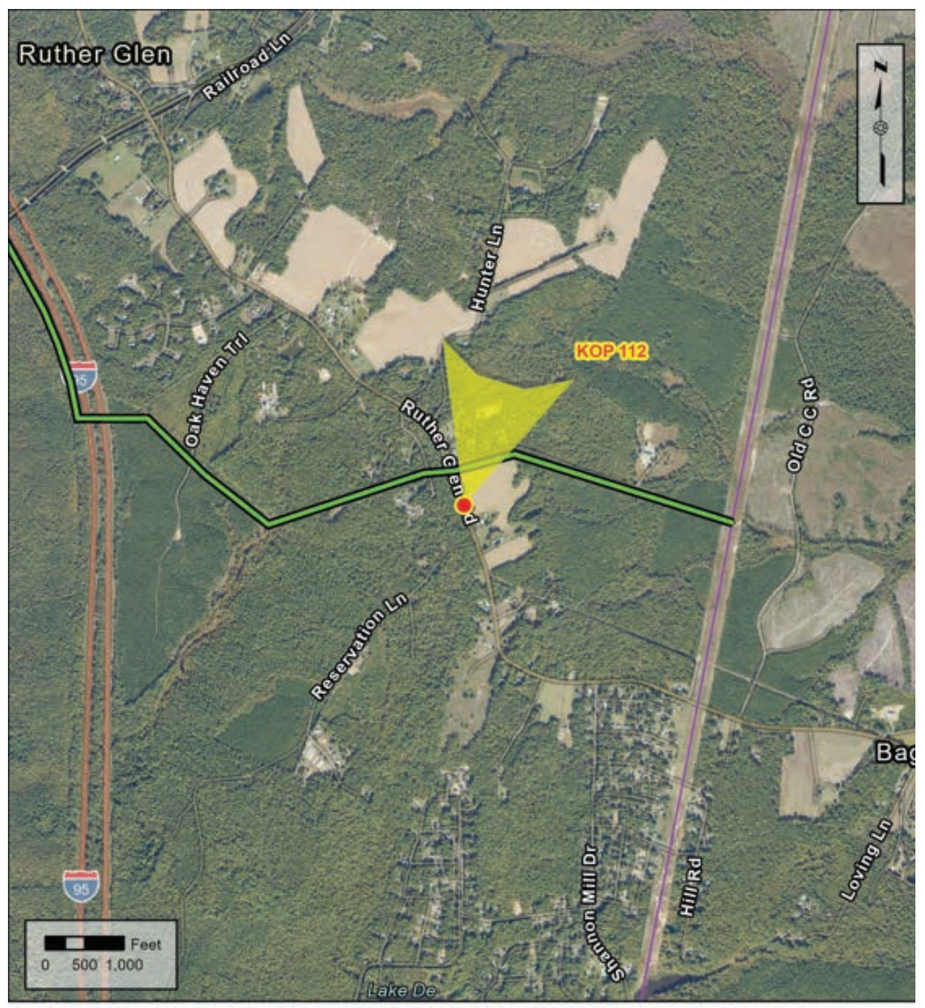
CARMEL CHURCH
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

KOP 112

Ruther Glen Rd

Figure 22
Route: 2
Date:09/03/2024
Time: 02:33 pm
Viewing Direction: Northeast
Distance to closest feature: 0.1 miles



Note: Project components illustrated are based on proposed preliminary designs
The images contained on this page show the proposed project within a wider landscape context and are not representative of scale and distance when viewed from the actual view point.



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