Application, Appendix, DEQ Supplement, Routing Study, Direct Testimony and Exhibits of Virginia Electric and Power Company

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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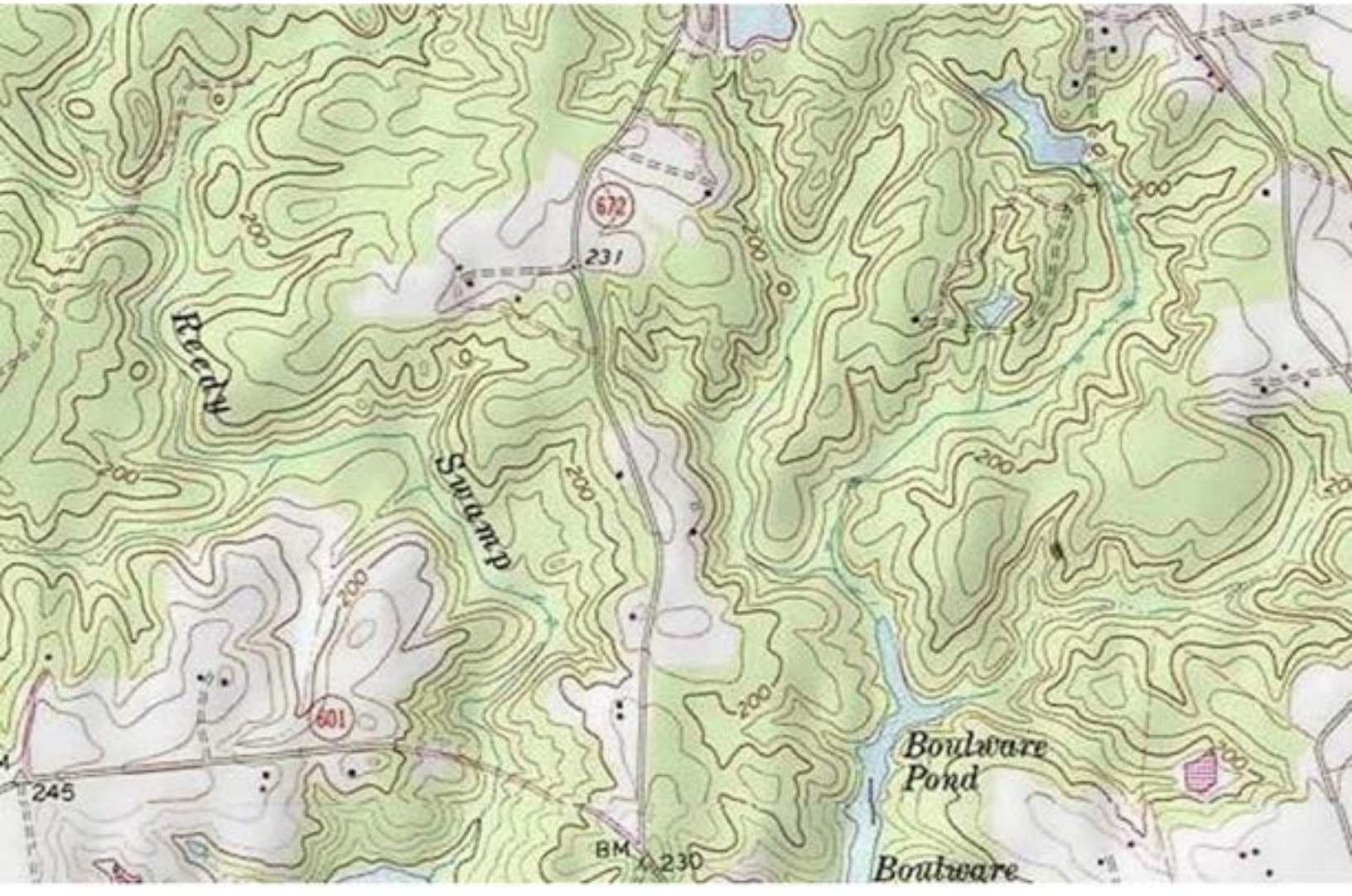
Environmental Routing Study

Ruther Glen 230 kV Line Extension



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Ruther Glen 230 kV Line Extensions

993261

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ACRONYMS AND ABBREVIATIONS

Acronym	Description
ABT	American Battlefield Trust
AGL	Above ground level
CBG	Census block group
CES	VCU-Center for Environmental Sciences
CFR	Code of Federal Regulations
Company	Virginia Electric and Power Company
CPCN	Certificate of Public Convenience and Necessity
CWA	Clean Water Act
DNH	Division of National Heritage
DOI	Department of Interior
EJ	Environmental Justice
EJSCREEN	Environmental Justice Screening and Mapping Tool
EMF	Electromagnetic field
ERM	Environmental Resources Management
ESA	Endangered Species Act
ESRI	Environmental Systems Research Institute, Inc.
FAA	Federal Aviation Administration
FCV	Forest Conservation Value

Acronym	Description
GIS	Geographic Information System
HCOD	Highway Corridor Overlay District
HUC	Hydrologic unit code
I-95	Interstate 95
IPaC	Information for Planning and Consultation System
ISMP	Invasive species management plan
IVMP	Integrated Vegetation Management Plan
KOP	Key Observation Point
kV	Kilovolt
MP	Milepost
NAIP	National Agricultural Imagery Program
NERC	North American Electrical Corporation
NHD	National Hydrography Dataset
NHL	National Historic Landmark
NHP	Natural Heritage Program
NHR	Natural heritage resources
NLEB	Northern Long-Eared Bat
NRCS	National Register of Conservation Services
NRHP	National Resources of Historic Places
NWI	National Wetlands Inventory
Ordinance	Caroline County Zoning Ordinance
PEM	Palustrine emergent
PFO	Palustrine forested
Project	Ruther Glen 230 kilovolt (kV) Line Extension Project
PSS	Palustrine scrub-scrub
PUB	Palustrine unconsolidated bottom
REC	Rappahannock Electric Cooperative
RPA	Resource Protection Area
RVR	Riverine
SCC	State Corporation Commission
SCS	Stream conservation site
SLs	VDEQ health-based Screening Levels

Acronym	Description
T&E	Threatened and Endangered
TCB	Tricolored bat
TOYRs	Time-of-year restrictions
U.S.	United States
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
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
VEJA	Virginia Environmental Justice Act
VGIN	Virginia Geographic Information Network
VOF	Virginia Outdoors Foundation
VSR	Visually sensitive resource
VSS	Virtual Stream Assessment
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 Ruther Glen 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 future 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 (NERC). The existing 230 kV Line #256 will support load growth for the Ruther Glen area (300 MW), as well as the Carmel Church area (299MW) and Slayden Creek area (120MW). To meet these new requests and maintain a service that complies with NERC Reliability Standards, a future second 230 kV circuit is anticipated for the Ruther Glen area.[1] As such, 160 feet of total new right-of-way is needed for the full buildout including the additional future double circuit structures routing from Line #256 to Ruther Glen Switching Station. Dominion will file a separate application for this second circuit as the need arises.

To meet these objectives, Dominion proposes to construct and operate the following:

- One new, double-circuit, overhead 230 kV transmission line (Ruther Glen Line #256) in 160 feet of new rights-of-way that will cut the existing Dominion Line #256 and connect to the proposed Ruther Glen Switching Station.
- One new 230 kV delivery point switching station (Ruther Glen 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 and planned development in the area,[2] the potential for environmental impacts and impacts on communities, and cost. [3]

For the purposes of developing route alternatives, ERM considered options connecting to existing lines #256 and #574. ERM identified four viable overhead route alternatives (referred to as

[1] This additional source is also needed to address the Company's 300MW load drop reliability criteria during N-1-1 contingency scenarios.
[2] "Planned developments" refers to projects that have been submitted to Caroline County for review/approval (or have been shared with Dominion through stakeholder outreach) but where construction has not yet been completed as of September 2024.
[3] Cost is addressed elsewhere in Dominion's application to the State Corporation Commission (SCC) of Virginia for the Project.

Ruther Glen Routes 4, 5, and 6) 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 Ruther Glen line entirely within new rights-of-way, measuring approximately 160 feet wide. Dominion would use weathered steel monopoles with heights ranging from 90 to 155 feet and an average height of approximately 114 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 structure would support two circuits. Structures would be installed at approximately 500- to 700-foot 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
- 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.[4]

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 the following:

- 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.

[4] *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 (CPCN) 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 CPCN filing).*

- 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 Code of Virginia (Va. Code) and included in the State Corporation Commission's (SCC) minimum filing guidelines for transmission projects.
- Comparing the route alternatives based on an analysis of environmental impacts and use of routing opportunities.
- Recommending preferred routes.

2 METHODOLOGY

The process of routing a new electric transmission line begins with the definition of a study area that encompasses and surrounds 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 AREA

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 (VSR)—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 into 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 ROUTE 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. This analysis is provided in Sections 5.0 and 6.0. A Proposed Route and route alternatives or route variations 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 contains approximately 31,270 acres (48.9 square miles) within Caroline County. The Project origin is the Company's existing Ladysmith CT–St. Johns Line (line #256), terminating at the proposed Ruther Glen Switching Station located approximately 0.8 mile east of the Ladysmith Road interchange on 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 study area as follows:

- The intersection of Cedon Road at Route 1 to the north
- The Legacy Park sports complex and the Caroline County Agricultural Fairgrounds to the south
- The existing Dominion line #256 transmission corridor to the east
- The existing Dominion 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 include:

- Caroline County Parcel Viewer GIS datasets (Caroline County n.d.);
- Environmental Systems Research Institute, Inc. (ESRI) World Elevation Terrain 2-foot contours (ESRI et al. 2024);
- VDOT Northern Virginia District project website (VDOT 2024);
- VDCR Conservation Lands Database (VDCR 2024a);
- Virginia Geographic Information Network (VGIN) statewide land cover dataset (VGIN 2023)
- 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 2023);
- 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, LLC 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, and REC.

Dominion announced the Ruther Glen Project jointly with the Carmel Church Project via mail and website[5] in early July 2024 and held two in-person open houses to share information and receive feedback in July and September 2024. During these open houses, the Ruther Glen Project routes were organized into Solutions 1,2,3, and 4. Solutions 1 and 2 presented route options that connected to both Line #256 and Line 574 and Solutions 3 and 4 showed route options navigating solely to Line #256. 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. Documentation supporting alterations to Route 4, described in Section 3.6 below, is attached as Appendix C.

3.4 IDENTIFYING AND ASSESSING ROUTE ALTERNATIVES

Within the study area, ERM initially identified five 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 to the west. These initial routes provided options that could accommodate the double circuit 230 kV through an east-west solution (100-foot right-of-way) that connected to both Line #256 and Line #574 or an east-only solution (160-foot right-of-way) to Line #256. Seven routes were proposed to connect to existing Line #256 and two routes were proposed to connect to existing Line #574. Of these, one potential cut-in location (existing Line #256) and three associated routes (Ruther Glen Routes 4, 5, and 6) were retained for analysis, while the others (including all east-west solutions) were eliminated. The routes are shown on Figure 3.4-1.

3.5 ROUTES REJECTED FROM FURTHER CONSIDERATION

3.5.1 ELIMINATED ROUTE 1

Eliminated Route 1 originates at a cut-in on the Company's existing Line #574 at the Company's existing Ladysmith Substation. From the substation, Eliminated Route 1 crosses Gatewood Road to the south and then turns east and continues through forested areas behind residential properties for about 1.0 mile. The route briefly turns northeast to cross Gatewood Road southeast of its intersection with Maggie's Road before turning east again for another approximately

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

1.6 miles (including a crossing of U.S. Route 1—Jefferson Davis Highway). The route then turns south and runs through forested areas parallel to the western edge of I-95 for approximately 1.2 miles. At this point, Eliminated Route 1 turns east to cross I-95 north of the Ladysmith Road interchange, travels another approximately 0.8 mile, and turns south to enter the Ruther Glen Switching Station.

Eliminated Route 1 measures approximately 5.4 miles. This route was eliminated due to its overall length, right-of-way requirements, and the need to cross I-95.

3.5.2 ELIMINATED ROUTE 2

Route 2 taps the Company's existing Line #256 approximately 0.6 mile south of Saint John Baptist Church, then extends west through forested land for about 0.9 mile before crossing the Columbia Natural Gas pipeline easement. After crossing the easement, the route alternative runs parallel to and south of the existing REC 115 kV corridor for approximately 0.5 mile. Route 2 turns northwest to cross the REC easement and Ladysmith Road just west of American Way, turns southeast for 0.2 mile, and then south to re-cross the REC easement and Ladysmith Road in order to reduce impacts on nearby residences. From this point, Route 2 continues west, parallel to and south of the REC easement for approximately 0.9 mile across forested and agricultural land. Route 2 turns northwest to cross the REC easement again, then crosses forested land parallel to the north side of the REC easement for 0.3 mile before entering the proposed Ruther Glen Switching Stations.

Route 2 measures approximately 2.9 miles and would require a 100-foot of right-of-way. This route was eliminated because it could not accommodate the needed 160-foot right-of-way and due to its proximity to a large number of residences.

3.5.3 ELIMINATED ROUTE 3

Eliminated Route 3 originates at a cut-in on the Company's existing Line #256 approximately 0.3 mile north of Saint John Baptist Church. From there, Route 3 extends west through forested rural residential properties along South River Road and then continues for approximately 1.5 miles through forested land. This segment of Eliminated Route 3 crosses a Columbia Natural Gas pipeline easement and a Virginia Natural Gas pipeline easement (near where the two pipeline easements cross each other, approximately 0.8 mile west of the cut-in point) and Bath Road (approximately 0.3 mile west of the natural gas easements). From Bath Road, Eliminated Route 3 turns gradually to the southwest for approximately 1.7 miles, crossing forested and cleared land. The route crosses and Ladysmith Road approximately 2.7 miles from the cut-in point and crosses an existing REC 115 kV line just before entering the initial site of the proposed Ruther Glen Switching Station (since elimination of this route, the Switching Station site have been relocated north and west of the terminus of Eliminated Route 3 shown on Figure 3.4-1).

Eliminated Route 3 measures approximately 3.2 miles. This route was eliminated due to environmental justice (EJ) concerns and crossings of several existing utility corridors, including natural gas and overhead electric transmission lines.

3.5.4 ELIMINATED ROUTE 4

Eliminated Route 4 cuts into the Company's existing Line #256 approximately 0.7 mile south of that line's crossing of Ladysmith Road. From there, the route extends southwest and then west across forested and agricultural land for approximately 1.3 miles before crossing Balty Road. This segment includes a crossing of an existing Columbia Natural Gas pipeline easement approximately 1.0 mile from the cut-in point. After crossing Balty Road, Eliminated Route 4 continues west across agricultural and then forested land for approximately 0.2 mile before turning generally northeast for approximately 1.0 mile through forested land behind residences along Balty Road. The route turns west and runs parallels to and south of the existing REC 115 kV corridor for approximately 1.1 miles before entering the initial site of the proposed Ruther Glen Switching Station (since elimination of this route, the Switching Station site have been relocated north and west of the terminus of Eliminated Route 4 shown on Figure 3.4-1).

Eliminated Route 4 measures approximately 3.6 miles. This route was eliminated due to space constraints near existing residential lands along Balty Road and Pond Road.

3.5.5 ELIMINATED ROUTE 5

Eliminated Route 5 cuts into the Company's existing Line #256 approximately 900 feet south of that line's crossing of Mays Run. The route extends west for approximately 2.4 miles across forested and agricultural land (including crossing an existing Columbia Natural Gas pipeline easement approximately 0.9 mile west of the cut-in point), as well as rural residential uses near the crossing of Balty Road (approximately 1.3 miles west of the cut-in point). The westernmost 0.4 mile of Eliminated Route 5 runs parallel to and south of the existing REC 115 kV corridor before entering the initial site of the proposed Ruther Glen Switching Station (since elimination of this route, the Switching Station site have been relocated north and west of the terminus of Eliminated Route 4 shown on Figure 3.4-1).

Eliminated Route 5 measures approximately 2.8 miles. This route was eliminated due to proximity to existing residences along Balty Road and on the future Muskie Solar Project within the Buchanon Farms property.

3.5.6 ELIMINATED ROUTE 11

Eliminated Route 11 would tap the Company's existing Line #574 approximately 0.8 mile north of that line's crossing of Houston Drive. From the cut-in point, the route extends east for approximately 2.8 miles through primarily forested land. This segment includes a crossing of Jefferson Davis Highway (approximately 1.8 miles east of the cut-in point) and I-95 (approximately 2.7 miles east of the cut-in point). After crossing I-95, Eliminated Route 11 turns south and runs for approximately 0.8 mile through primarily forested land adjacent to the east side of I-95. Eliminated Route 11 then turns east, crosses Ladysmith Road, and turns south before entering the proposed Ruther Glen switching station site.

Eliminated Route 11 measures approximately 4.8 miles. This route was eliminated primarily due to length, spanning of I-95, and its proximity to the dense residential development in the

Campbells Creek Village and Ladysmith Village neighborhoods near the route's crossing of Jefferson Davis Highway.

3.6 ROUTE ALTERNATIVES

The route alternatives carried through for evaluation in this Routing Study are described below and are shown on Figure 3.6-1.

3.6.1 ROUTE 4

Route 4 taps the Company's existing Line #256 approximately 0.8 mile due north of Golansville Road and extends west for approximately 1.1 miles across agricultural fields, forested land, a Columbia Gas Natural Gas easement and Balty Road. Following property lines west of Balty Road, Route 4 passes through forested parcels and crosses Dejarnette Mill Run twice before turning southwest to cross Boxley Road approximately 0.6 mile north of Golansville Road. West of Boxley Road, Route 4 turns northwest for approximately 1.1 miles through forested land east of Reedy Swamp and west of rural residential properties before turning west to enter the proposed Ruther Glen Switching Station.

Route 4 measures approximately 3.7 miles and would require a 160-foot of right-of-way. The cumulative right-of-way for this alternative (70.7 acres) and the proposed Ruther Glen Switching Station (7.5 acres) would encompass a combined 78.2 acres.

3.6.2 ROUTE 5

Route 5 taps the Company's existing Line #256 in the same location as Route 4 and follows the same path as Route 4 for the first approximately 2.0 miles. At this point, Route 5 turns north to cross Bath Road/Pond Road and extends north for approximately 0.80 mile through forested parcels and along the eastern edge of an agricultural parcel. Route 5 then turns west to run parallel to and south of the existing REC 115 kV easement for approximately 0.8 mile through agricultural and then forested land. Route 5 then crosses and runs parallel to the north side of the REC easement for approximately 0.4 mile through forested land before entering the Ruther Glen Switching Station.

Route 5 measures approximately 4.0 miles and would require a 160-foot of right-of-way. The cumulative right-of-way for this alternative (77.1 acres) and the proposed Ruther Glen Switching Station site (7.5 acres) would encompass a combined 84.6 acres.

3.6.3 ROUTE 6

Route 6 taps the Company's existing Line #256 in the same location as Route 4 and follows the same path as Route 4 for the first approximately 1.5 miles. At this point, Route 6 turns south for approximately 0.3 mile and then west for approximately 0.6 mile before crossing Boxley Road. This segment of Route 6 runs through forested land and crosses Dejarnette Mill Run three times, including two crossings north of Boulware Pond. After crossing BOxley Road, Route 6 turns northwest for approximately 1.2 miles through forested areas east of Reedy Swamp and west of rural residential properties along Boxley Road. Route 6 then crosses the existing REC 115 kV easement and turns west to enter the proposed Ruther Glen Switching Station.

Route 6 measures approximately 3.9 miles and would require a 160-foot of right-of-way. The cumulative right-of-way for this alternative (74.1 acres) and the proposed Ruther Glen Switching Station site (7.5 acres) would encompass a combined 81.6 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 D.

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 • Caroline 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

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 4 would cross 14 private parcels, Route 5 would cross 19 private parcels, and Route 6 would cross 15 private parcels. The Ruther Glen Switching Station would occupy one private parcel. County- and state-owned properties in the study area are described below.

Commonwealth of Virginia

VDOT owns and maintains most road rights-of-way in the study area, including major roadways such as I-95, US 1, Rt. 639 (Ladysmith Road), and Rt.601 (Golansville Road). In addition, ERM identified nine VDOT-owned parcels. Seven of these parcels are located along Ladysmith Road near US 1 and are associated with the widening of Ladysmith Road and the installation of a storm water management basin. An eighth parcel is approximately 1.3 miles south of the I-95 Ladysmith exit, along the southbound I-95 lanes. The ninth parcel houses the Ladysmith Safety Rest Area North (adjacent to the northbound lanes of I-95) and South (adjacent to the southbound lanes of I-95), both of which are just north of the study area's southern boundary. None of the Project routes are located within 0.25 mile of VDOT-owned parcels.

Caroline County

ERM identified one parcel owned by Caroline County in the study area. The Ladysmith Branch Library is located within the Ladysmith Village: Founders Park residential community and is a public library operated by the county. None of the Project routes are within 0.25 mile of the library.

Caroline County Department of Fire-Rescue and Emergency Management

ERM identified a fire station operated by the Caroline County Department of Fire-Rescue and Emergency Management. The Ladysmith Volunteer Fire Department, Co.2 is approximately 0.3 mile north of the intersection of Ladysmith Road and US 1. This parcel is owned by Ladysmith Volunteer Fire Department, Incorporated. The Ladysmith Volunteer Rescue Squad, R2 facility is approximately 0.4 mile south of the intersection of Ladysmith Road and US 1. This parcel is owned by the Ladysmith Rescue Squad, Incorporated. None of the Project routes are located within 0.25 mile of the fire station.

Caroline County School Board

ERM identified three Caroline County School Board parcels in the study area, including Madison Elementary School, Lewis & Clark Elementary School, and Lotus Academy. These properties are all west of I-95 and are not within 0.25 mile of Project routes.

Caroline County Board of Supervisors

ERM identified five parcels owned by the Caroline County Board of Supervisors. Two of these parcels are located approximately 0.5 mile north of the intersection of Ladysmith Road and Center Drive and appear to be well houses. A third parcel is located along Bull Church Road, approximately 0.6 mile south of the intersection with Michaels Road, and is undeveloped. A fourth parcel is located in the Ladysmith Village: Founders Park residential community and contains the

Caroline Family YMCA. The fifth parcel is the Ladysmith Solid Waste Convenience Site, located east of the intersection of US 1 and Green Road. None of the Project facilities are located within 0.25 mile of property owned by the Caroline County Board of Supervisors.

4.1.1.2 IMPACT ASSESSMENT

There are no federal, state, or local lands within 0.25 mile of any route alternative or the Ruther Glen Switching Station. 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. The Project's transmission structures and conductors could have visual impacts on some public lands in the study area. The severity of these impacts would depend on factors such as surrounding tree cover, landscaping, orientation of development in relation to transmission infrastructure, topography, and screening from other objects. Section 4.3 addresses the Project's visual impacts.

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.[6]

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 Ladysmith

[6] 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.

Road, Boxley Road, and Balty Road. 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 infrastructure installation.

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

Land Use/ Land Cover	Unit	Ruther Glen Route 4	Ruther Glen Route 5	Ruther Glen Route 6	Ruther Glen Switching Station
Total right-of-way [a]	Miles	3.7	4.0	3.9	NA
	Acres	70.7	77.1	74.1	7.5
Forested	Acres	45.7	43.9	46.8	7.5
Agricultural	Acres	8.7	17.4	10.5	0.0
Developed	Acres	0.4	0.8	0.2	0.0
Open Space	Acres	14.9	14.4	14.6	0.0
Open Water	Acres	0.0	0.0	0.4	0.0
Wetland	Acres	1.0	0.7	1.6	0.0

Source: VGIN 2024

[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

Route 4

Route 4 crosses 3.7 miles of land encompassing approximately 70.7 acres of right-of-way. If Route 4 is selected for the Project, the primary land use/land cover impact would be the conversion of approximately 45.7 acres of forested land to grassy open space within the maintained right-of-way.

Route 5

Route 5 crosses 4.0 miles of land encompassing approximately 77.1 acres of right-of-way. If Route 5 is selected for the Project, the primary land use/land cover impact would be the conversion of approximately 43.9 acres of forested land to grassy open space within the maintained right-of-way.

Route 6

Route 6 crosses 3.9 miles of land encompassing approximately 74.1 acres of right-of-way. If Route 6 is selected for the Project, the primary land use/land cover impact would be the conversion of approximately 46.8 acres of forested land to grassy open space within the maintained right-of-way.

Ruther Glen Switching Station

The proposed Ruther Glen Switching Station encompasses 7.5 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 local planning commissions to adopt a comprehensive plan that provides guidance for the physical development of the territory 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).

4.1.3.1 LAND USE PLANNING

Comprehensive Plan

Caroline County's current Comprehensive Plan was adopted in 2010 and amended in 2023 and guides growth and development within the County through 2030 (Caroline County 2023). The Comprehensive Plan provides no future land use designations for portions of the study area outside of the Ladysmith Community Plan area (discussed below), due to the rural nature of these areas.

Ladysmith Community Plan

The Ladysmith Community Plan (Community Plan), a component of the county's overall Comprehensive Plan sets forth a vision of the desired future of the Ladysmith community. The intersection of US 1 and Ladysmith Road was identified as the center of the community. The Community Plan's boundaries generally follow Countyline Church Road in the west, the Lake Caroline residential community in the south, Bull Church Road in the east, and Gatewood Road in the north. The Community Plan addresses the future availability of high-speed internet and other related technologies as important components to growth in the Ladysmith community that aims to attract technology dependent commercial users. The Community Plan identifies two land use goals regarding future development: minimize the visual impact of new development on the existing community and minimize site disturbance during new construction.

The Project would have minimal to no impacts on the goals of the Ladysmith Community Plan because the route alternatives and the proposed Ruther Glen Switching Station are barely located in the Community Plan's boundary (Caroline County 2008).

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: 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 various 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 Planned Innovation, Research, and Technology designations.
- 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

The Highway Corridor Overlay District (HCOD) provides 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 Ladysmith Road, US 1, Ruther Glen Road, and Bull Church Road.

Commercial Service Corridor

The Ordinance designates four Commercial Service Corridors (CSC) 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 to not impede traffic on the roads/corridors identified in Article XV, Section 15.2 of the Ordinance. In the study area, the portion of Ladysmith Road from the intersection of Bull Church Road to the intersection of US 1 is designated as a CSC.

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 [VAC 25-830-150]).

TABLE 4.1-1 ZONING AND OVERLAY DISTRICTS CROSSED BY THE PROJECT

Zoning District/Designation [a]	Measure	Ruther Glen Route 4	Ruther Glen Route 5	Ruther Glen Route 6	Ruther Glen Switching Station
Rural Preservation	Miles	2.9	3.6	3.1	NA
	Acres	56.3	69.3	59.7	0
Industrial	Miles	0.8	0.4	0.8	NA
	Acres	14.2	7.6	14.2	7.5

NA = not applicable

[a] Overlay district mileage and acreage are coterminous with base districts.

The route alternatives all primarily cross land areas with rural preservation and industrial land uses and zoning designations. The Ruther Glen switching station sits on approximately 7.5 acres of industrial land, which is designated by the zoning ordinance to encourage the development of industrial parks and manufacturing facilities.

4.1.4 PLANNED DEVELOPMENTS

ERM obtained information on planned future developments through publicly available data on Caroline County websites and consultations with County planning officials and other stakeholders.[7] Table 4.1-3 lists planned developments within the study area. Figure 4.1-4 depicts the planned developments within the study area. The Project would cross two of the planned developments in Table 4-1.3: Aldon Mega Site (which is the site of the proposed Ruther Glen Switching Station), and Muskie Solar. All other developments are more than 0.25 mile from the Project and would not be impacted.

[7] "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

Development Name	Development Type
AVAIO Data Center	Data Center
Airlee Data Center	Data Center
Aldon Mega Site	Proposed Data Center (Economic Development)
Bull Church Data Center	Data Center
CADC-VA Bazaar Data Center	Data Center
CADC-VA Ladysmith Data Center	Data Center
Ladysmith Industrial Center Lot 25	Service Building with Flex Space
Muskie Solar LLC/Shad Solar LLC	Minor Solar Energy Project
O'Reilly Auto Parts	Retail
Ladysmith Village—South River Section 3	Residential Development

The Aldon Mega Site is located on Parcel ID 53-A-57 and is marketed by the Caroline County Department of Economic Development for commercial and industrial uses, specifically data center development. The site is over 500 acres, and the CADC-VA Ladysmith planned developed will be located in the northwestern portion of the site, near the intersection of Bull Church Road and Ladysmith Road.

The Muskie Solar LLC/Shad Solar LLC project is located north of Golansville Road and east of Balty Road, in the northern portion of Parcel ID 54-A-58, where the land is already cleared.

4.1.4.1 IMPACT ASSESSMENT

The Ruther Glen Switching Station sits within the Aldon Mega Site proposed development and all route alternatives would cross the Aldon Mega Site project near MPs 2.9, 3.1, or 3.6 (depending on the route alternative). All route alternatives would cross the Muskie Solar LLC/Shad Solar LLC project from approximately MPs 0.0 to 0.6 or 0.7 (depending on the route alternative). Impacts on the planned development would be minor because the routes run along the southern border of the parcel and are not anticipated to cross the areas designated for solar panels. The Ruther Glen Switching Station is not located within 0.25 mile of any planned developments.

4.1.5 RESIDENTIAL AREAS AND NON-RESIDENTIAL BUILDINGS

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 (Table 4.1-4). There are no buildings within the rights-of-way of the route alternatives. Route 6 has one non-residential structure within 60 feet of the right-of-way and one non-residential structure within 100 feet of the route's centerline. Figure 4.1-5 depicts the locations of existing buildings along the routes. There are no buildings within the boundary of the proposed Ruther

Glen Switching Station. The subsections below provide additional information on the residential areas along each route alternative.

TABLE 4.1-4 RESIDENTIAL, COMMERCIAL, AND OTHER BUILDINGS WITHIN 60, 100, 250, AND 500 FEET OF THE ROUTE ALTERNATIVES

Feature	Ruther Glen Route 4	Ruther Glen Route 5	Ruther Glen Route 6	Ruther Glen Switching Station
Dwellings within 250 feet of a centerline [a]	1	1	1	0
Dwellings within 500 feet of a centerline [a]	5	4	3	0
Non-residential buildings within 60 feet of a right-of-way [b]	0	0	1	0
Non-residential buildings within 100 feet of a centerline [b]	0	0	1	0
Non-residential buildings within 250 feet of a centerline [b]	0	1	1	0
Non-residential buildings within 500 feet of a centerline [b]	2	5	3	0

[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 6 has a non-residential building within 60 feet of its right-of-way and within 100 feet of the route's centerline. The outbuilding is located just north of the Route 6 right-of-way at MP 2.0. Most buildings in the study area are single-family dwellings on privately owned parcels, particularly along Golansville Road and Ladysmith Road and within a residential subdivision such as Ladysmith Village, Lake Land'Or, or Lake Caroline. No dwellings are located within the right-of-way for any of the route alternatives.

Commercial and industrial uses in the study area are concentrated mainly along Ladysmith Road and US 1. Uses in these areas include sit-down and drive-through restaurants, a grocery store, and other retail businesses.

4.1.5.1 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.

Except for temporary impacts such as increased 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 routes and route variation, the Company attempted to minimize visual impacts on residences and residential areas to the extent practicable by using existing tree cover to visually obscure transmission infrastructure from existing residences. 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 and the Ruther Glen Switching Station are described below.

Ruther Glen Route 4

The nearest structure to the route is approximately 80 feet north of the route right-of-way at MP 2.3. This dwelling is separated from Route 4 by existing vegetation that provides some screening between the home and the proposed transmission line infrastructure. The right-of-way of Route 4 would also encompass and collocate with approximately 0.2 mile of a private access road, clearing trees on the south side of the road in this location.

Ruther Glen Route 5

The nearest structures to the route are located approximately 150 feet east of the route's right--of--way between MP 2.0 and MP 2.1 and approximately 210 feet north of the route's right--of--way at MP 3.4.

Ruther Glen Route 6

Route 6 is the only route to have a non-residential structure located within 60 feet of the right--of--way. This structure is located just north of route's right-of-way at MP 2.0. At MP 2.4, a residential dwelling and non-residential building exist approximately 150 feet north of the route's right-of-way.

Ruther Glen Switching Station

No dwellings or non-residential structures are within 500 feet of the Ruther Glen Switching Station.

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 habit 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. Figure 4.1-6 depicts conservation easements and lands within the study area.

Conservation Easements

Based on VDCR's Managed Conservation Lands Database, ERM identified two conservation easements managed by Ever Green Team (EGT). The first EGT easement, totaling approximately 253.0 acres, is east of Bull Church Road and south of Michaels Road. The second EGT easement, totaling approximately 128.0 acres, is east of Bull Church Road and north of Michaels Road. None of the Project facilities cross or are within 0.25 mile of the easements.

Virginia Outdoors Foundation

Based on VDCR's Managed Conservation Lands Database, ERM identified two Virginia Outdoors Foundation (VOF) conservation easements within the study area (VDCR 2024a). Both conservation easements are managed by the VOF. The 770-acre Charity Hill Farm, LLC easement is entirely in the study area. None of the Project facilities cross this easement; however, Routes 4 and 6 are within 0.25 mile of the Charity Hill Farm, LLC easement.

The 358-acre Poplar Grove, LLC conservation easement is in the northeast portion of the study area. None of the Project facilities cross the easement and none of the route alternatives are within 0.25 mile of this easement.

Resource Protection 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 (RPA) that identify lands considered necessary to protect the quality of state waters and Resource Management Areas (RMA) 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 the 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 storm water management (Va. Code §10.1-603.1 et seq.). Impacts on the RPAs and RMAs crossed by the routes would include the permanent conversion of trees and shrubby vegetation and to maintained herbaceous vegetation within the right-of-way, reducing riparian buffer benefits at these locations. Section 4.2 discusses wetlands in further detail.

4.1.6.2 IMPACT ASSESSMENT

Routes 4 and 6 both lie within 500 feet of a conservation easement. The closest conservation easement to Route 5 is more than 0.25 mile away. In addition, all route alternatives cross RPA lands. The Project would have minimal visual impacts on conservation easements, due existing forests that screen views of the route alternatives from the 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.

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 (BMP) to limit impacts on RPAs and RMAs to the minimum extent possible while safely and effectively constructing and maintaining this infrastructure.

Ruther Glen Route 4

Route 4 would cross about 0.7 mile of RPAs and RMAs, around a tributary to Mays Run between MPs 0.0 to 0.2, around a tributary to Boulware Pond between MPs 1.7 to 2.2, and around a tributary of Reedy Swamp near approximate MP 2.7 and MP 3.2.

Route 4 is approximately 400 feet from the Charity Hill Farm VOF conservation easement at MP 2.7. Approximately 300 feet of forested land exists between the proposed route right-of-way and the conservation easement, which would act as a vegetative buffer, minimizing potential visual impacts.

Ruther Glen Route 5

Route 5 would cross about 0.5 mile of RPAs and RMAs, including the same RPA and RMA areas around a tributary to Mays Run and around a tributary to Boulware Pond described for Route 4.

Ruther Glen Route 6

Route 6 would cross about 1.2 miles of RPAs and RMAs, around a tributary to Mays Run between MPs 0.0 to 0.2, including the same RPA and RMA areas around a tributary to Mays Run and around a tributary to Boulware Pond described for Route 4, as well as an area around a tributary of Reedy Swamp between MPs 3.3 to 3.4.

Route 6 would be approximately 250 feet from the Charity Hill Farm VOF easement at approximate MP 2.5. Approximately 200 feet of forested land between the route right-of-way and the conservation easement would act as a vegetative buffer, minimizing potential visual impacts.

Ruther Glen Switching Station

The Ruther Glen Switching Station is not within RPA or RMA lands or other conservation easements or lands.

4.1.7 RECREATION RESOURCES

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 12 recreational resources in the study area, depicted on Figure 4.1-7.

U.S. Bike Route 1 is a cross-country, long-distance bicycle route network that includes shared roadways, on-road accommodations, and off-road shared use paths, planned to connect the eastern United States from Florida to Maine (VDOT 2024). The Virginia segment of U.S. Bike Route 1 is approximately 374 miles long and generally follows a similar alignment to the East Coast Greenway. U.S. Bike Route 1 generally follows Golansville Road and Bull Church Road in the study 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 US 1, Golansville Road, and Bull Church Road. 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).

U.S. Bike Route 1 and the East Coast Greenway Trail are the closest recreational resources to the route alternatives; however, they are both more than 0.25 mile from the Project facilities. The other 10 recreational resources are west of I-95 and are farther from the Project facilities than the trails described above. These include the Pendleton Golf Club and several parks associated with residential Homeowners Associations.

4.1.7.1 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 the East Coast Greenway Trail, U.S. Bike Route 1, Pendleton Golf Club, and several Homeowners Associations recreational park amenities.

4.1.8 CEMETERIES, SCHOOLS, 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, LLC 2024)
- Cemetery and burial data (Find a Grave 2024)
- Publicly accessible county datasets (Caroline County 2024)
- Cultural resource data from the VCRIS (VDHR 2024)
- 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. Madison Elementary School, on Chance Place, is approximately 100 feet from the boundary of the proposed data center site associated with the Project; however, the school is more than 0.5 mile from the route alternatives and the Ruther Glen Switching Station site.

Cemeteries

Based on the review of the sources identified above, four cemeteries are located within 0.25 mile of the route alternatives (Table 4.1-5).

TABLE 4.1-5 CEMETERIES

Name	Description	Distance and Direction from Route Alternatives
Wright's Burial Ground/Old Wright Cemetery	Wright's Burial Ground/Old Wright Cemetery is located in the middle of an active agricultural field. The approximate number of graves is unknown.	Approximately 370 feet from Route 5 at MP 2.9
Wright's Chapel Cemetery	Wright's Chapel Cemetery is located on Ladysmith Road and is associated with Wright's Chapel United Methodist Church. The approximate number of graves is unknown.	Approximately 900 feet from Route 5 at MP 2.9
Oliver Cemetery	The Oliver Cemetery is an unmaintained historic African-American cemetery with as many as 300 graves in the cemetery. The Caroline County Cemetery Group is working to preserve the cemetery (Caroline Historical Cemetery).	Approximately 400 feet from Route 5 at MP 3.3

Of the three cemeteries identified within 0.25 mile of the route alternatives, only the Oliver Cemetery is within 500 feet of any of the routes. Cemeteries greater than 500 feet from the routes are not expected to be impacted and are not discussed further.

Places of Worship

Based on the review of the sources identified above, one place of worship is located within 0.25 mile of the route alternatives. Saint Mary of the Annunciation Roman Catholic Church is located on Ladysmith Road. Ruther Glen Route 5 runs through the rear of the church parcel but is greater than 500 feet from the church building; therefore no direct impact is expected.

4.1.8.2 IMPACT ASSESSMENT

This section describes the Project's impacts on cemeteries. No schools or places of worship were identified within 0.25 mile of Project facilities; therefore, the Project would have no direct impact on these resources in the study area. Although construction noise and traffic could temporarily disturb activity at schools and places of worship, these impacts would be temporary and limited to the period of construction in the immediate vicinity of the property and would not prevent or alter the use of these facilities.

Section 4.3 discusses the visual impacts of the route alternatives on cemeteries and places of worship in greater detail.

Figure 4.1-8 shows existing cemeteries and places of worship within 0.25 mile of the route alternatives. No cemeteries or places of worship are within 0.25 mile of Routes 4 or 6; therefore, these route alternatives would have no direct impact on cemeteries or places of worship.

Ruther Glen Route 5

Two cemeteries (Oliver Cemetery and Wright's Burying Ground/Old Wright Cemetery) are within 500 feet of Route 5. Approximately 130 feet of existing vegetation exists between Oliver Cemetery and the route, minimizing the visual impacts on the cemetery. The land between Route 5 and Wright's Burying Ground/Old Wright Cemetery appears to be an active agricultural field. Due to the lack of a forested buffer, Route 5 would have visual impacts on the cemetery.

4.1.9 TRANSPORTATION INFRASTRUCTURE

4.1.9.1 EXISTING CONDITIONS

Figure 1.1-1 shows existing transportation infrastructure in the study area. The road network in the study area includes a variety of functional classifications, including a freeway (I-95), arterial roads (US 1 and Rt. 639), and collector and local roads (Golansville Road and Boxley Road). I-95 runs generally north–south through the middle of the study area. US 1 runs parallel to and west of I-95. None of the routes cross I-95 or US 1 and the switching station would not be within or adjacent to any public roads. No existing or planned railroads are in the study area.

The Caroline County Comprehensive Plan identifies several roads in the study area needing improvements to accommodate anticipated growth, including US 1, Ladysmith Road, and Jericho Road (Caroline County 2023). ERM reviewed VDOT's Six-Year Improvement Plan to identify possible future road projects within the study area. VDOT's 2024 study of US 1 identified and analyzed transportation issues at various intersections along US 1. None of the Project facilities would be within 0.25 mile of the intersections studied. There are no planned county or VDOT projects within 0.25 mile of the routes. Additionally, the Company corresponded with VDOT, who did not express concerns about the proposed route alternatives.

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. None of the route alternatives cross I-95, US 1, Ladysmith Road, or Golansville Road, the most traveled roads in the study area. 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.

All route alternatives would cross Balty Road between MPs 1.1 and 1.2. Route 4 and Route 6 cross Boxley Road at MP 2.3 and MP 2.4, respectively. The Ruther Glen Switching Station is not within or adjacent to any 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) website to identify public use airports, airports operated by a federal agency or the U.S. 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 four airports, private airstrips, or heliports within 10 nautical miles (nm) of the proposed Project infrastructure (Figure 4.1-9). Table 4.1-6 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 (nautical miles)	Maximum Runway Length (feet)
Woodford Airpark Airport	Private	20VA	3.8 nm north of the proposed Ruther Glen Switching Station and western terminus of all route alternatives.	2,600
Mary Walker LZ Airport	Military/ Private	APH	6.0 nm northeast of the Route 4, 5 and 6 eastern cut-in.	2,202
Robbie Campbell Memorial Airfield Airport	Private	4VG8	7.5 nm north of the proposed Ruther Glen Switching Station and western terminus of all route alternatives.	2,384
Cool Water Airport	Private	4VG2	9.5 nm southeast of Alternative Route 6.	1,600

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 United States, 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 United States, 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 4.1-6, 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, 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 U.S. 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 at each end of the primary surface, has a length of 1,000 feet, and is 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 are imaginary surfaces associated with terminal instrument procedures (TERP). TERPs are guidelines created by the FAA that prescribe standardized methods for designing and evaluating airport specific instrument flight procedures (IFP), 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.
- 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.

4.1.10.6FEDERAL 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
  - 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
- 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.

4.1.10.7STATE 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.

4.1.10.8IMPACT 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 4.1-6. 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. None of the route alternatives would conflict with the private facilities listed in Table 4.1-6.

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 6.0 nm, or 36,450 feet northeast of the closest Project component (at the Routes 4, 5, and 6 eastern cut-in location).

As discussed in the previous Military Airport Imaginary Surfaces section (Section 4.1.10.4), the approach surface of all military airports extends from 200 feet beyond each end of the primary surface and extends for 50,000 feet. Based on a review of the runway geometry and approach procedures for Mary Walker LZ airport, none of route alternatives, nor the Ruther Glen Switching Station would overlap with FAA defined military use imaginary surfaces. In addition, the Project area is generally at the same or lower elevation as the Mary Walker LZ Airport (approximately 211 to 216 feet above mean sea level), and none of the proposed structures associated with any of the Project facilities or temporary cranes used during construction would exceed 200 feet above ground surface.

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 storm water 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, LLC 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 2024); and
- Soil Survey Geographic Database soils data from the U.S. Department of Agriculture-Natural Resources Conservation Service (USDA-NRCS 2024).

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

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, 2-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 2-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 4-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.
- The lower-Chesapeake 6-digit HUC watershed (020801), which drains about 8,320 square miles into the Chesapeake Bay.
- The Mattaponi 8-digit HUC subregion (02080105), which drains about 901 square miles into the York River (USGS 2023).

The study area is further split into two 10-digit HUC watersheds, approximately following Ladysmith Road from the west (near Lake Land'Or) and then continuing to follow Balty Road toward the southeast (near Athens). About 50% of the study area (approximately 16,760 acres) lies north of the divide within the Matta River-Mattaponi River 10-digit HUC subregion

(0208010503). Aquatic resources within Matta River-Mattaponi River 10-digit HUC watershed generally flow into the perennial South River, running from west to east toward its confluence with the Mattaponi River. None of the proposed Project infrastructure is in this watershed. The remaining 50% (approximately 14,570 acres) of the study area lies south of the divide within the Polecat Creek-Mattaponi River 10-digit HUC subregion (0208010503). The footprints of the proposed Ruther Glen Switching Station and all the route alternatives are within this watershed. Aquatic resources within the Polecat Creek-Mattaponi River watershed generally flow into the perennial Polecat Creek, running west to east toward its confluence with the Mattaponi River.

4.2.1.2 WETLANDS

Wetlands within the rights-of-way for the route alternatives (inclusive of the proposed Ruther Glen Switching Station site) were identified based on ERM's desktop wetland and waterbody probability analysis, described in the Wetland and Waterbody Desktop Summary (Appendix E). 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 diameter) covering greater than 25% of the area, with plants covering less than 30% of the area.
- Riverine streams: channels containing periodically or continuously moving water, with two exceptions: wetlands dominated by trees, shrubs, persistent emergent, 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 Wetland Studies and Solutions, Inc. in summer (between July and August) 2024 on the parcel containing the proposed Ruther Glen

Switching Station. This delineation identified aquatic resources along Route 4 between MP 3.0 and the Switching Station, Route 5 between MP 3.7 and the proposed Ruther Glen Switching Station, and Route 6 between MP 3.2 and the Switching Station (Wetland Studies and Solutions, Inc. 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 E. Maps in Attachment 2 of Appendix E 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 Classification	Unit [a]	Route 4	Route 5	Route 6
Total	Acres	4.4	4.9	5.1
PFO	Acres	2.9	2.9	2.9
PSS	Acres	NA	NA	NA
PEM	Acres	0.7	0.7	0.8
PUB	Acres	0.5	1.1	0.8
Riverine	Acres	0.2	0.2	0.5

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 the South River and its tributaries in the northern part of the study area, and Polecat Creek and its tributaries in the southern part of the study area. No wetlands or waterbodies were identified within the proposed Ruther Glen Switching Station site. No wetlands or waterbodies were identified within the proposed Ruther Glen Switching Station.

Route 4

The Route 4 right-of-way encompasses approximately 4.4 acres of wetlands and waterbodies. Locations of the wetlands along Route 4 include:

- PFO wetlands associated with intermittent tributaries to Mays Run between MPs 0.6 and 0.7;
- PEM wetlands associated with DeJarnette Mill Run at approximate MP 2.0; and
- PFO and PEM wetlands associated with Reedy Swamp and an intermittent tributary to Reedy Swamp between MPs 3.0 and 3.6.

If this route is selected for the Project, construction and operation of the transmission lines would convert the approximately 2.9 acres of PFO to PSS/PEM-type wetlands within the maintained right-of-way.

Route 5

The Route 5 right-of-way encompasses approximately 4.9 acres of wetlands and waterbodies. Route 5 shares an alignment with Route 4 from MPs 0.0 to 1.9 and from MPs 3.8 to the proposed Ruther Glen Switching Station. Wetlands crossed by Route 5 in these locations would be the same as those identified above between Route 4 MPs 0.0 and 1.9 and 3.5 and the proposed Ruther Glen Switching Station. From MPs 1.9 to 3.8, locations of the wetlands along Route 5 include:

- PEM wetlands between MPs 2.2 and 2.3; and
- PFO and PEM wetlands associated with Reedy Swamp between MPs 3.1 and 3.3.

If this route is selected for the Project, construction and operation of the transmission lines would convert the approximately 2.9 acres of PFO to PSS/PEM-type wetlands within the maintained right-of-way.

Route 6

The Route 6 right-of-way encompasses approximately 5.1 acres of wetlands and waterbodies. Route 6 shares an alignment with Route 4 from MPs 0.0 to 1.5 and from MPs 2.7 to the proposed Ruther Glen Switching Station. Wetlands crossed by Route 6 in these locations would be the same as those identified above between Route 4 MPs 0.0 and 1.5 and 2.6 and the proposed Ruther Glen Switching Station. From MPs 1.5 to 2.8, locations of the wetlands along Route 6 include PEM wetlands associated an intermittent tributary to DeJarnette Mill Run at approximate MP 1.9.

If this route is selected for the Project, construction and operation of the transmission lines would convert the approximately 2.9 acres of PFO to PSS/PEM-type wetlands within the maintained right-of-way.

Ruther Glen Switching Station

Based on the wetland and waters delineation of the site conducted by WSSI in 2024, there are no wetlands within the footprint of the proposed Ruther Glen Switching Station.

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 delineate water resources and 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 storm water 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 by the routes include:

- Reedy Swamp, which flows into Polecat Creek (Routes 4, 5, and 6), and
- DeJarnette Mill Run, which flows into Polecat Creek, (Routes 4 and 6).

The route alternatives also cross unnamed perennial, intermittent, and ephemeral stream tributaries, as well as open waterbody features. Table 4.2-2 shows the number of NHD-mapped waterbody crossings for each route alternative. The locations of waterbodies are described below. Appendix E provides a general location map illustrating waterbodies crossed by each route. No waterbodies were identified within the footprint of the proposed Ruther Glen Switching Station.

TABLE 4.2--2 WATERBODIES CROSSED BY THE ROUTE ALTERNATIVES

Waterbodies Crossed	Unit	Route 4	Route 5	Route 6
Total	Number	7	6	9

Waterbodies Crossed	Unit	Route 4	Route 5	Route 6
Perennial Streams/Rivers	Number	2	1	0
Intermittent Streams/Rivers	Number	5	5	7
Perennial Lakes/Ponds	Number	0	0	2

Source: USGS NHD (USGS 2024)

Route 4

Route 4 crosses seven NHD-mapped waterbodies as listed in Table 4.2-2, including two perennial waterbodies (a tributary to DeJarnette Mill Run DeJarnette Mill Run) and five unnamed, intermittent streams. Based on ERM's desktop wetland and waterbody analysis, the right-of-way for Route 4 would encompass approximately 0.3 acre of riverine features and 0.5 acre of PUB open water features. Waterbody crossing locations are summarized below:

- Unnamed, intermittent tributaries to Mays Run between MPs 0.6 and 0.7.
- An unnamed, intermittent tributary to DeJarnette Mill Run between MPs 1.2 and 1.3.
- An open waterbody feature associated with a perennial tributary to DeJarnette Mill Run at approximate MP 1.8.
- Perennial DeJarnette Mill Run at approximate MP 2.0.
- An intermittent segment of Reedy Swamp between MPs 3.1 and 3.2 and unnamed, intermittent tributaries to Reedy Swamp between MPs 3.4 and 3.6.

Route 5

Route 5 crosses six NHD-mapped waterbodies as listed in Table 4.2-2, including one perennial waterbody (an unnamed, perennial tributary to DeJarnette Mill Run) and five unnamed, intermittent streams. Based on ERM's desktop wetland and waterbody analysis, the right-of-way for Route 3 would encompass approximately 0.2 acre of riverine features and 1.1 acres of PUB open water features. Route 5 shares an alignment with Route 4 from MPs 0.0 to 1.9 and from MP 3.8 (Route 4 MP 3.5) to the proposed Ruther Glen Switching Station, crossing the same segments of wetlands identified above between Route 4 MPs 0.0 and 1.9, and 3.5 and the proposed Ruther Glen Switching Station. From MPs 1.9 to 3.8, Route 5 crosses an intermittent segment of Reedy Swamp at approximate MP 3.2.

Route 6

Route 6 crosses nine NHD-mapped waterbodies as listed in Table 4.2-2, including two perennial lakes/ponds (Boulware Pond), and seven unnamed, intermittent streams. Based on ERM's desktop wetland and waterbody analysis, the right-of-way for Route 6 would encompass approximately 0.5 acre of riverine features and 0.8 acre of PUB open water features. Route 6 shares an alignment with Route 4 from MPs 0.0 to 1.5 and from MPs 2.7 to the proposed Ruther Glen Switching Station, crossing the same segments of waterbodies identified above between Route 4 MPs 0.0 and 1.5 and 2.6 and the proposed Ruther Glen Switching Station. From MPs 1.5 to 2.8, waterbodies crossed by Route 6 are summarized below:

- A PUB open water feature associated with an intermittent tributary to Boulware Pond between MPs 1.6 and 1.7.
- An unnamed, intermittent tributary to Boulware Pond between MPs 1.8 and 1.9.
- Perennial DeJarnette Mill Run between MPs 2.0 and 2.1.

Ruther Glen Switching Station

Based on the wetland and waters delineation of the site conducted by WSSI in 2024, there are no waterbodies within the footprint of the proposed Ruther Glen Switching Station.

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 above ground level 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 delineate water resources and 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 (NHR) 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 F). The VDCR letter indicates that no natural area preserves, stream conservation sites, 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 other NHRs along the routes, including conservation sites 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)

- General significance (B5)

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

VDCR identified three conservation sites within the Project study area, including Ladysmith North Conservation Site, Wright's Corner Conservation Site, and Wright's Corner South Conservation Site. Descriptions of each conservation site are provided below, and the three sites are depicted on Figure 4.2-2.

Ladysmith North Conservation Site

The Ladysmith North Conservation Site consists of approximately 551 acres of land with a B3 ranking, indicating a site of high significance. The conservation site borders the east side of the Company's existing Line #574 and is situated approximately 0.4 mile north of Ladysmith Road, approximately 0.6 mile south of Gatewood Road, and just west of Ladysmith Village. It consists primarily of forested land bisected by the South River, which flows from west to east through the central part of the site. Non-forested land is generally limited to an approximately 19.6-acre area of open land along the northwest boundary maintained for agricultural use. The remaining land north of the South River consists of semi-mature forest communities. Land south of the South River has fragments of semi-mature forest mixed with approximately 125 acres of immature forest communities where trees were cleared prior to 2002 and have since regenerated. The southern portion of the site also contains clearings for several roads: Crump Drive, Durrette Road, and Riverside Drive. The southeast and southwest edges of the conservation site contain a few residences.

One T&E species is documented by the VDCR within the Ladysmith North Conservation Site, the federally threatened and state-endangered plant called Small whorled pogonia (*Isotria medeoloides*). Small whorled pogonia is a perennial orchid that grows in forested areas, particularly mid-aged woodland habitats, and often can remain dormant in the soil for long periods of time. Field surveys are recommended by the Virginia Field Office of the USFWS from June 1 to July 20 in Caroline County. With habitat disturbance and loss, this species has become less common in Virginia (VDCR 2024c).

Wright's Corner Conservation Site

The Wright's Corner Conservation Site consists of approximately 615 acres of land with a B3 ranking, indicating a site of high significance. The site is north of Ladysmith Road, and Michaels Road borders the northern boundary of the site. Hobby Swamp and several of its tributaries are located along the western boundary of Wright's Corner Conservation Site. The remainder of the site mostly consists of forested woodlands interspersed with streams and wetlands. It also contains a right-of-way for a distribution line that fragments forests along the northern boundary. Several roads are located in the eastern half of the site, including Michaels Road, Bath Road, and McKenney Drive.

One T&E plant species and two rare plant species are documented by the VDCR within this site, including New Jersey rush (*Juncus caesariensis*), Sheep laurel (*Kalmia angustifolia*), and Purple

pitcher plant (*Sarracenia purpurea*). New Jersey rush is listed as state threatened. While it is not listed federally, New Jersey rush is classified as a Species of Concern by the USFWS, which provides no federal legal protection. This rush species inhabits acidic wetlands like hardwood swamps, seeps, swales, pond edges, and seepages (e.g., transmission line rights-of-way). Field surveys are recommended during the plant's fruiting period from August through October. Existing threats to populations of this species include drastic water level changes in wetlands and the presence of competitor species due to land clearing.

Both Sheep laurel and Purple pitcher plant are classified by the VDCR as rare in Virginia, but neither are federal- or state-listed species. Both species have been documented within the study area. See Section 4.2.3.3 for additional information regarding these two species, along with several other rare plants noted by VDCR outside of the Wright's Corner Conservation Site.

Wright's Corner South Conservation Site

The Wright's Corner South Conservation Site consists of approximately 72 acres of land with a B3 ranking, indicating a site of high significance. The site is south of Wright's Corner Conservation Site, adjacent to the south side of Ladysmith Road and the east side of American Way. The site is bisected by an existing natural gas pipeline operated by Virginia Natural Gas, Inc., and approximately 57.3 acres of land in the southwest portion of the site was cleared between 2017 and 2021. The T&E or rare species associated with the Wright's Corner Conservation Site listed above (New Jersey rush, Sheep laurel, and Purple pitcher plant) are the same resources associated with Wright's Corner South Conservation Site. See Section 4.2.3 for additional information regarding these species.

Impact Assessment

No routes cross Ladysmith North Conservation Site. The Ruther Glen Switching Station is approximately 2.4 miles east of the site. Due to this distance, no impacts are anticipated to the conservation site or T&E species (Small whorled pogonia) within the site.

No routes cross Wright's Corner Conservation Site. The nearest route to the site is Route 5 (at approximate MP 2.8), which lies approximately 0.5 mile south of the site. Due to this distance, no impacts are anticipated to the conservation site or T&E/rare species (New Jersey rush, Sheep laurel, Purple pitcher plant) within the site.

No routes cross Wright's Corner South Conservation Site. Route 5 near MP 2.8 is the nearest route, lying approximately 0.5 mile west of the site. Given this distance, no impacts are anticipated to the conservation site or T&E/rare species (New Jersey rush, Sheep laurel, Purple pitcher plant) within the site. See Section 4.2.3.1 for additional information on the New Jersey rush and Section 4.2.3.3 for additional information on the Sheep laurel and Purple pitcher plant.

4.2.2.2 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 2024b).

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 natural 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 C4 or C5. Because the route alternatives do not cross any ecological cores ranked C1, C2, or C3 no formal impact analysis is provided for the ecological cores crossed, per the recommendation of VDCR (Gustafson 2024; see Appendix F). Table 4.2-3 summarizes the area of C4 and C5 ecological cores crossed by the Project's route alternatives. Figure 4.2-3 shows the location 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 4	Route 5	Route 6	Ruther Glen Switching Station
Outstanding (C1)	acres	0.0	0.0	0.0	0.0
Very High (C2)	acres	0.0	0.0	0.0	0.0
High (C3)	acres	0.0	0.0	0.0	0.0
Moderate (C4)	acres	32.2	36.6	32.8	0.0
General (C5)	acres	13.4	5.6	14.6	6.8

Ecological Cores	Unit	Route 4	Route 5	Route 6	Ruther Glen Switching Station
Total [a, b]	acres	**45.7**	**42.2**	**47.4**	**6.8**

[a] Totals may not equal the sum of addends due to rounding.
[b] 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 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 5 would create the least impact on ecological cores at 42.2 acres, and Route 6 would have the greatest impact on cores at 47.4 acres. Descriptions of potential impacts to ecological cores from Project route alternatives are provided below.

Route 4

Route 4 crosses two ecological cores ranked C4 and three ranked C5. Table 4.2-4 provides information on each of the ecological cores crossed by Route 4 based on ERM's observations of aerial photography.

Route 4 crosses a combined approximately 1.7 miles of cores ranked C4, with a combined right--of-way footprint of approximately 32.2 acres. The route bisects Core ID 50579 (ranked C4) and crosses agricultural and forested land through the core. The route crosses approximately 0.2 mile (42% of total core crossing) of cleared agricultural land within Core ID 50579, reducing fragmentation of the core. The route crosses forested land in Core ID 50533, and approximately 0.2 mile of the crossing (17% of total core crossing) intersects forested land that is regenerating after tree clearing that occurred between 2011 and 2013.

Route 4 crosses a combined approximately 0.7 mile of cores ranked C5, with a combined right--of--way footprint of approximately 13.4 acres. The route bisects the northern extent of Core ID 50663 through forested land. The route slightly intersects Core ID 50532, a habitat fragment (i.e., 10 to 99 acres of contiguous forest) almost entirely within the Aldon Mega Site planned development. Route 4 intersects the southern border of Core ID 50449, which is also partially within the Aldon Mega Site planned development footprint.

TABLE 4.2--4 ECOLOGICAL CORES CROSSED BY RUTHER GLEN ROUTE 4

Core ID	Core Rank	Total Core Acres	Location	MP (Start)	MP (End)	Condition	Miles Crossed	Acres Crossed
50579	C4	322	East of Balty Road and of petroleum products pipeline right-of-way, north of Golansville Road, west of the Company's existing Line # 256 and Mays Run	0.1	0.9	Partially cleared core; tree clearing occurred between 1994 and 2021.	0.6	10.7
50533	C4	576	South of Ladysmith Road, east of Boxley Road, north of Golansville Road, and west of Balty Road	1.1	2.3	Partially cleared core that contains DeJarnette Mill Run; tree clearing occurred between 2011 and 2021.	1.1	21.5
50663	C5	116	Northwest and adjacent to the intersection of Golansville Road and Boxley Road	2.3	2.8	Contains Reedy Swamp; mostly forested with unmarked road in the northern portion of core.	0.5	9.3
50532	C5	69	South of Core ID 50449, east of Floyd Madison Drive, northeast of Reedy Swamp	3.4	3.4	Habitat fragment (10 to 99 acres of contiguous forest); almost entirely within the Aldon Mega Site planned development footprint.	<0.1	0.7
50449	C5	118	South of Ladysmith Road, east of Bull Church Road, north of Core ID 50532, west of Boxley Road	3.5	3.7	Mostly unfragmented forest; partially within the Aldon Mega Site planned development footprint.	0.2	3.4
Total [a]							**2.4**	**45.7**

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

Route 5

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

Route 5 crosses a combined approximately 1.9 miles of cores ranked C4, with a combined right--of-way footprint of approximately 36.6 acres. Route 5 follows the same alignment through Core ID 50579 (ranked C4) and Core ID 50532 (ranked C5) as Route 4. Route 5 also follows the same alignment through Core ID 50533 (ranked C4) as Route 4 until approximately MP 1.9, where it heads north and bisects a mixture of cleared and forested land. Approximately 0.3 mile (21% of the total core crossing) of the crossing of Core ID 50533 is cleared land, and approximately 0.3 mile (24% of the total core crossing) intersects forested land that is regenerating after tree clearing that occurred between 2011 and 2013.

Route 6

Route 6 crosses two ecological cores ranked C4 and three ranked C5. Table 4.2-6 provides information on each of the ecological cores crossed by Route 6 based on ERM's observations of aerial photography.

Route 6 crosses the same five cores as Route 4, but the routing location through Core IDs 50533 and 50663 differs. Route 6 crosses a combined 1.7 miles of cores ranked C4, with a combined right-of-way footprint of approximately 32.8 acres. Route 6 crosses Core ID 50533 through forested land to the south of the Route 4 crossing, while the crossing at Core ID 50579 is the same as the Route 4 crossing.

Route 6 crosses a combined approximately 0.8 mile of cores ranked C5, with a combined right-of-way footprint of approximately 14.6 acres. The Route 6 crossing of Core ID 50663 bisects forested land adjacent to Reedy Swamp for a greater distance than the Route 4 alignment. The crossing of Core ID 50532 is the same for both routes.

Ruther Glen Switching Station

The Ruther Glen Switching Station is partially within Core ID 50449, which is ranked C5. The construction footprint is on forested land in the southwestern portion of the core, at approximately 6.8 acres (approximately 90% of the footprint).

TABLE 4.2--5 ECOLOGICAL CORES CROSSED BY RUTHER GLEN ROUTE 5

Core ID	Core Rank	Total Core Acres	Location	MP (Start)	MP (End)	Condition	Miles Crossed	Acres Crossed
50579	C4	322	East of Balty Road and of petroleum products pipeline right-of-way, north of Golansville Road, west of the Company's existing Line # 256 and Mays Run	0.1	0.9	Partially cleared core; tree clearing occurred between 1994 and 2021.	0.6	10.7
50533	C4	576	South of Ladysmith Road, east of Boxley Road, north of Golansville Road, and west of Balty Road	1.1	2.5	Partially cleared core that contains DeJarnette Mill Run; tree clearing occurred between 2011 and 2021.	1.3	25.9
50449	C5	118	South of Ladysmith Road, east of Bull Church Road, north of Core ID 50532, west of Boxley Road	3.7	4.0	Mostly unfragmented forest; partially within the Aldon Mega Site planned development footprint.	0.4	5.6
Total [a]							**2.2**	**42.2**

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

TABLE 4.2--6 ECOLOGICAL CORES CROSSED BY RUTHER GLEN ROUTE 6

Core ID	Core Rank	Total Core Acres	Location	MP (Start)	MP (End)	Condition	Miles Crossed	Acres Crossed
50579	C4	322	East of Balty Road and of petroleum products pipeline right-of-way, north of Golansville Road, west of the Company's existing Line # 256 and Mays Run	0.1	0.9	Partially cleared core; tree clearing occurred between 1994 and 2021.	0.6	10.7
50533	C4	576	South of Ladysmith Road, east of Boxley Road, north of Golansville Road, and west of Balty Road	1.1	2.3	Partially cleared core that contains DeJarnette Mill Run; tree clearing occurred between 2011 and 2021.	1.1	22.1
50663	C5	116	Northwest and adjacent to the intersection of Golansville Road and Boxley Road	2.4	3.0	Contains Reedy Swamp; mostly forested with unmarked road in the northern portion of core.	0.5	10.5
50532	C5	69	South of Core ID 50449, east of Floyd Madison Drive, northeast of Reedy Swamp	3.5	3.6	Habitat fragment (10 to 99 acres of contiguous forest); almost entirely within the Aldon Mega Site planned development footprint.	<0.1	0.7
50449	C5	118	South of Ladysmith Road, east of Bull Church Road, north of Core ID 50532, west of Boxley Road	3.7	3.8	Mostly unfragmented forest; partially within the Aldon Mega Site planned development footprint.	0.2	3.4
Total [a]							**2.5**	**47.4**

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

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 (VDACS) in cooperation with VDCR.
- Bald eagles (*Haliaeetus leucocephalus*) protected under the federal Bald and Golden Eagle Protection Act enacted in 1940 and administered by the USFWS.
- 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 ESA in 1973, which states that T&E plant and animal species are of aesthetic, ecological, educational, historic, and scientific value to the United States, 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 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 sodalis*), Northern long-eared bat (NLEB; *Myotis septentrionalis*), Yellow lance (*Elliptio lanceolata*), Atlantic sturgeon (*Acipenser oxyrinchus*), Small whorled pogonia (*Isotria medeoloides*), and Swamp pink (*Helonias bullata*). Two additional state-listed species (which are not also federally listed) identified by the queries include: Tricolored bat (TCB; *Perimyotis subflavus*) and New Jersey rush (*Juncus caesariensis*).

Each federal- and state-listed species was reviewed for potential of occurrence within and adjacent to the route alternatives. Table 4.2-7 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--7 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
Northern long-eared bat	*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 VaFWIS VDWR—Winter Habitat and Roost Tree Map
Invertebrates					
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 VaFWIS

Common Name	Scientific Name	Status	Global Rank	Habitat	Source
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					
Small whorled pogonia	*Isotria medeoloides*	FT, SE	G2	Woodland areas, particularly mid-aged woodland areas on gently north- or northeast-facing slopes within small draws.	IPaC VDCR
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; NA = not applicable; VaFWIS = Virginia Fish and Wildlife Information Service; 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		

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 4.2-7, ERM identified six federal-listed species and one species with a proposed federal listing, each of which are also state-listed, that may potentially occur within the study area. While all seven of these species were identified by either the IPaC database, VaFWIS database, or VDCR as having potential occurrence within a 2.0-mile search radius of the study area boundary, only the Atlantic sturgeon and Yellow lance have occurrences confirmed within a 2.0-mile search radius of the study area. The Atlantic sturgeon has been confirmed as present within the Mattaponi River, which is within 2.0 miles of the study area boundary. Due to the documented occurrences of this federal- and state-listed species and its habitat, the Mattaponi River has been classified as Threatened and Endangered Species Waters (T&E Waters). This designation classifies streams and rivers that contain documented occurrences of federal- or state-listed species and their habitat. In 1994, there was a confirmed occurrence recorded of the Yellow lance within the South River, which is classified as T&E Waters for the Yellow lance, southwest of the intersection of Clifton Road and Bull Church Road.

The USFWS proposed that the TCB be listed as endangered in 2022 (USFWS 2022) and a final decision on the listing is expected in late 2024 or early 2025. 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 bat (VDWR 2024a, 2024b).

State-Listed Species

Eight state-listed species—New Jersey rush, Indiana bat, TCB, NLEB, Yellow lance, Atlantic sturgeon, Small whorled pogonia, 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 eight species, only the Atlantic sturgeon and Yellow lance have documented occurrences within the 2.0-mile search radius around the study area, as mentioned above.

The VDCR reported that New Jersey rush is associated with both the Wright's Corner Conservation Site and Wright's Corner South Conservation Site. As noted in Section 4.2.2.1, no route alternatives cross Wright's Corner Conservation Site, and Route 2 crosses Wright's Corner South Conservation Site (VDCR 2024c). The VDCR Natural Heritage Data Explorer shows the following approximate amounts of predicted suitable habitat for New Jersey rush along each route:

- Route 4: 10.4 acres
- Route 5: 12.5 acres
- Route 6: 13.3 acres

Impact Assessment

Table 4.2-7 provides information on the eight 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.

Potential habitat exists for all eight species along the route alternatives; however, the VDWR, VaFWIS, and WERMS data show that only the Atlantic sturgeon and Yellow lance 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.

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 presence of the Yellow lance and the spawning of the Atlantic sturgeon if their habitats were crossed; however, no route alternatives cross Yellow lance habitat (South River), and no route alternatives cross Atlantic sturgeon habitat (Mattaponi River), so no impacts are anticipated to either species.

Based on landscape and vegetation within the study area, each route alternative crosses a variety of habitat types. As mentioned in Section 4.2.2.1, no routes cross Ladysmith North Conservation Site, the NHR for Small whorled pogonia, so no impacts are anticipated to this species.

The VDCR reported multiple areas of predicted suitable habitat for the New Jersey rush (VDCR 2024c). Route 4 would cross the least predicted suitable habitat for the New Jersey Rush at 10.4 acres, and Route 6 would cross the most predicted suitable habitat at 13.3 acres. Figure 4.2-4 provides the locations of VDCR-reported New Jersey rush predicted suitable habitat.

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 Indiana bat, TCB, NLEB, Small whorled pogonia, and Swamp pink within the study area has not been confirmed. The Atlantic sturgeon and Yellow lance have 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.

Regardless of the route selected for the Project, Dominion will coordinate with state and federal agencies as needed to determine if surveys, construction time-of-year-restrictions, 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 United States migrate north to the Chesapeake Bay

every spring, and Bald eagles from the northeastern United States (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 Threatened and Endangered 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 nearest Bald eagle nest to the Project is Nest ID CA1901, which was last observed by the CCB to be occupied in 2019 (CCB 2022). This Bald eagle nest is approximately 6.0 miles southeast of Route 4 at MP 0.0.

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 Plant 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 2024). 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 six rare plants have the potential to occur in the study area if suitable habitat is present (VDCR 2024c). Table 4.2-8 provides a summary of these species and their habitat.

TABLE 4.2--8 RARE PLANT SPECIES WITH THE POTENTIAL TO OCCUR IN THE STUDY AREA

Common Name	Scientific Name	Status	Global Rank	State Rank	Habitat
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.
Brown bog sedge	*Carex buxbaumii*	None	G5	S2	Bogs, seeps, calcareous and mafic fens, depression swamps and ponds, and wet meadows; occurs in both extremely acidic and highly calcareous soils
Blood panic grass	*Dichanthelium consanguineum*	None	G5	S1/S2	Sandy to clayey woodlands, clearings, and wetland ecotones; often in moist or boggy depressions in sandy upland settings.
Epling's hedge-nettle	*Stachys eplingii*	None	G1/G2	S1	Calcareous fens and wet meadows.
Larkspur coreopsis	*Coreopsis delphiniifolia*	None	G3?*	S1	Dry power-line clearings, the few known sites all on base-rich soils.

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
* Global ranks followed by a question mark denote inexact or uncertain ranking by the VDCR
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 six rare plants could potentially occur within the study area (VDCR 2024c). Habitat requirements for the 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 any impacts on rare plants and/or rare plant habitat.

4.2.4 VEGETATION

4.2.4.1 LOCAL VEGETATION CHARACTERISTICS

The study area is 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 that have occurred 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 early 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 2021b).

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 2021).

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 2021).

Sphagnous seepage bog communities of the Coastal Plain now only exist in frequently burned training areas of the Fort Walker military base (approximately 7 miles northeast of the eastern terminus of the Project's route alternatives) 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*).

As noted in Section 4.1.2, ERM used the VGIN Land Cover data to determine land use cover along the route alternatives. Table 4.2-9 shows vegetated land use crossed by the Project. Figure 4.1-2 depicts land use/land cover, including forested areas, along the routes.

TABLE 4.2--9 VEGETATED LAND USE CROSSED BY THE PROJECT

Vegetation Type	Unit	Route 4	Route 5	Route 6	Ruther Glen Switching Station
Forest	acres	45.7	43.9	46.8	7.5
Open Space	acres	14.9	14.4	14.6	<0.1
Agricultural	acres	8.7	17.4	10.5	0.0
Total [a]	**acres**	**69.2**	**75.6**	**71.9**	**7.5**

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

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 2023b). 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

Table 4.2-10 summarizes the area of FCV within the right-of-way for each route alternative and the Ruther Glen Switching Station. 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--10 FCV CROSSED BY THE PROJECT

FCV	Unit	Route 4	Route 5	Route 6	Ruther Glen Switching Station
Average (1)	acres	12.1	15.8	11.7	0.0
Moderate (2)	acres	14.3	10.7	14.8	4.2
High (3)	acres	15.1	12.8	16.2	3.4
Very High (4)	acres	16.6	19.2	19.8	0.0
Outstanding (5)	acres	2.5	1.8	1.3	0.0
Total [a]	**acres**	**60.7**	**60.3**	**63.7**	**7.5**

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

4.2.4.3 IMPACT ASSESSMENT

In forested areas, trees would be cleared from the right-of-way, which subsequently would be maintained with an herbaceous or scrub/shrub 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.

As shown in Table 4.2-10, the route alternatives and the Ruther Glen Switching Station would primarily affect forested land. Route 6 would impact the largest extent of forest. Route 4 would impact the most forested land with an Outstanding FCV rating. Route 6 would impact the most land with any FCV rating, and Route 5 would impact the least forested land with any FCV rating.

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 split 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 4.2-11 displays where fragmentation occurs along the routes.

TABLE 4.2--11 LOCATIONS OF FOREST FRAGMENTATION ALONG ROUTE ALTERNATIVES

Route 4	Route 5	Route 6
• MPs 0.0 to 0.1 • MPs 0.4 to 1.0 • MPs 1.1 to 1.8 • MPs 2.0 to 2.1 • MPs 2.3 to 2.7 • MPs 2.7 to 2.8 • MPs 2.9 to 3.4	• MPs 0.0 to 0.1 • MPs 0.4 to 1.0 • MPs 1.1 to 1.8	• MPs 0.0 to 0.1 • MPs 0.4 to 1.0 • MPs 1.1 to 2.3 • MPs 2.4 to 2.9 • MPs 2.9 to 3.0 • MPs 3.1 to 3.6

MP = milepost

Of the route alternatives, Route 5 would result in the least fragmentation impacts overall. This route primarily follows the edges of forested lands (as opposed to crossing their interiors) in areas adjacent to cleared lands and/or the existing distribution line corridor that spans laterally through the study area. Route 4 would result in the greatest number of points of fragmentation, while Route 6 would result in the greatest span of contiguous fragmentation.

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) 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 (KOP) 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 Project with respect to visual impacts.

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 a chapter and direction on scenic resources in the state (VDCR 2018). In general, the VDCR defers to local governments for the protection and management of scenic resources. However, VDCR does work 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 collocated along Bull Church Road to the west of the Project study area but it is not a designated Virginia scenic resource.

The 2030 Caroline County Comprehensive Plan includes a section on scenic resources (Caroline County 2023a). This section identifies the important rural character of the county and notes that there are many scenic areas throughout the county. However, there are no county designated scenic areas in the Project study area, nor does the Comprehensive Plan provide direction (e.g., goals and objectives) regarding the preservation of important scenic resources. The Caroline County Zoning Ordinance also does not identify scenic resource objectives and/or established thresholds (or criteria) for what constitutes a significant impact on scenic resources (Caroline County 2023b). In the absence of a local regulatory framework for assessing visual resources and to avoid arbitrary processes and capricious decisions, ERM visual resource specialists based the visual resource assessment in the Routing Study on commonly used federal systems and best practices as noted above (Section 4.3.1).

4.3.1.3 VISUALLY SENSITIVE RESOURCES

The Project study area includes a portion of western Caroline 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 topography and is dominated by forest

ecosystems (VDCR 2021). 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. The rural character of the area is due in part to the combination of low-density development and large tracts of forest. The forested areas and lack of substantial topography limits panoramic views of the area and generally constrains most viewsheds to the fore and middle ground.

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 VISUALLY SENSITIVE RESOURCES AND VIEWER 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 Bull Church Road and Golansville Road.	Recreationists/tourists (bicyclists and pedestrians)
Places of Worship and Cemeteries			
2	Old Wright Cemetery (Wright's Burying Ground)	Cemetery accessed by gravel road on the south side of Ladysmith Road, east of Boxley Road.	Residents
3	St. Mary of the Annunciation Roman Catholic Church	Faith gathering site on the south side of Ladysmith Road, west of Boxley Road.	Residents and workers (church staff)
Primary Road/Travel Corridors			
4	Boxley Road	Two lane, paved, local road. Boxley Road carries an AADT volume of 90 vpd between Golansville Road and Ladysmith Road.	Motorists, residents, workers
5	Ladysmith Road	Two-lane, paved, local road that runs east-west through the northern portion of the study area. The road carries an AADT volume of 11,000 vpd west of I-95; 5,900 vpd between I-95 and Bull Church Road; and 4,400 between Bull Church Road and Rogers Clark Boulevard.	Motorists, residents, workers
Areas of High Public Concentration			
6	Ladysmith Road Residences	Residences on the north and south sides of Ladysmith Road between Bath Road to the west and St Johns Church Road to the east.	Residents

Sources: VDOT 2024 (AADT data)

AADT = annual average daily traffic; Hwy = highway; 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), as well as those viewers engaged in setting-dependent activities (e.g., some types of recreation, tourism) tend to have higher levels of sensitivity to change compared to others.

4.3.2 KEY OBSERVATION POINTS

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.

TABLE 4.3-2 KEY OBSERVATION POINTS

KOP #	Location	Reason for Inclusion	Project Component Represented
009B	View looking south along Boxley Road	Example of proposed right-of-way (with clearing) through a rural residential, agricultural, and timber production landscape. Affected viewers include local residents and workers travelling along the roadway. Representative of a typical rural road with residences.	Route 4
010	View looking southeast from Balty Road south of a field access road	Example of proposed right-of-way (with clearing) crossing a rural roadway with agricultural and forested landscape. Affected users include local residents and workers. Representative of VSR Balty Road.	Route 4 Route 5 Route 6
016	View looking south from Ladysmith Road, east of Boxley Road intersection	Example of proposed right-of-way (with clearing) crossing an agricultural and forested landscape. Affected users include local residents and workers. Representative of VSR Ladysmith Road.	Route 5
119	View looking north from Boxley Road, north of the Golansville Road intersection	Example of proposed right-of-way (with clearing) crossing a rural residential and forested landscape. Affected users include local residents and workers. Representative of typical rural road with residences and woodland.	Route 6

KOP = key observation point; VSR = visually sensitive resource

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.

4.3.2.1 KOP 009B

Existing Conditions

KOP 009B is on the east side of Boxley Road approximately 0.7 mile north of the intersection with Pond Road. The view is oriented to the south. The immediate foreground is dominated by the manicured bright medium green grassy lawn of a residence. Boxley Road is a medium grey paved roadway that curves out of view approximately 0.10 mile to the southeast. Several mailboxes on posts sit on the left (west) side of the road. A dark grey paved driveway runs perpendicular to Boxley Road in front of a tall, dense line of trees. The dense mix of mature conifers and deciduous trees continues across and along Boxley Road. These trees generally limit more distant views in these directions and add varying shades of matte greens and muted browns to the landscape. A cleared telecommunication right-of-way cuts through the trees on the west side of Boxley Road. A single light brown wooden pole with an attached light grey conduit and associated thin black conductors is visible in the right-of-way. A grey and black fifth-wheel trailer is visible within the right-of-way. Through the opening in the trees created by Boxley Road, corn fields and medium green grassy shoulders are visible along the eastern side of the road. Dense trees are also visible through the overhanging tree canopy on Boxley Road and frames the background of the view.

The primary viewer groups at KOP 009B are local residents and motorists traveling along the roadway. Residents would have a medium to high sensitivity to visual changes at this KOP and motorists would have a medium sensitivity.

Visual Simulation

Route 4 crosses Boxley Road approximately 0.07 mile south of KOP 009B. The existing trees on both sides of Boxley Road screen views of the proposed Project, so there would be no change in visual conditions at KOP 009B. As drivers head south along Boxley Road, the views may open up to show the Project crossing the roadway due to tree clearing on both sides of the road.

4.3.2.2 KOP 010

Existing Conditions

KOP 010 is on the east side of Balty Road, south of an unnamed roadway that provides access to several residences. The view is oriented southeast with Balty Road visible on the righthand (west) side and the corn field dominating the center to lefthand (east) side of the view. The foreground is dominated by the cornfield with the glossy green leaves and medium yellow-brown tassels of the corn plants adding light texture to the landscape. Balty Road is a low, smooth, medium grey paved roadway that heads south into dense trees that frame the view from this KOP. Tall, dark to medium green conifer and deciduous trees border the west side of Balty Road, and the south edge

of the cornfield. The density and height of the trees enclose the landscape and limit more distant views.

The primary viewer groups at KOP 010 are local residents and motorists traveling along the roadway. Residents would have a medium to high sensitivity to visual changes at this KOP and vehicle travelers would have a medium sensitivity.

Visual Simulation

Routes 4 and 5 share the same corridor at this location and cross Balty Road approximately 0.10 mile southeast of KOP 010. The Project corridor crosses the southern side of the corn field and Balty Road introducing utility structures to the existing rural view. The transmission line structures are most visible in areas where they are fully or partially skylined and generally absorbed into the background where they are sited in front of and below the tops of trees. A single, tall transmission structure is partially skylined in the center of the view. The dark brown weatherized steel monopole, horizontal crossbeams, and horizontal thin black conductors are visible above the tree line. The Project corridor requires some vegetation clearing on the west side of Balty Road. Due to the presence and density of mature trees screening views of the Project corridor, substantial views of the vegetation clearing are not available from KOP 010.

Routes 4 and 5 would be highly visible to the visitors along this section of Balty Road. Due to the Project introducing a utility corridor with new, tall vertical structures and multiple thin horizontal lines in the view, the project would result in a moderate to high change to the existing visual conditions at KOP 010.

4.3.2.3 KOP 016

Existing Conditions

KOP 016 is on the north side of Ladysmith Road, approximately 0.1 mile east of Boxley Road. The view from this KOP is oriented to the south and provides a view of a wide agricultural field on the south side of Ladysmith Road. The fore to middle ground is dominated by this field of low, maturing corn that extends to the treeline to the south and east. The amorphous forms of a couple of mature deciduous trees are visible at the western side of the field. The darker green trees that border the agricultural field add some height and partially enclose the view from this KOP. A pair of existing utility corridors extends east to west across the agricultural field. The existing distribution line and REC 115 kV line, within these corridors, are prominent and add tall, vertical, repeating forms and long, thin, horizontal lines to the landscape at KOP 016.

The primary viewer groups at KOP 016 are local residents and motorists on Ladysmith Road. The residents would have medium to high sensitivity to visual changes at this KOP and vehicle travelers would have a medium sensitivity.

Visual Simulation

Route 5 runs east–west approximately 0.1 mile south of KOP 016. The proposed route would introduce additional monopole structures to the existing distribution line corridor. Given the low height of the corn field and the much taller transmission line poles, the proposed structures would be highly visible on the landscape. Their color (medium brown weatherized steel) generally

complements the existing color palette of the landscape (medium to dark greens), but contrasts with the colors of the existing distribution line poles (light grey, galvanized steel and brown). Due to the expanded right-of-way, additional trees and vegetation would be removed along the treeline to the east. The route would add a new utility corridor from the south that generally parallels the eastern side of the agricultural field before turning to the west along the existing utility corridor. This additional infrastructure would be highly visible to nearby residents and motorists travelling along Ladysmith Road. While there are prominent, existing utility structures on the landscape in this location, Route 5 would increase the number of similar structures and expand the area in which these structures are located. As such, this route would have a moderate to high change in visual conditions at this KOP.

4.3.2.4 KOP 119

Existing Conditions

KOP 119 is on the west side of Boxley Road, approximately 0.1 mile north of the intersection with Golansville Road. The view from this KOP is oriented to the north and provides a view of the rural residential area along the west side of Boxley Road. The roadway appears as a flat, smooth paved directional form that extends and disappears beyond the trees at the back of the view. Dense trees to the west and east enclose the view from this KOP and create a focal point centered on a single residence about 0.2 mile north of this location. The geometric form and lighter colors of the house contrast with the surrounding green hues of the vegetation (both the trees and corn field). The east side of Boxley Road is bordered by dense forest with mature conifers and deciduous trees, dark green leaves, and narrow silver-grey and brown trunks. The tall tree line along this side of the road limits views to the east. The foreground on the west side of the roadway is dominated by a furrowed grassy field with medium green and tan grasses and small bright yellow flowers. This field transitions into a brighter green field of corn to the north. To the west of the field, a cluster of rusted metal framing, a light grey building, and a silver-grey dump truck are visible in the trees. A distribution line parallels the tree line to the west. This distribution line adds several vertical forms, but it generally blends into the existing landscape.

The primary viewer groups at KOP 119 are local residents and motorists on Boxley Road and Golansville Road to the south. The residents would have medium to high sensitivity to visual changes at this KOP and motorists would have a medium sensitivity.

Visual Simulation

Route 6 crosses Boxley Road nearly 0.2 mile north of KOP 119. The proposed route would introduce one partially visible monopole structure and associated conductors to the view. The top portion of the weatherized steel monopole would be visible above the dense trees west of Boxley Road. The required vegetation clearing for the corridor would also decrease the density of trees in this area accentuating the degree of visibility of the monopole. The existing trees screening views to the east block any views of structures on the east side of the roadway. As vehicles travel along Boxley Road, there will be opportunities to view more of the corridor and associated transmission line structures since this route is sited across open agricultural fields to the north of this location.

TABLE 4.3-3 SUMMARY OF ANTICIPATED IMPACTS BY VISUALLY SENSITIVE RESOURCE AND KEY OBSERVATION POINT

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 designated educational resources in the Project study area					
Recreational Resources (Parks, Trails, Open Space and other Recreation Areas)					
1	East Coast Greenway (Bull Church Road)	NA	Switching Station	The section of this route runs along Bull Church Road, nearly 0.4 mile west of the switching station boundary. The area along the East Coast Greenway in the vicinity of the Project is a mixture of low density residential interspersed with tracts of forested land. The existing, dense vegetation along the eastern side of the roadway screens most views of the proposed switching station. There may be limited views toward the switching station along the existing distribution line that crosses the road from the west and continues to the east.	Impact: Negligible Viewer Sensitivity: Moderate—recreational visitors (e.g., 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	Old Wright Cemetery (Wright's Burying Ground)	NA	Route 5	The burial ground is about 0.1 mile south of the proposed route. The southern leg of Route 5 is also about 0.2 mile to the east of the burial ground.	Impact: Moderate Viewer Sensitivity: Medium as the route is adding to an existing distribution line corridor.
3	St. Mary of the Annunciation Roman Catholic Church	NA	Route 5	This church is approximately 0.1 mile north of the proposed corridor Route 5. Given the distance and forest cover between this location and the proposed route, the proposed transmission line would not be visible from this VSR.	Impact: Negligible Viewer Sensitivity: Low since most activities occur indoors

VSR #	VSR Name	KOP #	Relevant Route(s)	Description of Impact	Potential Impact Rating/Visual Sensitivity
Primary Road Corridors					
4	Boxley Road	KOP 009B; KOP 119	Route 4 Route 5 Route 6	Rural road with mixed low density residential, dense woodland, and agricultural fields. The road runs north-south between Ladysmith Road to the north and Golansville Road to the south.	Impact: Minor to Moderate Viewer Sensitivity: Low to medium for motorists
5	Ladysmith Road	KOP 011B; KOP 013; KOP 016	Route 5	Roadway that runs along the northern portion of the study area with mixed low density residential, agricultural, and forested land. Route 5 paralleis the roadway while crossing a field to the south	Impact: Minor to Moderate Viewer Sensitivity: Low to medium for motorists
Areas of High Public Concentration					
6	Ladysmith Road Residences	KOP 016	Route 5	There is a cluster of residential homes along Ladysmith Road that would have either direct or partially obscured views of the proposed Project. Existing distribution lines are already visible in this area which would reduce the overall visual impact created by the new transmission line.	Impact: Moderate due to existing utility corridors in the area Viewer Sensitivity: Medium to High as residents would have static, longer duration views of the proposed Project

Route 6 would be highly visible to nearby residents and motorists travelling along Boxley Road and to a lesser extent on Golansville Road. Due to the existing distribution line and trees screening views to the east and west, Route 6 would result in a low to moderate change to existing scenic conditions at KOP 019.

4.3.3 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), duration of the view, and distances from the viewer. The specific combination of these factors changes from location to location, which contributes to a range of potential influences and impacts across the study area from the proposed Project. The anticipated impacts from the Project to the existing visual resource conditions in each VSR are described in Table 4.3-3. This table also 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.

4.3.3.1 IMPACTS BY ROUTE ALTERNATIVE

Table 4.3-4 summarizes the anticipated impacts on visual conditions from the proposed routes. This table also provides a potential impact rating (major, moderate, minor, or negligible) that takes into account both the anticipated change to the existing landscape from the proposed Project, as well as the estimated viewer sensitivity to this change for each route.

Route 4

The transmission line infrastructure installed along Route 4 primarily crosses woodland/timber production areas and would primarily be screened from nearby residences and motorists on Golansville Road by these dense trees. The route would be most visible where it crosses Balty Road and Boxley Road as well as a private access road off Boxley Road. The route would require significant vegetation removal along most of the corridor because it does not share a corridor with existing transmission or distribution routes. Similar to Route 2, the Project transmission infrastructure would generally be compatible with existing development in the Project study area although the height of the new structures would make them more prominent on the landscape.

Route 5

The eastern portion of Route 5 shares the same corridor as Route 4 until it heads north towards Ladysmith Road. The route will parallel the southern side of Ladysmith Road expanding the existing corridor of a distribution line. Where the route does not share the same corridor as Route 4, it crosses timber areas/dense woodland and open agricultural fields. While the southern portion of this route segment would mostly be screened from views, the northern portion would generally be visible from Ladysmith Road near Wright's Burial ground. Because the route shares the same corridor as Route 4, it also would be compatible with existing development in the Project area and would introduce similar tall vertical structures to the landscape.

TABLE 4.3-4 VISUAL RESOURCE IMPACT SUMMARY

Route	Potentially Impacted VSRs	Impacted Areas and Viewer Groups	Potential Impact Rating
Route 4	6 **Total: 1**	Road crossings: • New right-of-way—2 crossings Sensitive VSRs (impacts > negligible): • Boxley Road Impacted Viewer Groups: • Residents • Motorists—commuters/through-travelers/workers	VSR Impact: Minor to Moderate Viewer Group Impact: Minor to Moderate **Overall Rating: Minor to Moderate**
Route 5	3, 5, 6 through 8 **Total: 5**	Road crossings: • New right-of-way—3 crossings Sensitive VSRs (impacts > negligible): • Boxley Road (VSR 6) • Wright's Burying Ground (VSR 3) Impacted Viewer Groups: • Residents • Motorists—commuters/through-travelers/workers	VSR Impact: Minor to Moderate Viewer Group Impact: Minor to Moderate **Overall Rating: Minor to Moderate**
Route 6	6 **Total: 1**	Road crossings: • New right-of-way—2 crossings Sensitive VSRs (impacts > negligible): • Boxley Road (VSR 6) Impacted Viewer Groups: • Residents • Motorists—commuters/through-travelers/workers	VSR Impact: Minor to Moderate Viewer Group Impact: Minor to Moderate **Overall Rating: Minor to Moderate**

Route	Potentially Impacted VSRs	Impacted Areas and Viewer Groups	Potential Impact Rating
Ruther Glen Switching Station	1 **Total: 1**	Sensitive VSRs (impacts > negligible): • East Coast Greenway (Bull Church Road) Impacted Viewer Groups: • Recreationists • Motorists—commuters/through-travelers	VSR Impact: Minor Viewer Group Impact: Minor **Overall Rating: Minor**

Route 6

Route 6 primarily shares the same corridor as Route 4 except for a 1.4 mile section that deviates to the south through dense forest land and re-enters the Route 4 corridor to the west of Boxley Road. Route 6 crosses similar timber/woodland landscapes to the south of Route 4 and would also require extensive vegetation clearing. The right-of-way would open views to the east from Boxley Road because the route runs east-west at that crossing. Similar to the routes above, the unique segment of Route 6 would generally be compatible with existing development in the Project area.

Ruther Glen Switching Station

The proposed Ruther Glen Switching Station would potentially be visible from Bull Church Road, which is a segment of the East Coast Greenway, and from potentially from nearby residences on Bull Church Road, 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 Aldon Mega Site but would contrast with remaining forest. Viewers in vehicles traveling on Bull Church Road may notice this contrast but would have only brief glimpses of the switching station. Bicyclists using the roadway to travel the East Coast Greenway, would have potentially longer views of the switching station due to travel speeds. Viewers from some areas of the Aldon Mega site may have more extended views but would see the switching station within other industrial and commercial development.

4.3.3.2 SUMMARY

Routes 4 and 6 have the least impact on residents and motorists as the only locations the structures will be visible is near the road crossings at Boxley and Balty roads. Existing tree cover and topography would fully or partially block views of proposed transmission structures along other segments of the routes.

Route 5 would have the largest visual impact where it parallels Ladysmith Road and crosses open fields without tall screening vegetation.

Overall, while the transmission line structures are anticipated to result in changes to existing visual conditions, their adverse impacts would be moderate because:

- Human influences and built structures (modifications to the landscape), including transmission and distribution line infrastructure, are common in the area;
- The study area 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); and
- Opportunities for foreground views (where the transmission route structures are most noticeable) are limited due to vegetated areas and topography that block sightlines. Foreground views would occur most frequently along travel corridors where there is already a higher level of visual disturbance and where most viewers are in moving vehicles.

4.4 CULTURAL RESOURCES

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

- National Historic Landmarks (NHL) 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.

Data on previously recorded cultural resources within each study tier was obtained from the VCRIS. However, no previously recorded resources aligned with the criteria for including in the study tiers. As a result, ERM additionally collected information by contacting several possibly interested parties: Caroline County, Caroline Historical Society, Hanover County, Hanover County Historical Society, Hanover County Black Heritage Society, VDOT, VDHR, Northern Virgnia 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.

Many of the previously recorded aboveground cultural resources in the vicinity of the routes 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 applicable previously recorded architectural resources and historic districts in the study area as required by the Guidelines. Digital photographs were taken of each architectural resource with views toward the applicable transmission line route (or routes) and/or switching station. Photo simulations were prepared to assess potential visual effects on the applicable resources within the tiered study areas. For the previously recorded archaeological sites under consideration, aerial photographs were examined 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 4.6.1 and 4.6.2, as appropriate.

As enumerated in more detail below, ERM did not identify any previously recorded archaeological sites within the right-of-way for all four routes. One locally significant resource for architectural/ historic resources was identified within the study tiers described above.

4.4.1 ARCHAEOLOGICAL SITES

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). No known archaeological sites were identified within the right-of-way for any of the alternative transmission line routes.

4.4.2 ABOVEGROUND HISTORIC RESOURCES AND ARCHITECTURAL SITES AND FINDINGS

This section of the report presents information on known aboveground cultural resources in the vicinity of each route using the VDHR's tiered study area model described above. Figure 4.4-1 depicts the locations of resources relevant to the route alternatives. A description and location of the resource is provided in the Pre-application Analysis Report, which is attached as Appendix H. This resource could be affected regardless of the route selected by the SCC for the Project. A comparison of the impacts and the degree of impact on these resources for each route are presented in Table 4.4-1. Based on desktop analysis and visual simulations prepared for the routes (see Appendix H), all three route alternatives pass near one locally significant historic resource which meets the VDHR criteria for inclusion in the study. The Ruther Glen Switching Station is located approximately 0.6 mile from this resource.

As discussed in more detail below, ERM recommends that:

- Route 4 would have no impact on this resource;
- Route 5 would have a minimal impact on this resource;
- Route 6 would have no impact on this resource; and
- Ruther Glen Switching Station would have no impact on this resource.

All three routes pass near the same historic resources meeting the criteria specified in the Guidelines. ERM recommends that Routes 4 and 6 would have no impact on this one resource. Routes 5 would have a minimal impact on this resource. Either Route 4 or Route 6 appears to present the least impact on cultural resources based on the total number of resources (archaeological and historic) that would be impacted.

The specific resources affected for each route are discussed in the following subsections.

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 4	1	0	0	0	1
Route 5	0	1	0	0	1
Route 6	1	0	0	0	1
Ruther Glen Switching Station	1	0	0	0	1

4.4.2.1 ROUTE 4

Information on the single resource meeting the VDHR criteria for inclusion in the study is provided in Table 4.4-2. ERM conducted a field reconnaissance of this resource to assess conditions and took photographs to support the preparation of simulations to assist with the impact assessment. Based on our study, we conclude that construction and operation of the proposed transmission infrastructure along this route would have no impact on 016-5243.

TABLE 4.4-2 HISTORIC RESOURCES IN THE STUDY TIERS FOR ROUTE 4

Buffer (miles)	Resource Category	Resource Number	Description	Impact
1.0 to 1.5	NHLs	Not Applicable	None Identified	Not Applicable
0.5 to 1.0	National Register—Listed	Not Applicable	None Identified	Not Applicable
0.0 to 0.5	National Register—Eligible	Not Applicable	None Identified	Not Applicable
	Locally Significant	016-5243	Olive Cemetery	No Impact
0.0 (within the right-of-way)	National Register—Eligible	Not Applicable	None Identified	Not Applicable

NHL = National Historic Landmark.

4.4.2.2 ROUTE 5

Information on the single resource meeting the VDHR criteria for inclusion in the study is provided in Table 4.4-3. ERM conducted a field reconnaissance of this resource to assess conditions and took photographs to support the preparation of simulations to assist with the impact assessment. Based on our study, we conclude that construction and operation of the proposed transmission infrastructure along this route would have a minimal impact on 016-5243.

TABLE 4.4-3 HISTORIC RESOURCES IN THE STUDY TIERS FOR ROUTE 5

Buffer (miles)	Resource Category	Resource Number	Description	Impact
1.0 to 1.5	NHLs	Not Applicable	None Identified	Not Applicable
0.5 to 1.0	National Register—Listed	Not Applicable	None Identified	Not Applicable
0.0 to 0.5	National Register—Eligible	Not Applicable	None Identified	Not Applicable
	Locally Significant	016-5243	Olive Cemetery	Minimal
0.0 (within the right-of-way)	National Register—Eligible	Not Applicable	None Identified	Not Applicable

NHL = National Historic Landmark.

4.4.2.3 ROUTE 6

Information on the single resource meeting the VDHR criteria for inclusion in the study is provided in Table 4.4-4. ERM conducted a field reconnaissance of this resource to assess conditions and took photographs to support the preparation of simulations to assist with the impact assessment. Based on our study, we conclude that construction and operation of the proposed transmission infrastructure along this route would have no impact on 016-5243.

TABLE 4.4-4 HISTORIC RESOURCES IN THE STUDY TIERS FOR ROUTE 6

Buffer (miles)	Resource Category	Resource Number	Description	Impact
1.0 to 1.5	NHLs	Not Applicable	None Identified	Not Applicable
0.5 to 1.0	National Register—Listed	Not Applicable	None Identified	Not Applicable
0.0 to 0.5	National Register—Eligible	Not Applicable	None Identified	Not Applicable
	Locally Significant	016-5243	Olive Cemetery	No Impact
0.0 (within the right-of-way)	National Register—Eligible	Not Applicable	None Identified	Not Applicable

NHL = National Historic Landmark.

4.4.2.4 RUTHER GLEN SWITCHING STATION

Information on the single resource meeting the VDHR criteria for inclusion in the study is provided in Table 4.4-5. ERM conducted a field reconnaissance of this resource to assess conditions and took photographs to support the preparation of simulations to assist with the impact assessment. Based on our study, ERM concludes that construction and operation of the proposed transmission infrastructure along this route would have no impact on 016-5243.

TABLE 4.4-5 HISTORIC RESOURCES IN THE STUDY TIERS FOR RUTHER GLEN SWITCHING STATION

Buffer (miles)	Resource Category	Resource Number	Description	Impact
1.0 to 1.5	NHLs	Not Applicable	None Identified	Not Applicable
0.5 to 1.0	National Register—Listed	Not Applicable	None Identified	Not Applicable
	Locally Significant	016-5243	Olive Cemetery	No Impact
0.0 to 0.5	National Register—Eligible	Not Applicable	None Identified	Not Applicable
0.0 (within the right-of-way)	National Register—Eligible	Not Applicable	None Identified	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

There have been no previous cultural resource surveys covering the alternative routes for Ruther Glen Lines within the right-of-way or within 1 mile of the rights-of-way. Three prior surveys have been conducted within 1.5 miles of the route alternatives. As a result, ERM collected information by contacting several possibly interested parties. Information on these previous surveys—including VDHR survey number, report title, report authors, and report date—is provided in Table 4.4-6.

TABLE 4.4-6 CULTURAL RESOURCE SURVEYS OVERLAPPING PORTIONS OF THE PROJECT ROUTE ALTERNATIVES

VDHR Survey #	Title	Author	Date
CE-009	Phase I Archaeological Reconnaissance Survey, Caroline County Park	Lyle E. Browning	1986
CE-172	A Cultural Resources Survey Associated with Route 639 Ladysmith Road Widening, Caroline County, Virginia	Nicholas Arnhold, Laura Purvis	2017
CE-198	A Phase I Cultural Resources Survey of Approximately 2.5 Acres Associated with the Proposed Development of Sheetz #37, in Ruther Glen, Virginia	Donald Sadler, Ellen Brady	2020

4.5 ENVIRONMENTAL JUSTICE

4.5.1 EXISTING CONDITIONS

Federal guidelines for EJ studies define potential EJ communities based on the share of minority and low-income populations are of a given area, compared to the minority or low-income

population in the state or county that contains the community.[8] The guidelines established in the Virginia Environmental Justice Act (VEJA) of 2021 (Va. Code § 2.2-234 through 2.2-235) 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.

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

4.5.1.1 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");
- 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%.

4.5.1.2 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

[8] 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.

criteria thresholds above, all four CBGs within 1 mile of the route alternatives contain EJ communities (Figure 4.5-1). All of the route alternatives directly cross one CBG, CT 305.03 BG 1. Table 4.5-1 provides population and demographic information for each of the CBGs crossed and within one mile of the route alternatives (the Project area). CBGs are identified first according to the census tract that contains them.

None of the CBGs in the study area 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 specifically Black of African American residents—including the CBG crossed by all route alternatives and the Ruther Glen Switching Station. There are no statistically perceivable linguistically isolated communities within any of the CBGs in the study area. There are no statistically perceivable limited English -speaking residents within any of the CBGs in the study area.

4.5.1.3 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.

None of the CBGs meet the education or age-based criteria for identifying a sensitive population (Table 4.5-1).

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.

All routes cross (and the proposed Ruther Glen Switching Station is within) a CBG that meets criteria for consideration as a potential EJ community (Figure 4.5-1 Table 4.5-1). All the routes largely cross through wooded areas devoid of structures and residences. No route alternative has more than five 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.

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

State/County Census Block Group (Census Tract, Block Group)	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	0.0	1	0.0	4.3	2	6	14	0	7	7	10	
CT 305.01 BG 1	2,566	24	76	8	0.0	1	0.0	0.0	11	3	9	0	0	3	16	
CT 305.02 BG 1	882	2	79	7	0.0	0	0.0	0.0	0	14	24	0	6	4	10	
CT 305.03 BG 1	1,441	62	38	49	0.0	0	0.0	0.0	1	12	21	0	21	0	32	4, 5, 6 and RG SS

Source: U.S. Census Bureau (2022.
BG= Census Block Gorup; CT= Census Tract; RG SS= Ruther Glen 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.

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 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 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 alternatives. 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. KOP 009b (Route 4 from Boxley

Road) and KOP 10 (Balty Road South, all routes) 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 five homes that are within 500 feet of its centerline. The landscapes that the routes pass through are predominantly rural and wooded, except for some residential development along Ladysmith and Boxley Road. 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 (EMF) 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 Ruther Glen route alternatives and the Ruther Glen Switching Station are located within sections of unconsolidated, undifferentiated sediments deposited within the Tertiary Period (2.6 to 66.0 million years ago). Each of the sediment units encountered by the routes are primarily composed of sand and gravel.

4.6.1 MINERAL RESOURCES

ERM reviewed publicly available Virginia Department of Energy datasets (2023), USGS topographic quadrangles, and recent (2023) digital aerial photographs to identify mineral resources in the study area. Based on this review, no active mineral resource sites were identified within 0.25 mile of the Ruther Glen route alternatives. The closest active mineral resource site is approximately 2.5 miles northeast of Route 2 (MP 0.0). Additionally, two inactive mineral resource sites are within 0.25 mile of Route 2, the closest of which is approximately 0.2 mile northwest of MP 2.2.

4.6.2 IMPACT ASSESSMENT

Because the closest active mineral resource site is more than 0.25 mile from the Ruther Glen Project area, it is anticipated that 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 Ladysmith Road, US 1, and I-95, and the existing REC 115 kV corridor. Collocations with Ladysmith Road and US 1 were limited by residential and commercial development east of I-95. Collocation along I-95 was considered for route alternatives routing west to east; however, these routes were eliminated as described in Section 3.5. No other public utilities were available for collocation opportunities.

Route alternatives were constrained west of I-95 by the Pendleton Golf Club, Lake Caroline, and residential development surrounding it, residential development around Gatewood Road (Ryland Corner) US 1, and Ladysmith Road (Ladysmith Village), and planned industrial parks adjacent to I-95 and Ladysmith Road.

East of I-95 route alternatives were constrained by wetlands around Polecat Creek and the South River on the north and south sides of the study area, two conservation easements near Hobby Swamp and the South River, and industrial parks adjacent to I-95 and Bull Church Road.

The Project would require the construction of the proposed Ruther Glen Switching Station and one of the Ruther Glen route alternatives. ERM evaluated three route alternatives from one cut-in location on existing Line#256. The remainder of this report provides a comparative analysis of the route alternatives to identify a preferred alignment. The Features Crossing Table (Appendix D) 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 the potential impacts from each route alternative. Resources that would not be directly or indirectly impacted by the Project (publicly owned lands, schools, 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 Ruther Glen Switching Station and each route alternative are compared below.

5.1.1 RUTHER GLEN SWITCHING STATION

In addition to the impacts of the route alternative selected, the proposed Ruther Glen Switching Station footprint would encompass 7.5 acres of forested located within the Aldon Mega Site parcel, all of which would be cleared and graded by the developer prior to Project construction.

5.1.2 RUTHER GLEN ROUTE ALTERNATIVES

5.1.2.1 LENGTHS, FOOTPRINTS, PARCELS, AND COLLOCATION

Table 5.1-1 shows 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	Ruther Glen Route 4	Ruther Glen Route 5	Ruther Glen Route 6
Total Route Length	Miles	3.7	4.0	3.9
Construction Footprint	Acres	70.7	77.1	74.1
Parcels Crossed	Acres	14	19	15
Collocation Length	Miles	0.4	1.3	0.2

Route 4 would be the shortest route and would have the smallest footprint, followed by Route 6 and then Route 5.

Route 5 would collocate with 1.3 miles of the existing REC 115 kV transmission line. Route 4 would collocate with the existing REC transmission line and Boxley Road for a total of 0.4 mile of collocation. Route 6 would collocate only with 0.2 mile of the REC transmission line.

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 4 would cross the fewest parcels (14), Route 6 would cross the second fewest parcels (15) and Route 5 would cross the most (19). Three of the parcels crossed by Routes 4 and 6 and two of the parcels crossed by Route 5 are within the footprint of the Aldon Mega Site, that is currently marketed for data center development.

Landowners who attended the open houses expressed concerns about Routes 4 and 5 due to their proximity to residential. The adjustments to Route 4 and 6, following the first open house, were in response to community feedback. Follow up landowners after these adjustments indicated a preference for the new route path.

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.

All the route alternatives predominantly cross forested lands. Route 5 encompasses the least amount of forested land (43.9 acres), followed by Route 4 (45.7 acres), with Route 6 encompassing the most (46.8 acres). 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 result in permanent conversion of forested vegetation to herbaceous vegetation. Route 6 would cross the most RPA/RMA (1.2 mile), followed by Route 4 (0.7 mile), with Route 5 crossing the least amount of RPA/RMA.

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. All three routes have one residential dwelling within 250 feet of their centerlines.

Route 4 has the most residential dwellings within 500 feet of its centerline (five), followed by Route 5 (four). Route 6 has the fewest residential dwellings within 500 feet of its centerline (three).

Route 5 has the most non-residential structures within 500 feet of its centerline (five), followed by Route 6 (three). Route 4 has the fewest residential dwellings within 500 feet of its centerline (two).

5.1.2.6 CEMETERIES

Route 5 passes approximately 350 feet south of Oliver Cemetery near MP 3.3. The land between the route and the cemetery is forested, which would minimize visual impacts. However, transmission line infrastructure may still be visible from the cemetery.

Routes 4 and 6 do not pass within 500 feet of any cemeteries.

5.1.2.7 TRANSPORTATION INFRASTRUCTURE

Project construction would require temporary road or lane closures and/or detours, regardless of the route selected for the Project.

Routes 4 and 6 would each require two road crossings, while Route 5 would require three. These crossings would be mostly perpendicular as preferred by VDOT.

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, and eliminate riparian buffer and riparian buffer functions at waterbody crossings. Forested land provides habitat for many species, including federal- and state-listed species, such as the NLEB, Indiana Bat, TCB, Small whorled pogonia, Swamp pink,

New Jersey rush, Bald eagles, and other non-protected species. Tree clearing would eliminate forested habitat and bisect ecological cores.

5.2.1 RUTHER GLEN SWITCHING STATION

The 7.5-acre footprint of the Ruther Glen Switching Station is entirely forested, with an FCV ranking of 3. The footprint encompasses about 6.9 acres of C4-ranked ecological core and contains no aquatic resources. The entire footprint would be cleared and graded by the developer prior to Project construction. No other natural resources would be impacted by the proposed Ruther Glen Switching Station.

5.2.2 RUTHER GLEN 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 VDCR-predicted suitable habitat for the New Jersey rush. Table 5.2-1 summarizes the natural resources potentially impacted by each route.

TABLE 5.2-1 NATURAL RESOURCES CROSSED BY THE RUTHER GLEN ROUTE ALTERNATIVES

Natural Resource	Unit	Ruther Glen Route 4	Ruther Glen Route 5	Ruther Glen Route 6
Wetlands Total	Acres	4.4	4.9	5.1
PFO Wetlands	Acres	2.9	2.9	2.9
Waterbodies Total	Number	7	6	9
Forested Lands	Acres	45.7	43.9	46.8
VDCR-Predicted Suitable Habitat for the New Jersey Rush	Acres	10.4	12.5	13.3
Ecological Cores	Acres	45.7	42.2	47.4

PFO = palustrine forested

5.2.2.1 WETLANDS

Route 4 would cross the smallest amount of total wetlands (4.4 acres), followed by Route 5 (4.9 acres), with Route 6 crossing the largest amount of wetland (5.1 acres). All the routes would cross the same amount of PFO wetlands (2.9 acres).

Overall, Route 4 would have the least impact on wetlands.

5.2.2.2 WATERBODIES

Route 6 would cross the most waterbodies (nine), followed by Route 4 (seven), with Route 5 crossing the fewest waterbodies (six). Routes 4 and 6 both cross two perennial waterbodies, while Route 5 crosses only one. Routes 4 and 6 would cross through unfragmented forest around DeJarnette Mill Run, perennial tributaries to DeJarnette Mill Run and Boulware Pond, and Reedy Swamp, while Route 5 would cross only one perennial tributary in unfragmented forest.

Route 5 would cross the smallest number of waterbodies and eliminate less riparian buffer around perennial waterbodies than the other routes.

5.2.2.3 VDCR-PREDICTED SUITABLE HABITAT

Route 4 would cross the smallest amount of predicted suitable habitat for the New Jersey Rush (10.4 acres), followed by Route 5 (12.5 acres). Route 6 would cross the most predicted suitable habitat of the routes (13.3 acres).

5.2.2.4 ECOLOGICAL CORES

Route 5 would cross the fewest acres of ecological core (42.2 acres), followed by Route 4 (45.7 acres), with Route 6 crossing the most (47.4 acres). All the ecological cores crossed by the routes are ranked C4 and C5. The routes cross the same C4-ranked cores for the first 1.5 miles. The area of ecological core encompassed by Route 5 would be mostly recently cleared forest and agricultural land, while Routes 4 and 6 would bisect forested cores around perennial DeJarnett Mill Run and Reedy Swamp.

Route 5 would impact both the fewest acres of ecological core and would pass through mostly previously disturbed core compared to Routes 4 and 6.

5.2.2.5 FOREST

Route 5 encompasses the fewest acres of forested land (43.9 acres), followed by Route 4 and then Route 6. The routes cross similar acres of FCV-ranked forest. 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 6 footprint includes the largest amount of FCV-ranked forest (63.7 acres) and the largest extent ranked 3 or higher (37.3 acres). Route 4 encompasses 60.7 acres of FCV-ranked forest, of which 34.2 acres are ranked 3 or higher, and Route 5 encompasses 60.3 acres of FCV-ranked forest with 33.8 acres ranked 3 or higher. Based on aerial imagery, Route 5 would result in the least fragmentation of the routes. Route 4 would result in the greatest number of points of fragmentation, while Route 6 would have the greatest span of continuous fragmentation.

Route 5 would impact the smallest amount of forest and would result in the least amount of fragmentation of all the routes.

5.3 VISUAL RESOURCES

5.3.1 RUTHER GLEN SWITCHING STATION

The proposed Ruther Glen Switching Station have an overall minor impact on potentially impacted VSRs in its proximity. The switching station would potentially be visible from Bull Church Road, which is a segment of the East Coast Greenway, and nearby residences on Bull Church Road, but would otherwise be screened by dense forest would screen views of the switching station.

5.3.2 RUTHER GLEN ROUTE ALTERNATIVES

All routes would have minor to moderate impacts on potentially impacted VSRs in their proximity. The route alternatives would be most visible at their road crossings. Routes 4 and 6 would be the

least impactful to residents and motorists, while Route 5 would have a greater impact due to its routing through open fields and its parallel with Ladysmith Road.

5.4 CULTURAL RESOURCES

5.4.1 RUTHER GLEN SWITCHING STATION

No previously recorded archaeological sites were identified within the footprint of the Ruther Glen Switching Station. There is one locally significant resource for architectural/historic resources approximately 0.6 mile from the switching station, which the switching station is expected to have no impact on.

5.4.2 RUTHER GLEN ROUTE ALTERNATIVES

No previously recorded archaeological sites were identified within the rights-of-way of the route alternatives.

One locally significant historic architectural resource was identified within the study tiers. Routes 4 and 6 would have no impact on this resource, while Route 5 would have a minimal impact.

5.5 ENVIRONMENTAL JUSTICE

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.

5.5.1 RUTHER GLEN SWITCHING STATION

The Ruther Glen Switching Station would be located within a potential EJ CBG; however, the facility would be in a forested area. The nearest residence is approximately 900 feet away with forest between the proposed switching station and the residence. The switching station would not result in a disproportionate, adverse, or significant impact on EJ communities.

5.5.2 RUTHER GLEN ROUTE ALTERNATIVES

All three route alternatives would cross a potential EJ community CBG. Each route alternative has fewer than five homes and fewer than five non-residential structures within 500 feet of its centerline. Primarily due to the limited number of homes and businesses near the routes, no disproportionate, adverse, or significant impacts are expected as a result of any of the route alternatives.

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 5 as the preferred alternative.

Route 5 would have the most route collocation opportunity, the fewest number of wetland body crossings, and has the least impact on forested lands. Although Route 5 is the longest route, it measures only 0.3 mile longer than Route 4 and 0.1 mile more than Route 6. At the same time, Route 5 would be collocated along the existing REC 115 kV Line corridor for approximately 1.3 miles (33 percent of the total route), compared to Routes 4 (0.4 mile) and 6 (0.2 mile).

All three route alternatives would have one residential dwelling within 250 feet of their rights-of-way. Route 5 has four residential dwellings within 500 feet of its right-of-way, compared to five by Route 4 and three by Route 6. Route 5 has received minimal negative feedback from the community and as a result follows its original proposed alignment. The location of Routes 4 and 6 in proximity to residences along Boxley Road resulted in negative community feedback during both open houses and individual landowner meetings. All routes cross two local roads.

From a natural resources perspective, Route 5 would require the smallest extent of conversion of forested lands to open space (43.9 acres) and would have the smallest impact on ecological cores (42.2 acres). Notably, the total acreage of General (C5) cores impacted by Route 5 would be approximately half of that for Routes 4 and 6. All routes would require the clearing of the same amount of PFO wetlands and the same amount of PEM wetlands clearing between Routes 4 and 5. Route 5 crosses the smallest number of NHD-mapped waterbodies (6) and only one perennial waterbody (Reedy Swamp).

Routes 4 and 6 would be the least visually impactful on residents, motorists, and existing landscape conditions due to their alignment away from major thoroughfares. However, the visual impacts of Route 5 from Ladysmith Road are somewhat mitigated by the presence of the existing REC 115 kV line.

None of the route alternatives 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 5 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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APPENDIX A FIGURES

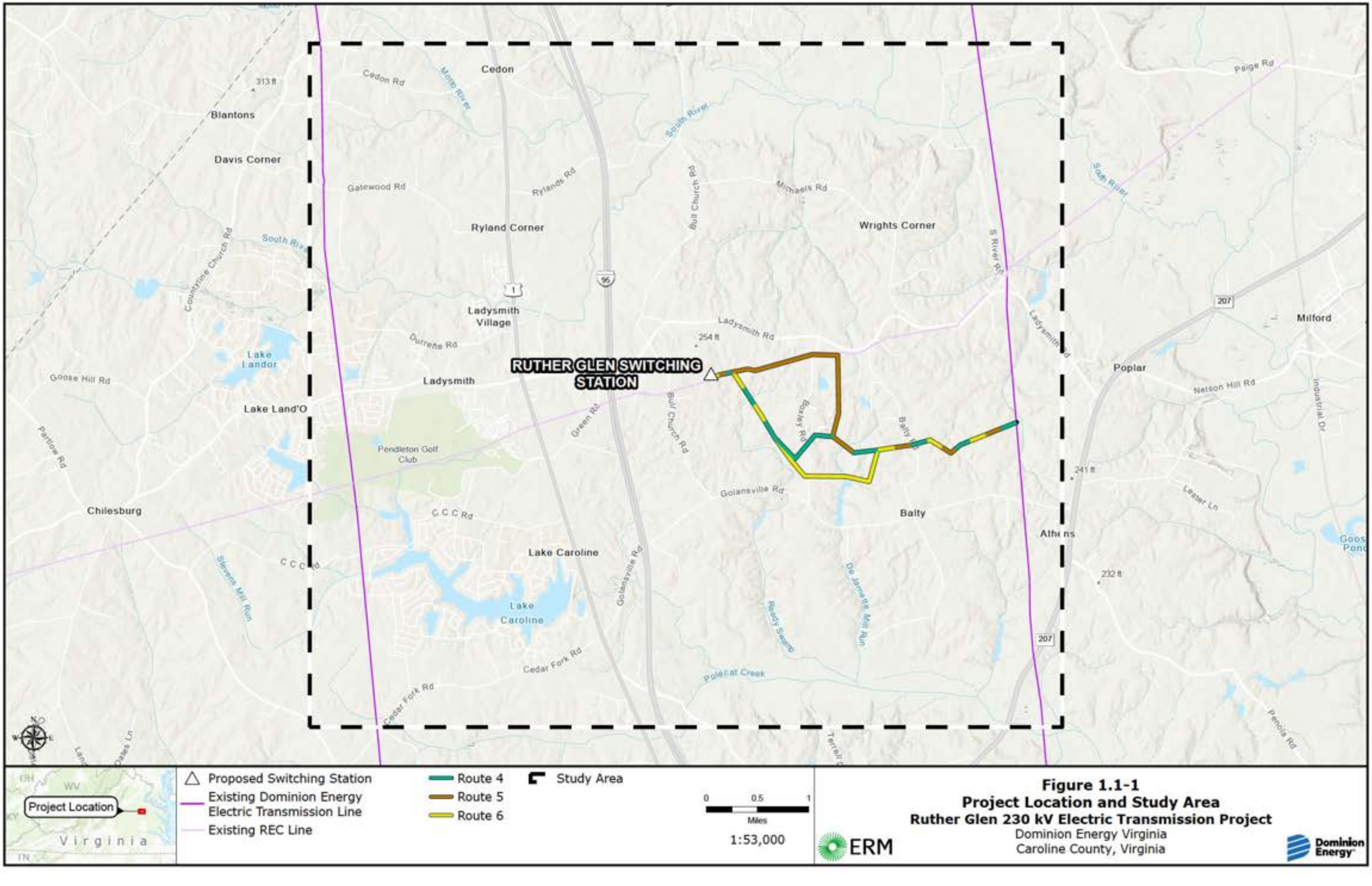


Figure 1.1-1
Project Location and Study Area
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

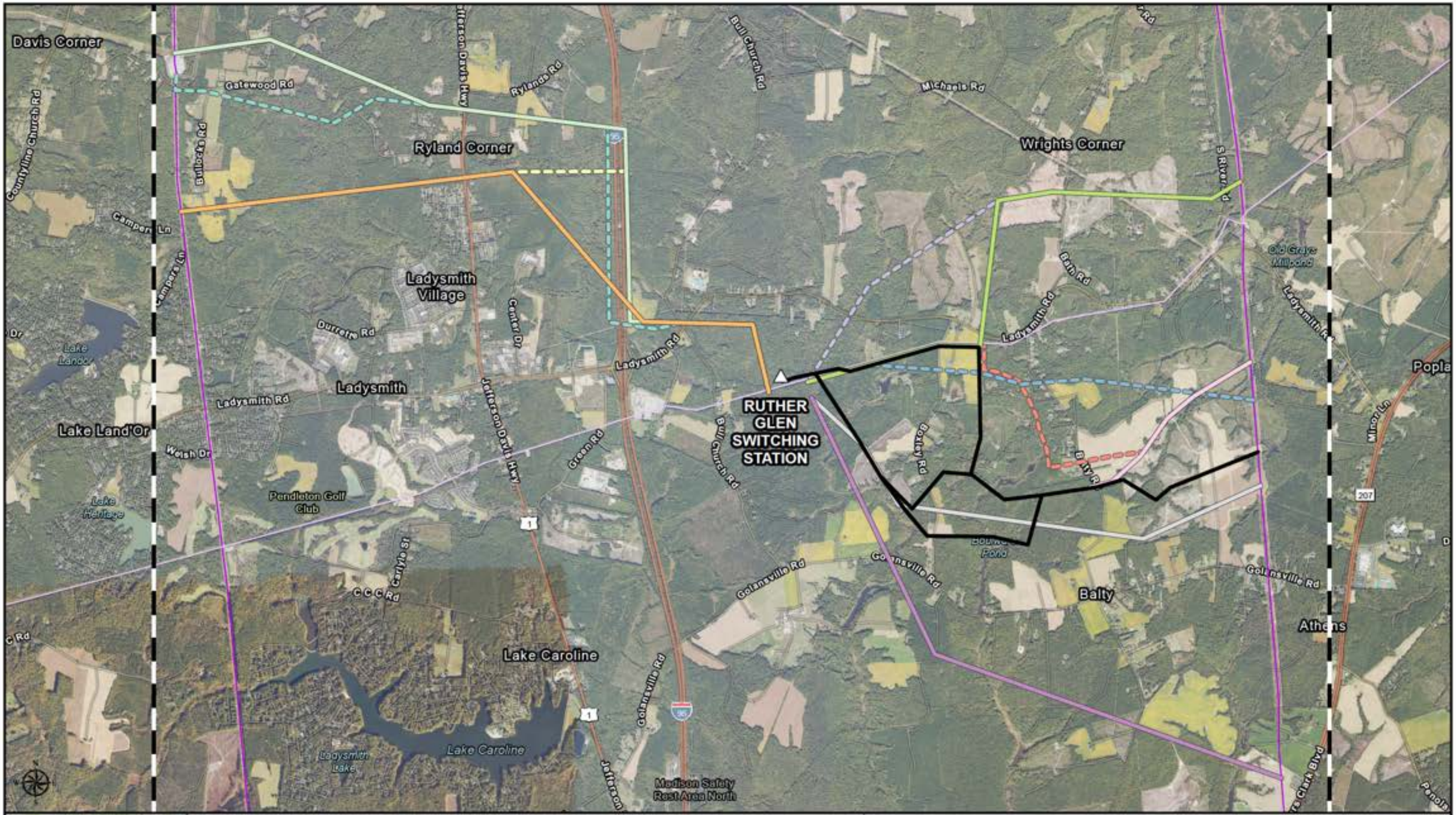


Figure 3.4-1
Dismissed Route Alternatives
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

RUTHER GLEN SWITCHING STATION

Ladysmith Rd
Ladysmith Rd
Ladysmith Rd
American Way
Run Dr
Boxley Rd
Boxley Rd
Boxley Rd
Bally Rd
Bally Rd
Bally Rd
Pond
Bull Church Rd
Golansville Rd
Golansville Rd
Golansville Rd
Boxley Pond
Bally

Project Location
OH
WV
Virginia
TN

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

0 600 1,200
Feet
1:14,400

Figure 3.6-1
Route Alternatives
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM
Dominion Energy

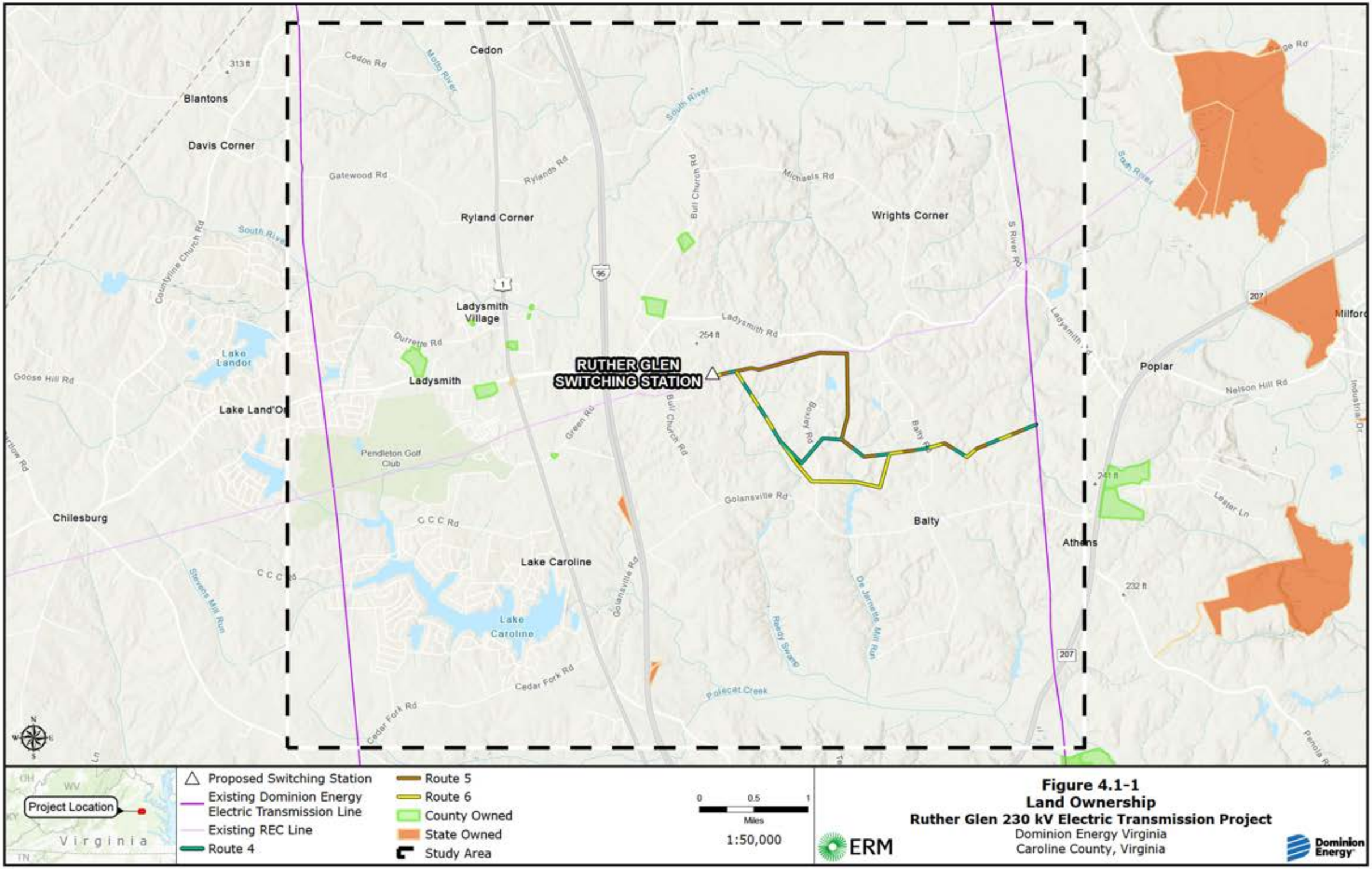


Figure 4.1-1
Land Ownership
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

RUTHER GLEN SWITCHING STATION

1

2

3

4

5

Project Location

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

Figure 4.1-2
Land Use/Land Cover Index
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy


Bally Rd
Existing Dominion Energy Electric Transmission 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 160-foot wide
Bally
Page 1 of 5
Figure 4.1-2
Land Use/Land Cover
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia
ERM
Dominion Energy

Page 2 of 5

Figure 4.1-2
Land Use/Land Cover
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

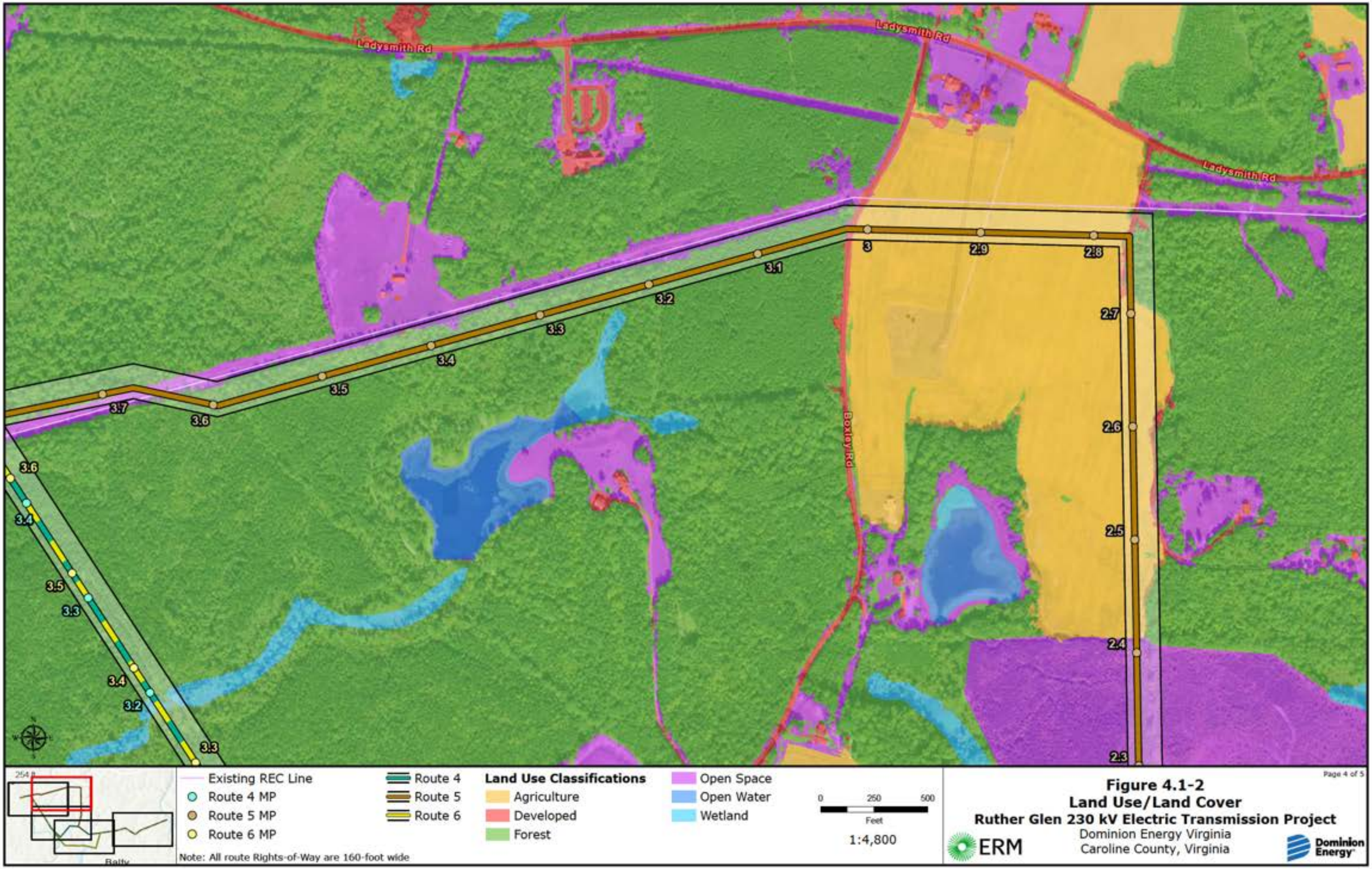
Dominion Energy

Page 3 of 5

Figure 4.1-2
Land Use/Land Cover
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy


Ladysmith Rd
Ladysmith Rd
Ladysmith Rd
Boxley Rd
3
2.9
2.8
2.7
2.6
2.5
2.4
2.3
3.1
3.2
3.3
3.4
3.5
3.7
3.6
3.6
3.4
3.5
3.3
3.4
3.2
3.3
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 160-foot wide
Page 4 of 5
Figure 4.1-2
Land Use/Land Cover
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia
ERM
Dominion Energy

RUTHER
GLEN SWITCHING STATION

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

Note: All route Rights-of-Way are 160-foot wide

Land Use Classifications
Agriculture
Developed
Forest
Open Space
Open Water
Wetland

0 250 500
Feet
1:4,800

Figure 4.1-2
Land Use/Land Cover
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM
Dominion Energy

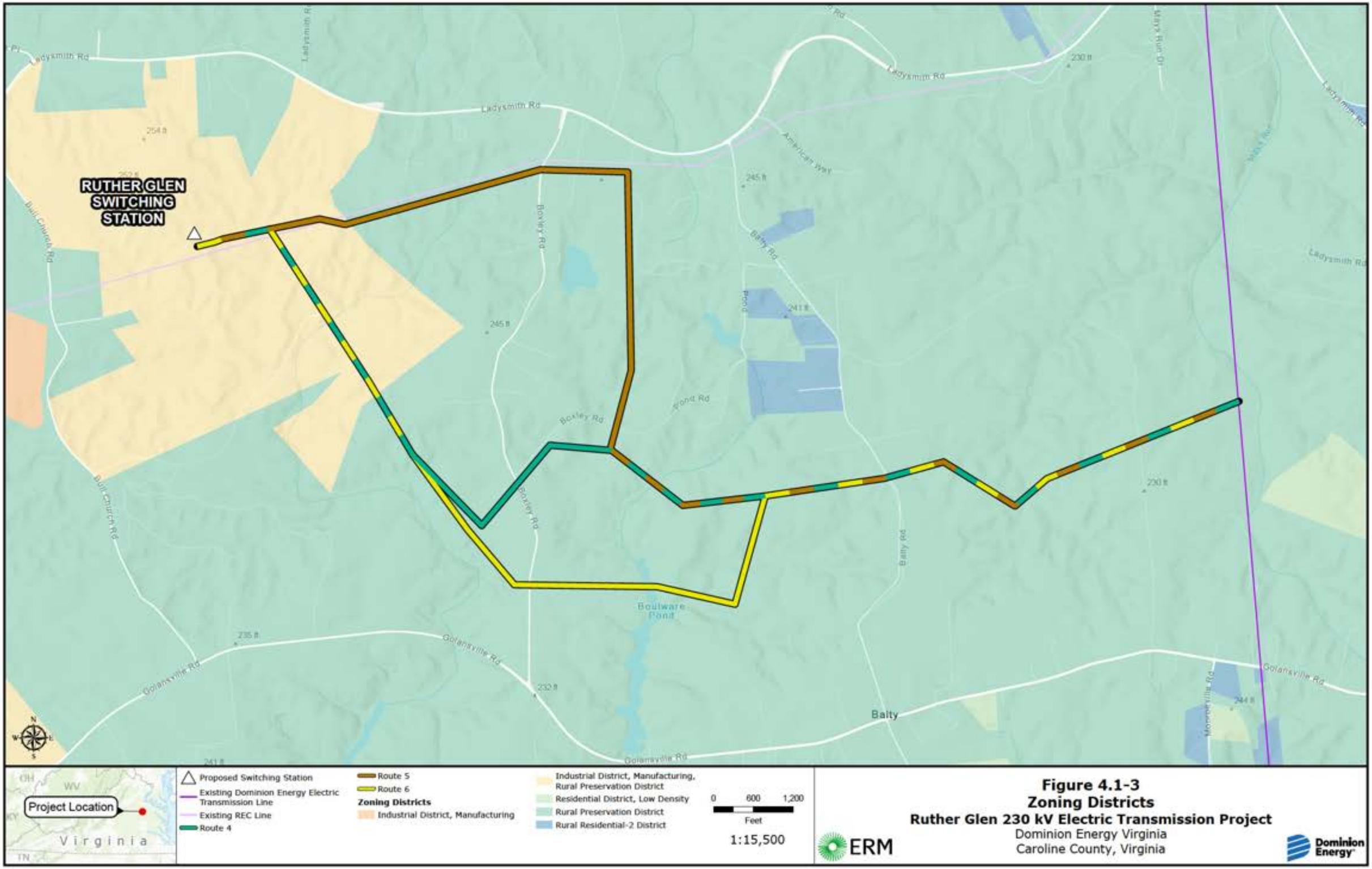


Figure 4.1-3
Zoning Districts
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

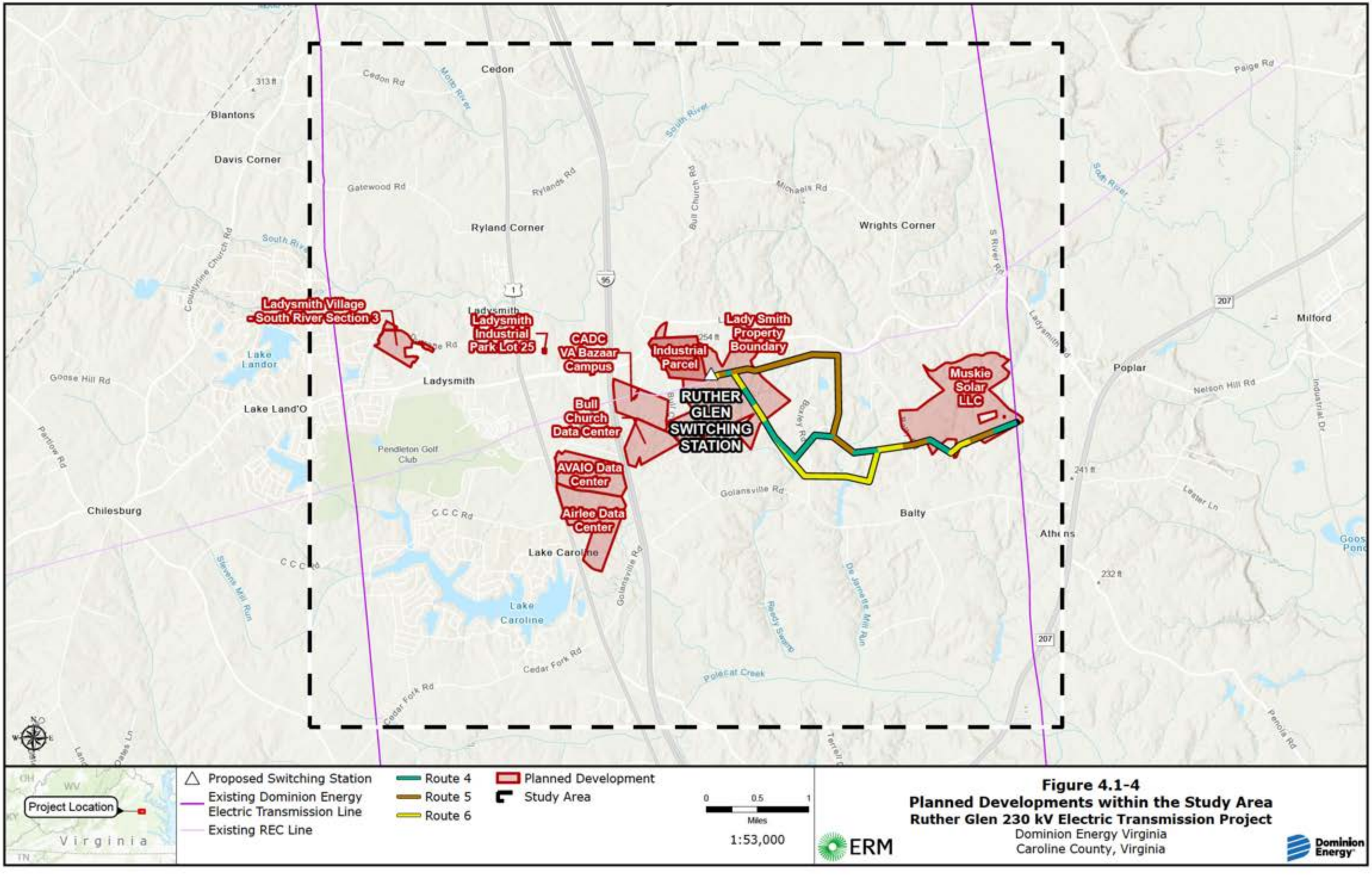


Figure 4.1-4
Planned Developments within the Study Area
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

RUTHER GLEN SWITCHING STATION

Ladysmith Rd
Bull Church Rd
Bath Rd
Old Grays Millpond
Mays Run Dr
Mays Run
American Way
Bailey Rd
Bailey Pond
Vip Jon Rd
Boxley Rd
Boxley Pond Rd
Boulware Pond
Golansville Rd
Monroeville Rd
Balty Rd
Balty
Athens
254 ft
252 ft
245 ft
241 ft
230 ft
231 ft
235 ft
232 ft
244 ft
219 ft
207
95

1
2
3
4
5

Project Location
OH
WV
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

Page 0

Figure 4.1-5
Existing Structures within 500 feet of Routes Index
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM
Dominion Energy

Page 1 of 5

Figure 4.1-5
Existing Structures within 500 feet of Routes
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

Figure 4.1-5
Existing Structures within 500 feet of Routes
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

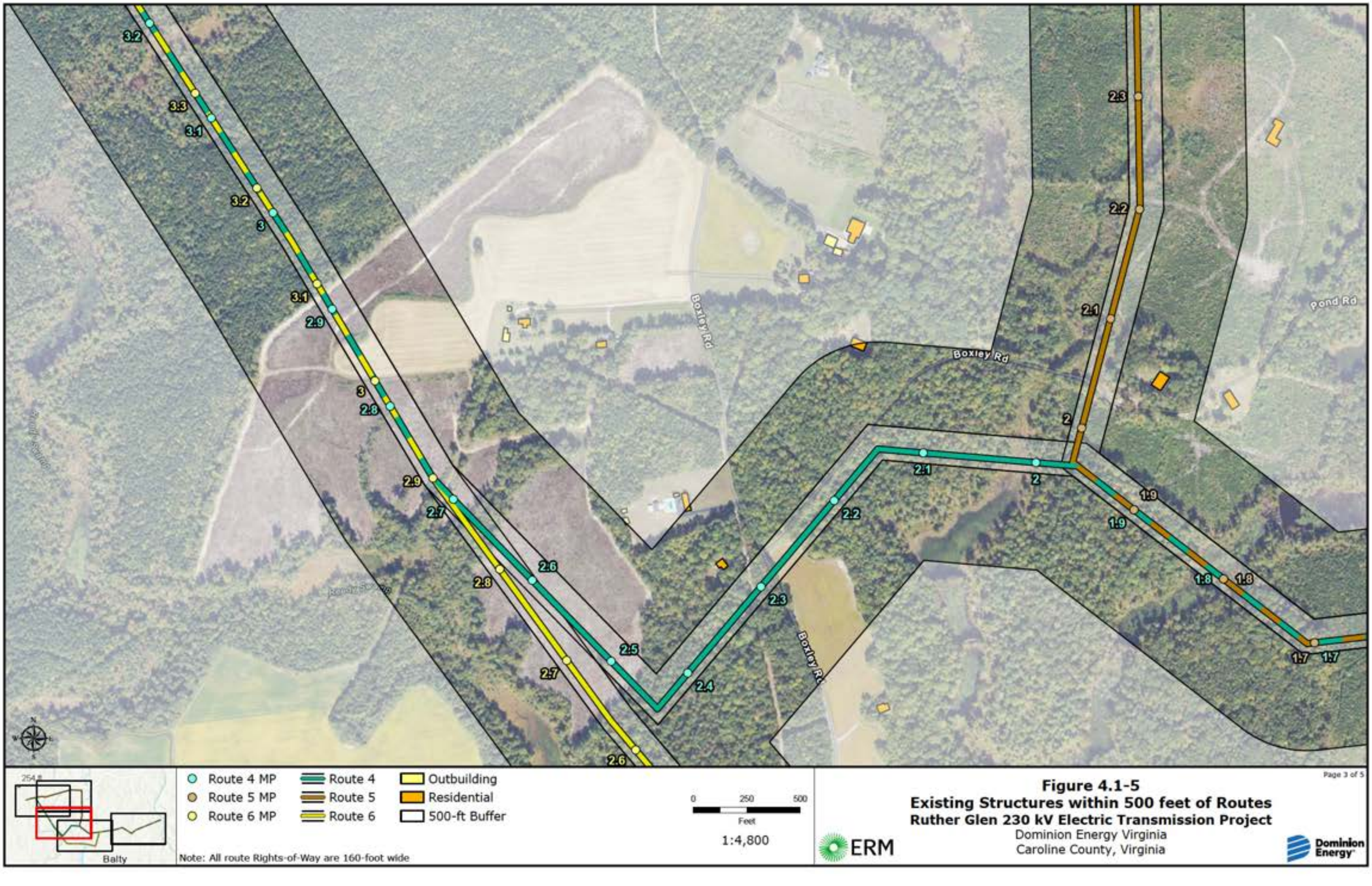
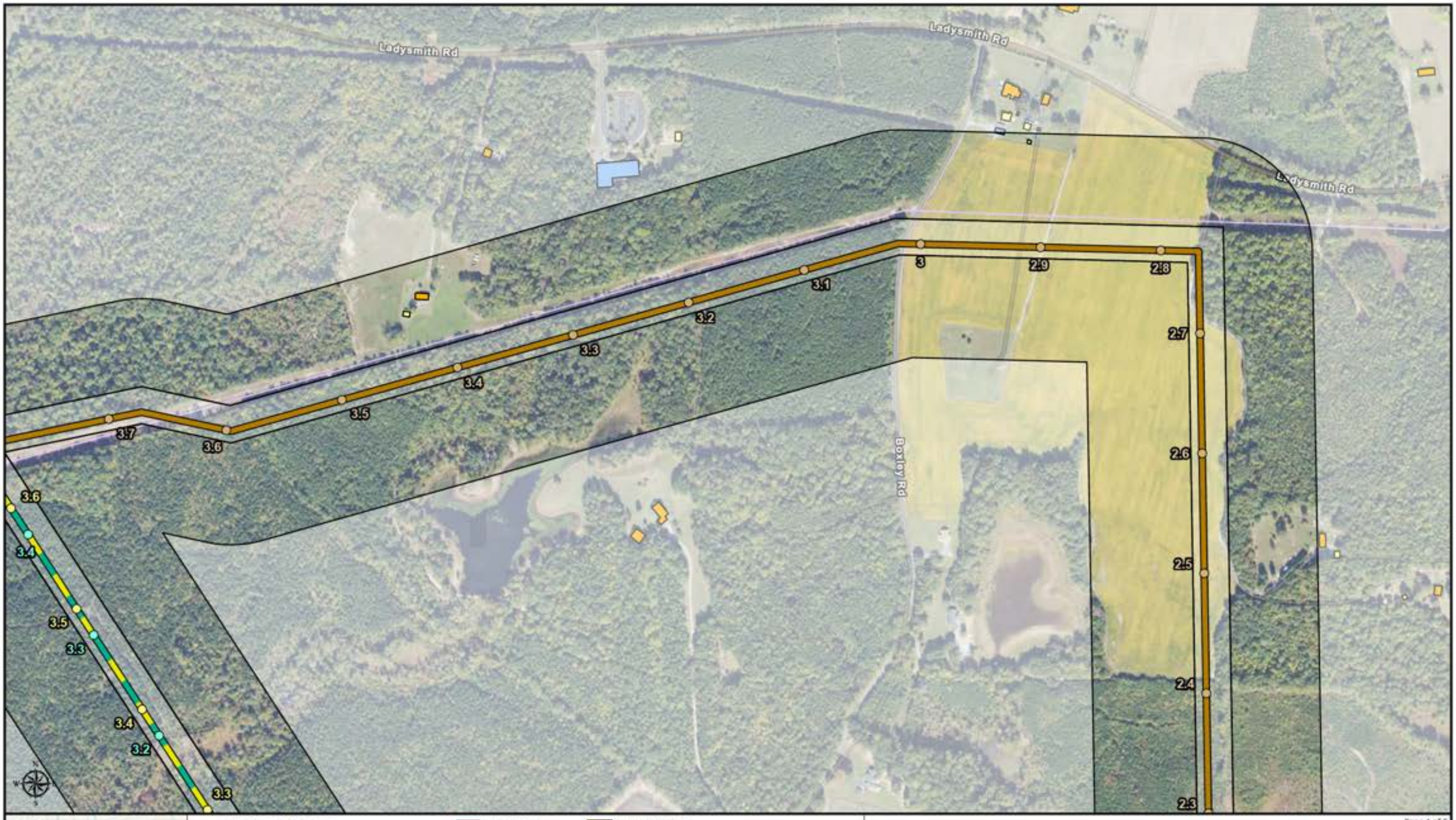


Figure 4.1-5
Existing Structures within 500 feet of Routes
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy



Page 4 of 5

Figure 4.1-5
Existing Structures within 500 feet of Routes
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
3.8
3.7
3.6
3.5
3.4
3.3
3.2
3.1
3.6
3.4
3.5
3.3
3.4
3.2
3.3
3.1
3.2
3
Proposed Switching Station
Existing REC Line
Route 4 MP
Route 5 MP
Route 6 MP
Route 4
Route 5
Route 6
Commercial
Outbuilding
Residential
500-ft Buffer
0
250
500
Feet
1:4,800
Note: All route Rights-of-Way are 160-foot wide
Balty
Page 5 of 5
Figure 4.1-5
Existing Structures within 500 feet of Routes
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia
ERM
Dominion Energy

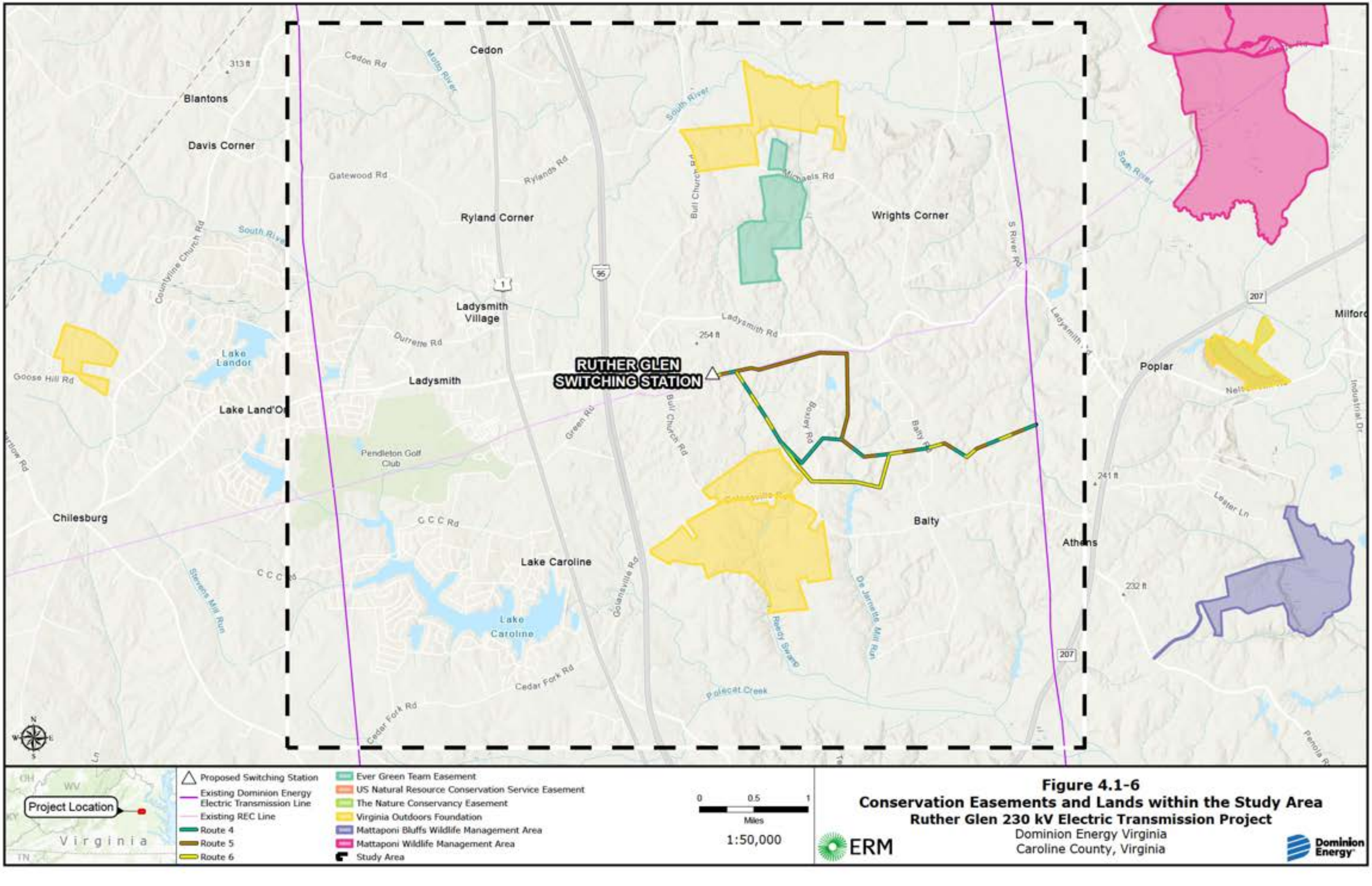


Figure 4.1-6
Conservation Easements and Lands within the Study Area
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

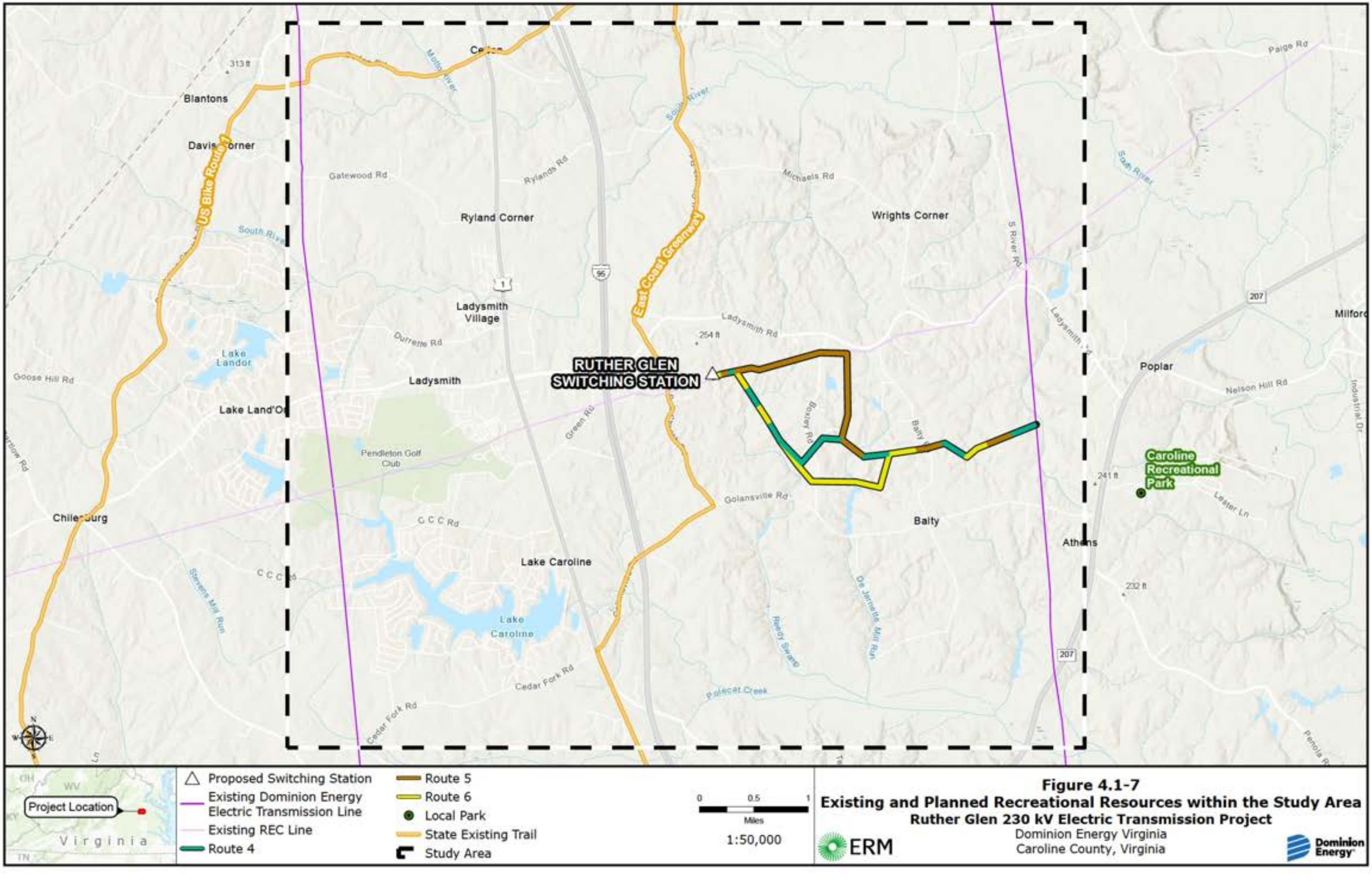
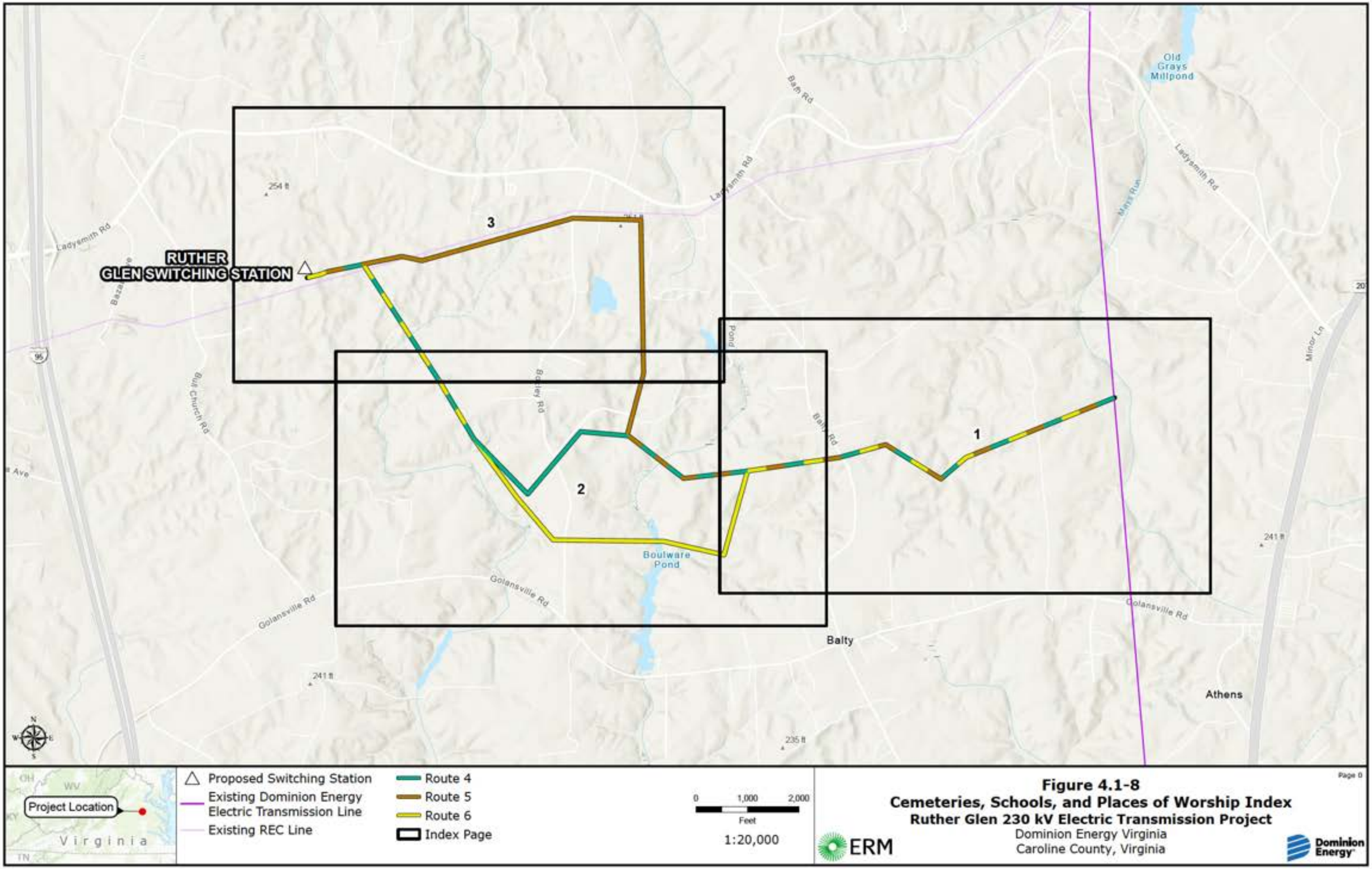
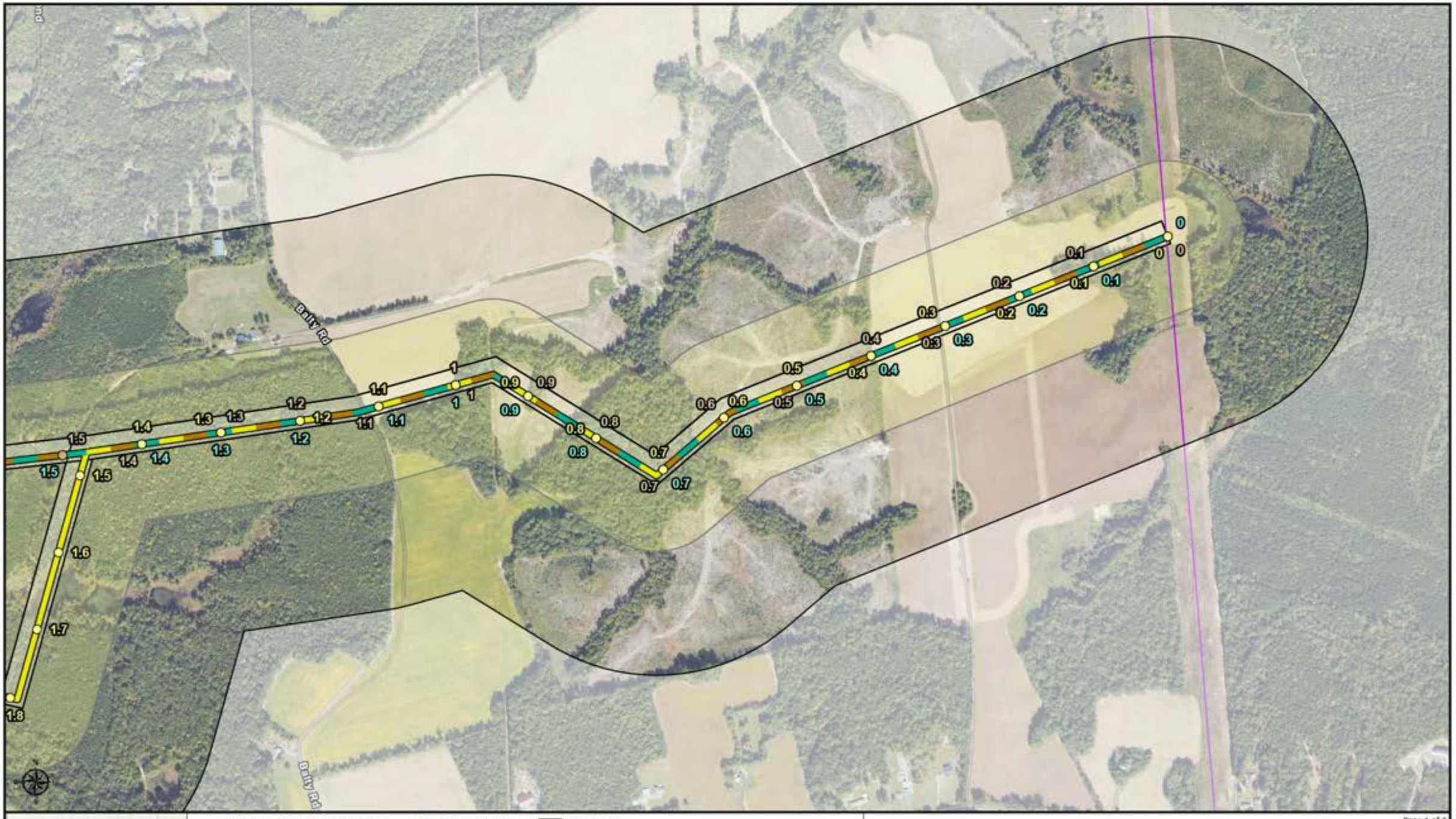


Figure 4.1-7
Existing and Planned Recreational Resources within the Study Area
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy


RUTHER
GLEN SWITCHING STATION
3
2
1
Ladysmith Rd
Bazaar Ave
Bus Church Rd
Bailey Rd
Pond
Bailey Rd
Baltz Rd
Old
Grays
Millpond
Mess Run
Ladysmith Rd
Minor Ln
Boulware
Pond
Golansville Rd
Golansville Rd
Golansville Rd
Balty
Athens
254 ft
241 ft
241 ft
235 ft
96
N
W
E
S
OH
WV
Project Location
Virginia
TN
Proposed Switching Station
Existing Dominion Energy
Electric Transmission Line
Existing REC Line
Route 4
Route 5
Route 6
Index Page
0
1,000
2,000
Feet
1:20,000
Page 0
Figure 4.1-8
Cemeteries, Schools, and Places of Worship Index
Ruther Glen 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
500-ft Buffer
0.25-Mile Buffer

Note: All route Rights-of-Way are 160-foot wide

0 300 600
Feet
1:7,200

Figure 4.1-8
Cemeteries, Schools, and Places of Worship
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

Boxley Rd
Pond Rd
Boxley Rd
Boxley Rd
Boxley Rd
Colansville Rd
Bailey Rd
Bailey Rd
Boulware Pond
Route 4 MP
Route 5 MP
Route 6 MP
Route 4
Route 5
Route 6
500-ft Buffer
0.25-Mile Buffer
Note: All route Rights-of-Way are 160-foot wide
0 300 600
Feet
1:7,200
Page 2 of 3
Figure 4.1-8
Cemeteries, Schools, and Places of Worship
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia
ERM
Dominion Energy

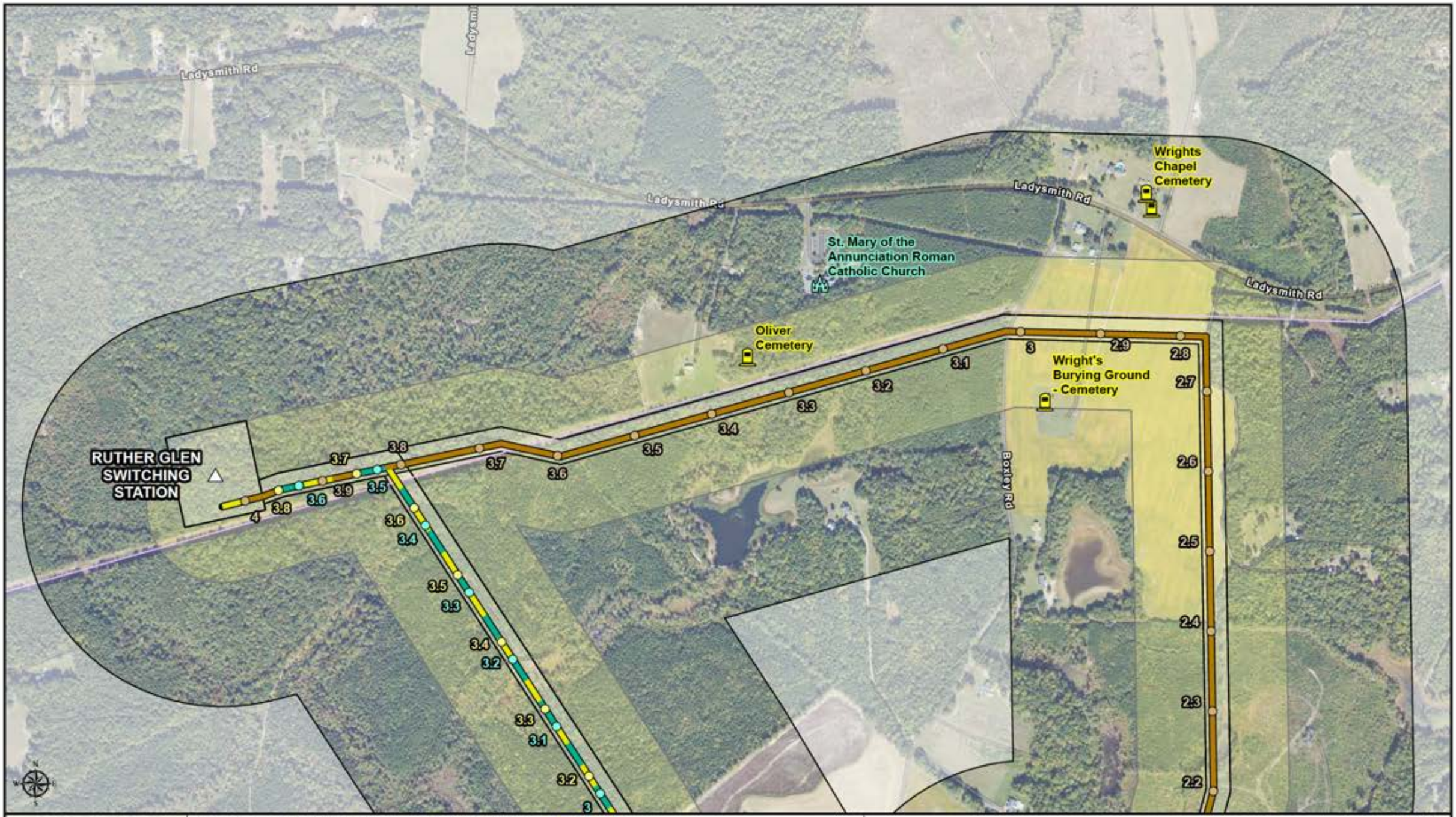


Figure 4.1-8
Cemeteries, Schools, and Places of Worship
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

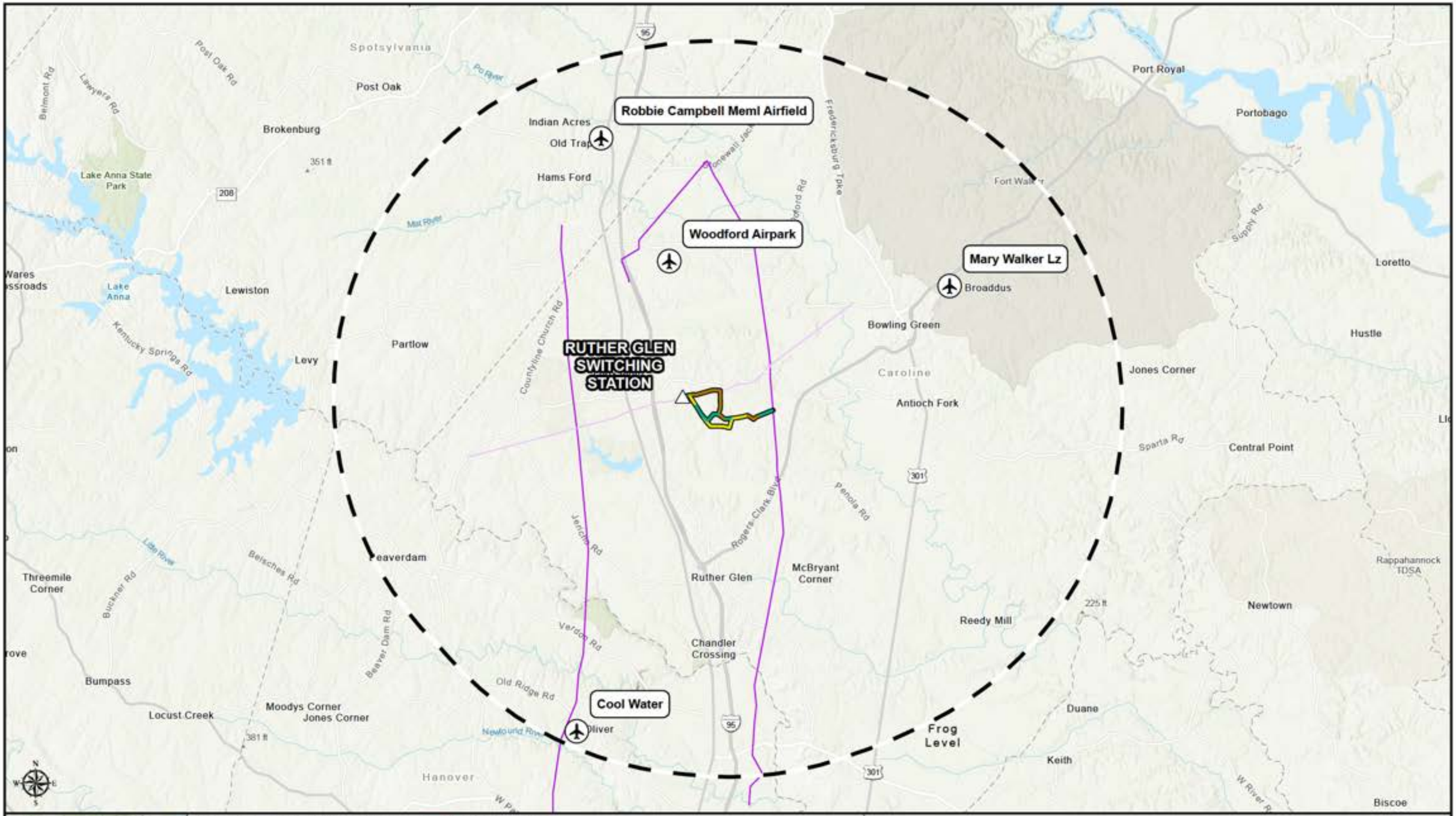


Figure 4.1-9
Aviation Facilities Within 10 Nautical Miles of Project
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

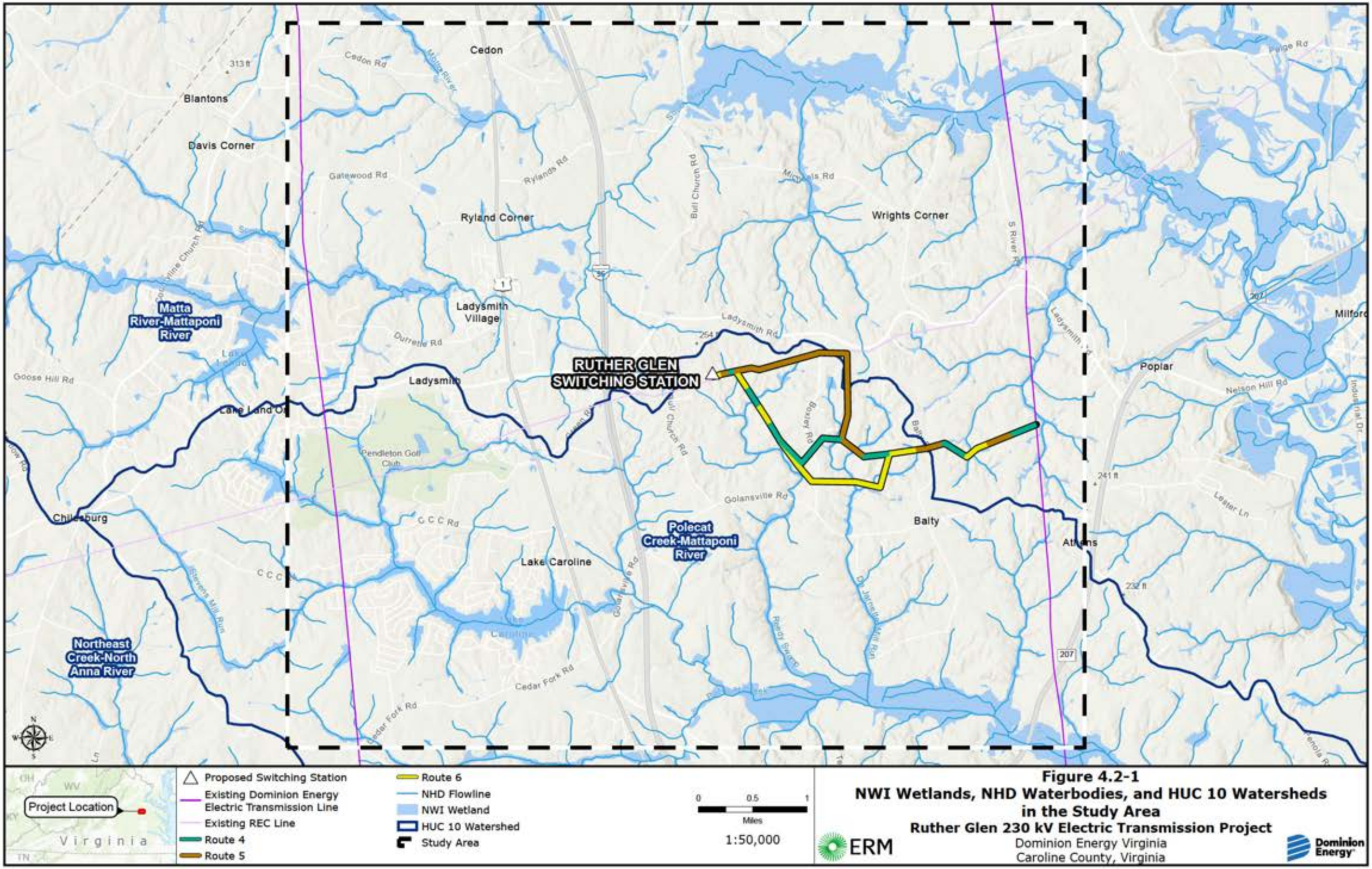


Figure 4.2-1
NWI Wetlands, NHD Waterbodies, and HUC 10 Watersheds in the Study Area
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

RUTHER GLEN SWITCHING STATION

1

2

3

4

5

Ladysmith Rd

Bull Church Rd

Bath Rd

American Way

Mays Run Dr

Mays Run

Old Grays Millpond

Bailey Rd

Bailey Rd

Bailey Rd

Bailey Rd

Bailey Rd

Boulware Pond

Golansville Rd

Golansville Rd

Golansville Rd

Monroeville Rd

Vip Jon Rd

Balty

Balty Rd

Athens

254 ft

252 ft

245 ft

241 ft

230 ft

231 ft

235 ft

232 ft

244 ft

219 ft

207

95

Project Location

OH

WV

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

Page 0

Figure 4.2-1

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

Figure 4.2-1
NWI Wetlands, NHD Waterbodies, and HUC 10 Watersheds
Ruther Glen 230 kV Electric Transmission Project

ERM
Dominion Energy Virginia
Caroline County, Virginia
Dominion Energy

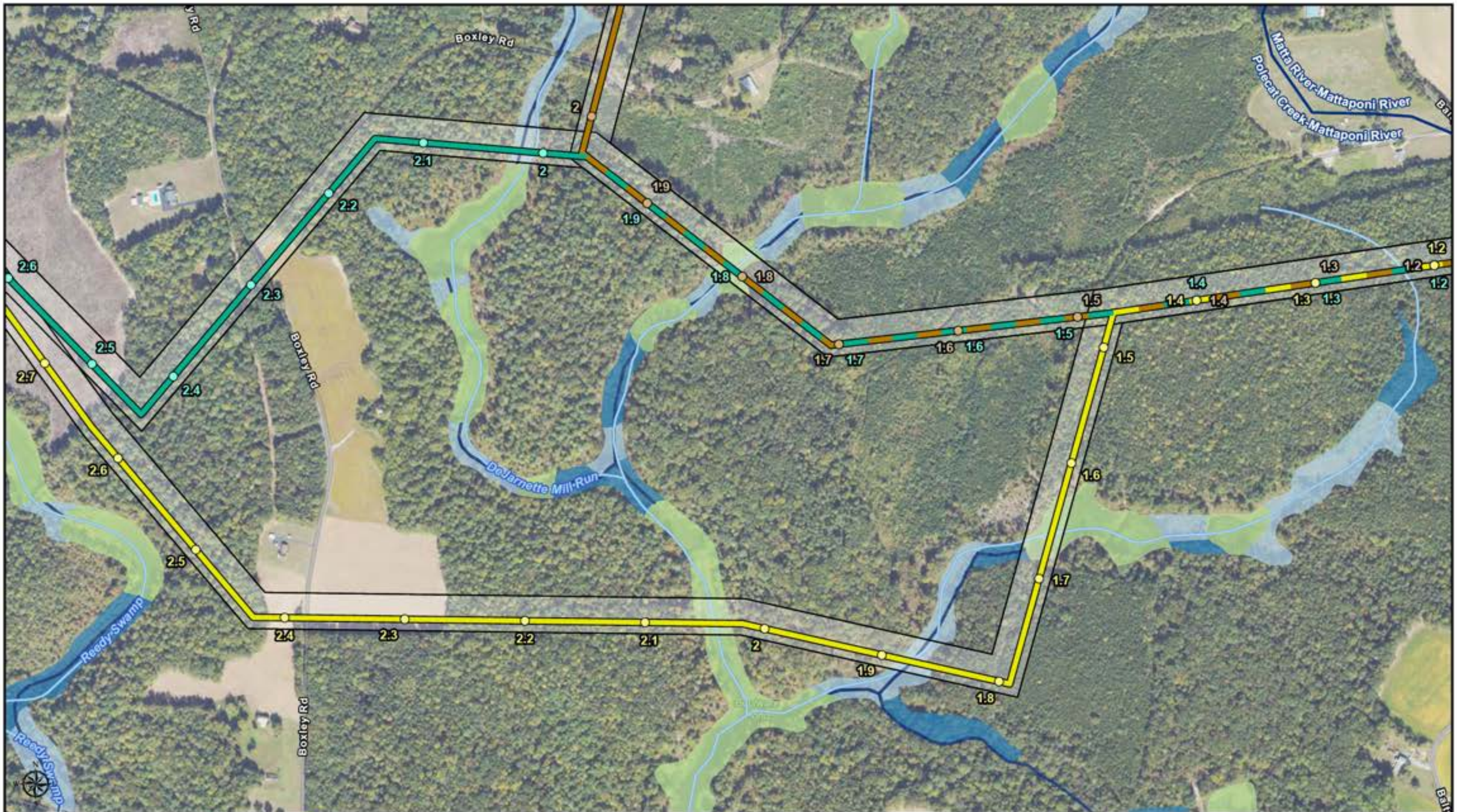
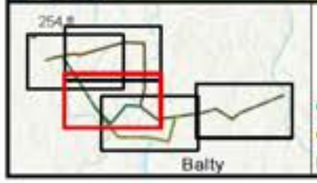


Figure 4.2-1
NWI Wetlands, NHD Waterbodies, and HUC 10 Watersheds
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy



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

Note: All route Rights-of-Way are 160-foot wide

0 250 500
Feet
1:4,800

Figure 4.2-1
NWI Wetlands, NHD Waterbodies, and HUC 10 Watersheds
Ruther Glen 230 kV Electric Transmission Project
ERM
Dominion Energy Virginia
Caroline County, Virginia
Dominion Energy

Figure 4.2-1
NWI Wetlands, NHD Waterbodies, and HUC 10 Watersheds
Ruther Glen 230 kV Electric Transmission Project

ERM
Dominion Energy Virginia
Caroline County, Virginia
Dominion Energy

Figure 4.2-1
NWI Wetlands, NHD Waterbodies, and HUC 10 Watersheds
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

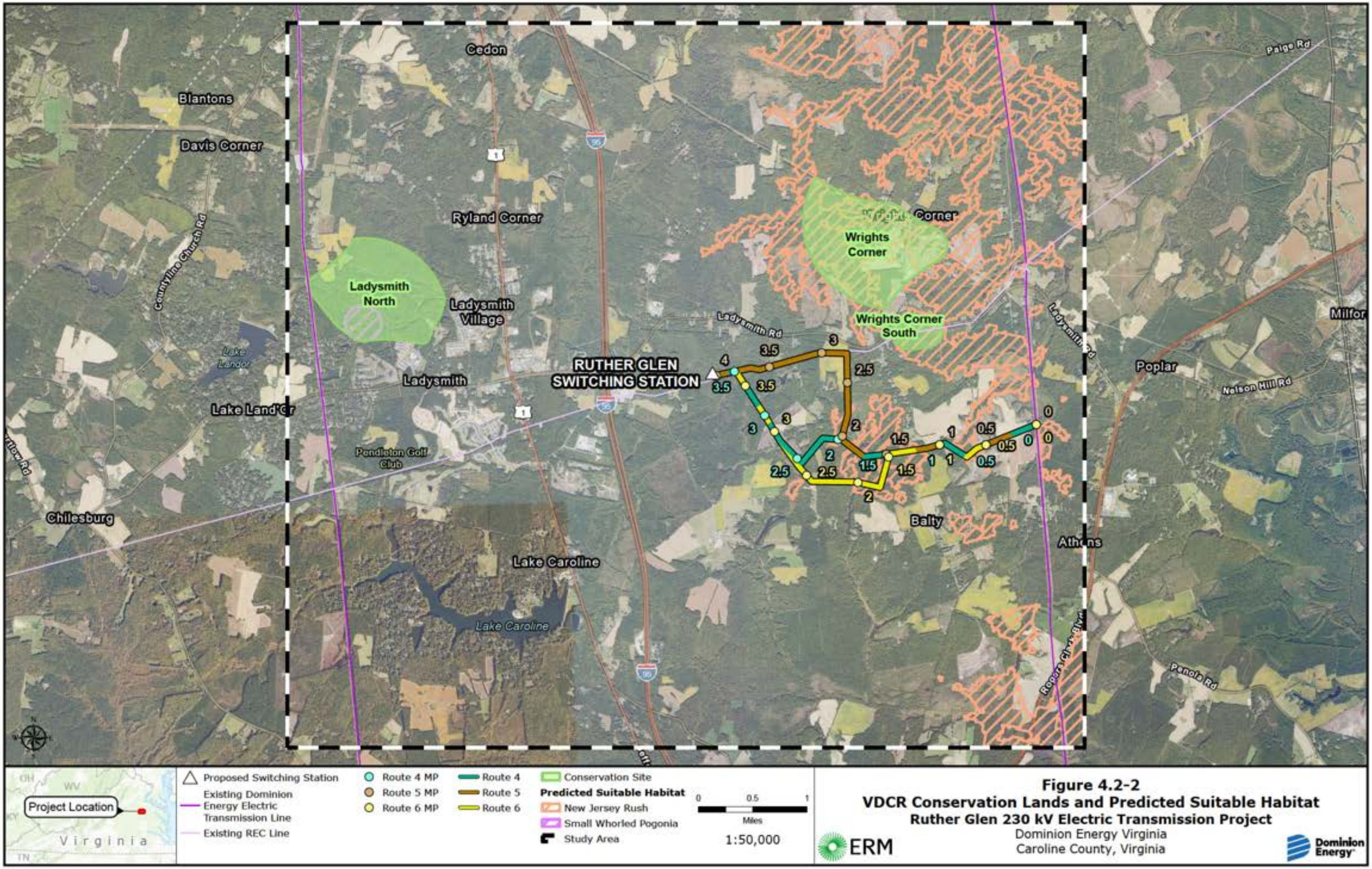
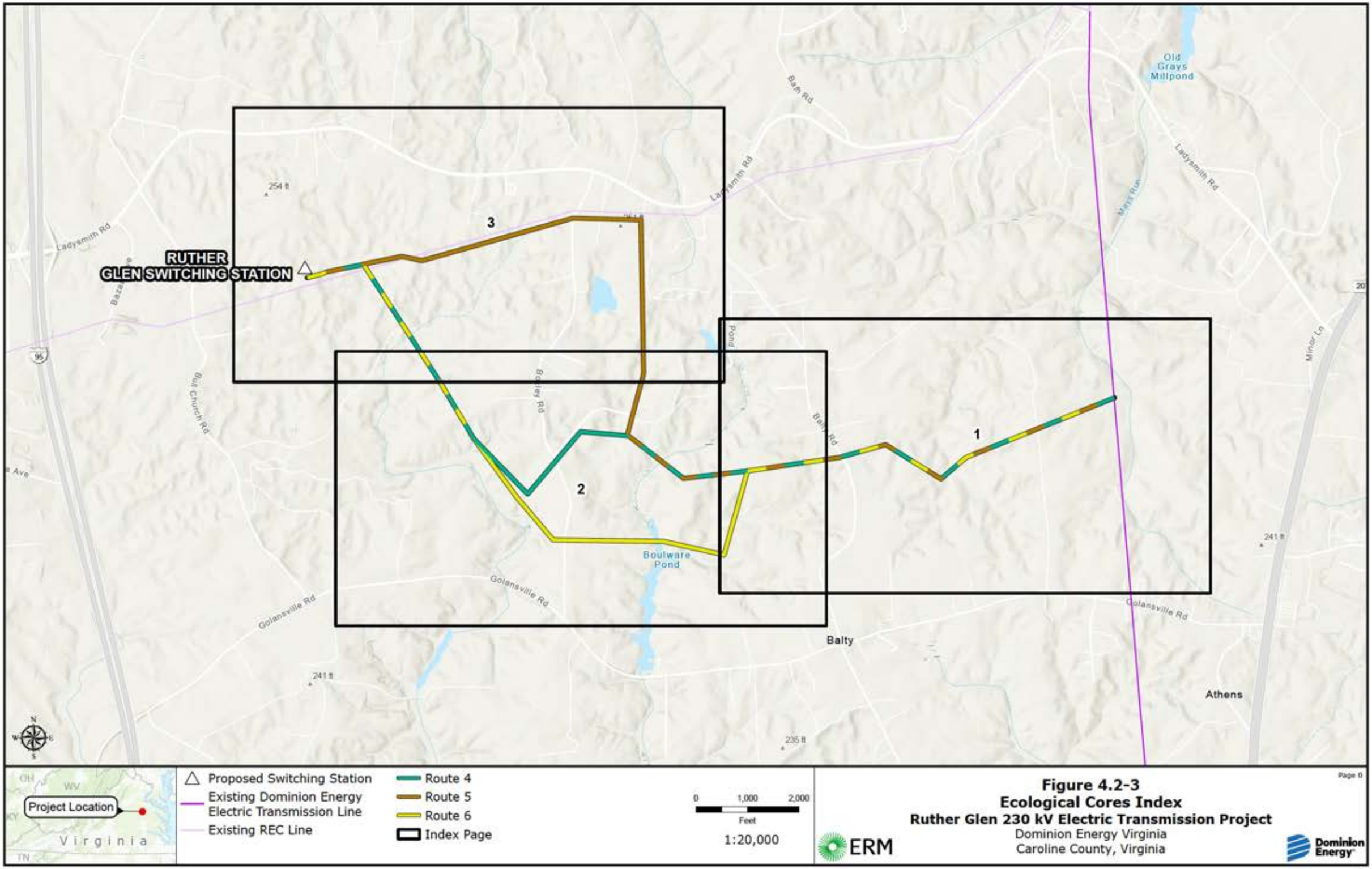


Figure 4.2-2
VDCR Conservation Lands and Predicted Suitable Habitat
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

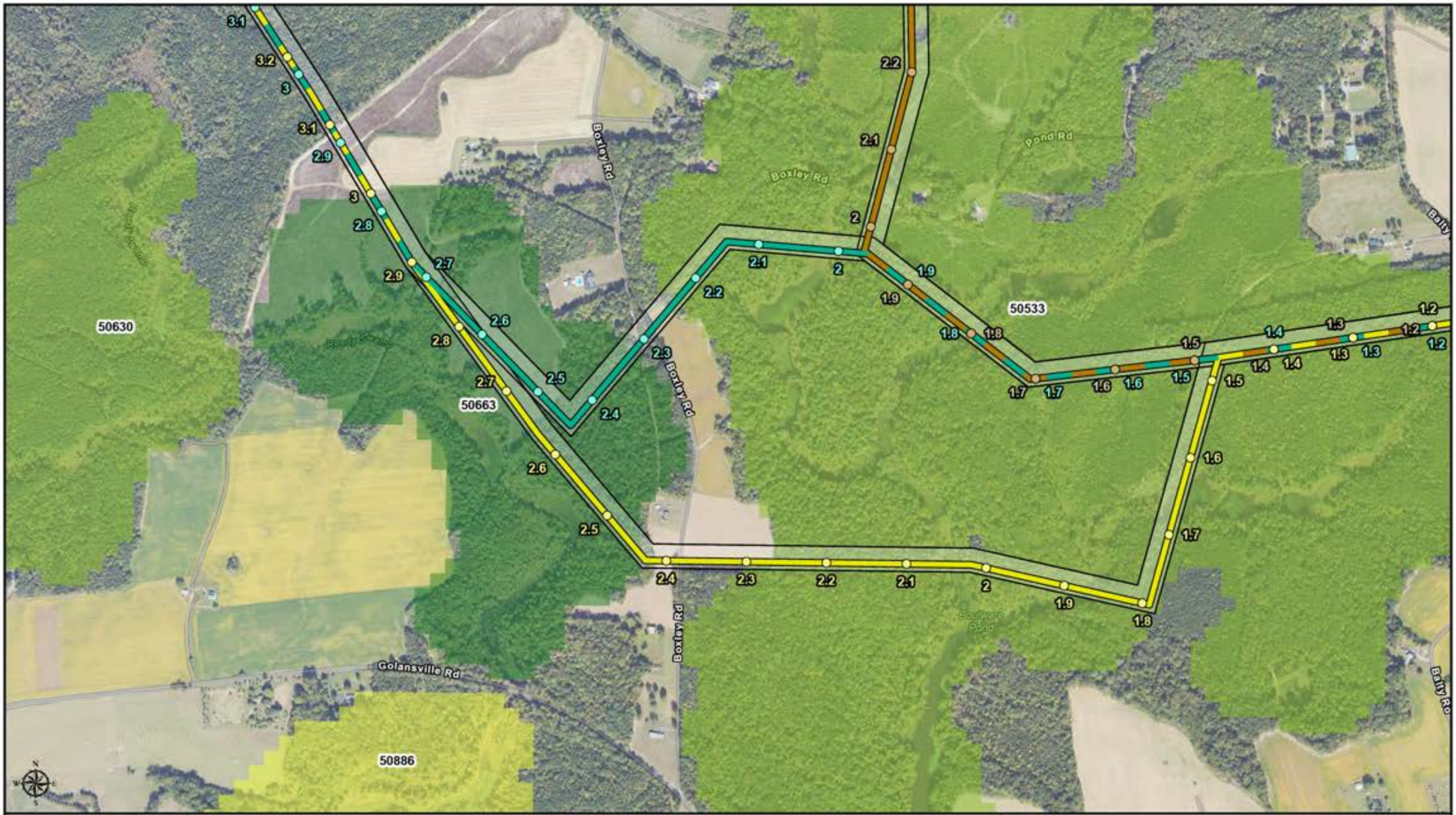

RUTHER
GLEN SWITCHING STATION
3
2
1
Ladysmith Rd
Bazaar Ave
Bus Church Rd
Bailey Rd
Pond
Bailey Rd
Bass Rd
Old
Grays
Millpond
Mess Run
Ladysmith Rd
Minor Ln
Boulware
Pond
Golansville Rd
Golansville Rd
Golansville Rd
Balty
Athens
254 ft
241 ft
241 ft
235 ft
Project Location
OH
WV
Virginia
TN
Proposed Switching Station
Existing Dominion Energy
Electric Transmission Line
Existing REC Line
Route 4
Route 5
Route 6
Index Page
0
1,000
2,000
Feet
1:20,000
ERM
Page 0
Figure 4.2-3
Ecological Cores Index
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia
Dominion
Energy

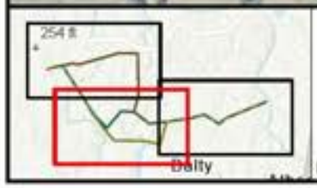
Page 1 of 3

Figure 4.2-3
Ecological Cores
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

Core Rank
C3: High
C4: Moderate
C5: General

Note: All route Rights-of-Way are 160-foot wide

0 300 600
Feet
1:7,200

Figure 4.2-3
Ecological Cores
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy


Ladysmith Rd
50145
50449
50532
50533
50630
RUTHER GLEN SWITCHING STATION
Boxley Rd
3.7
3.6
3.8
3.9
4
3.5
3.6
3.4
3.5
3.3
3.4
3.2
3.3
3.1
3.2
3
3.7
3.6
3.5
3.4
3.3
3.2
3.1
3
2.9
2.8
2.7
2.6
2.5
2.4
2.3
2.2
N
Proposed Switching Station
Existing REC Line
Route 4 MP
Route 5 MP
Route 6 MP
Route 4
Route 5
Route 6
Core Rank
C3: High
C4: Moderate
C5: General
Note: All route Rights-of-Way are 160-foot wide
0 300 600
Feet
1:7,200
Page 3 of 3
Figure 4.2-3
Ecological Cores
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia
ERM
Dominion Energy

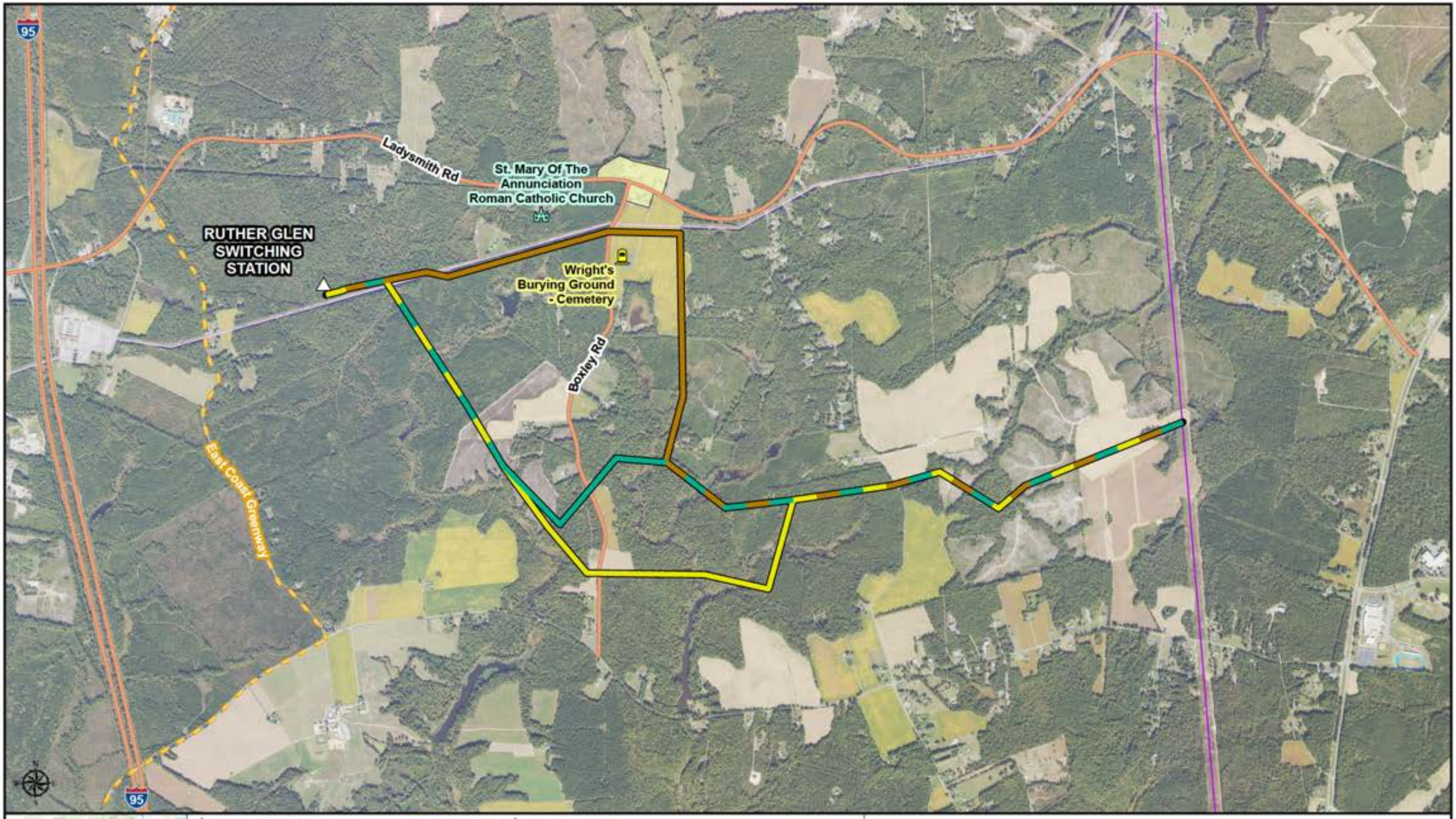


Figure 4.3-1
Visually Sensitive Resources
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

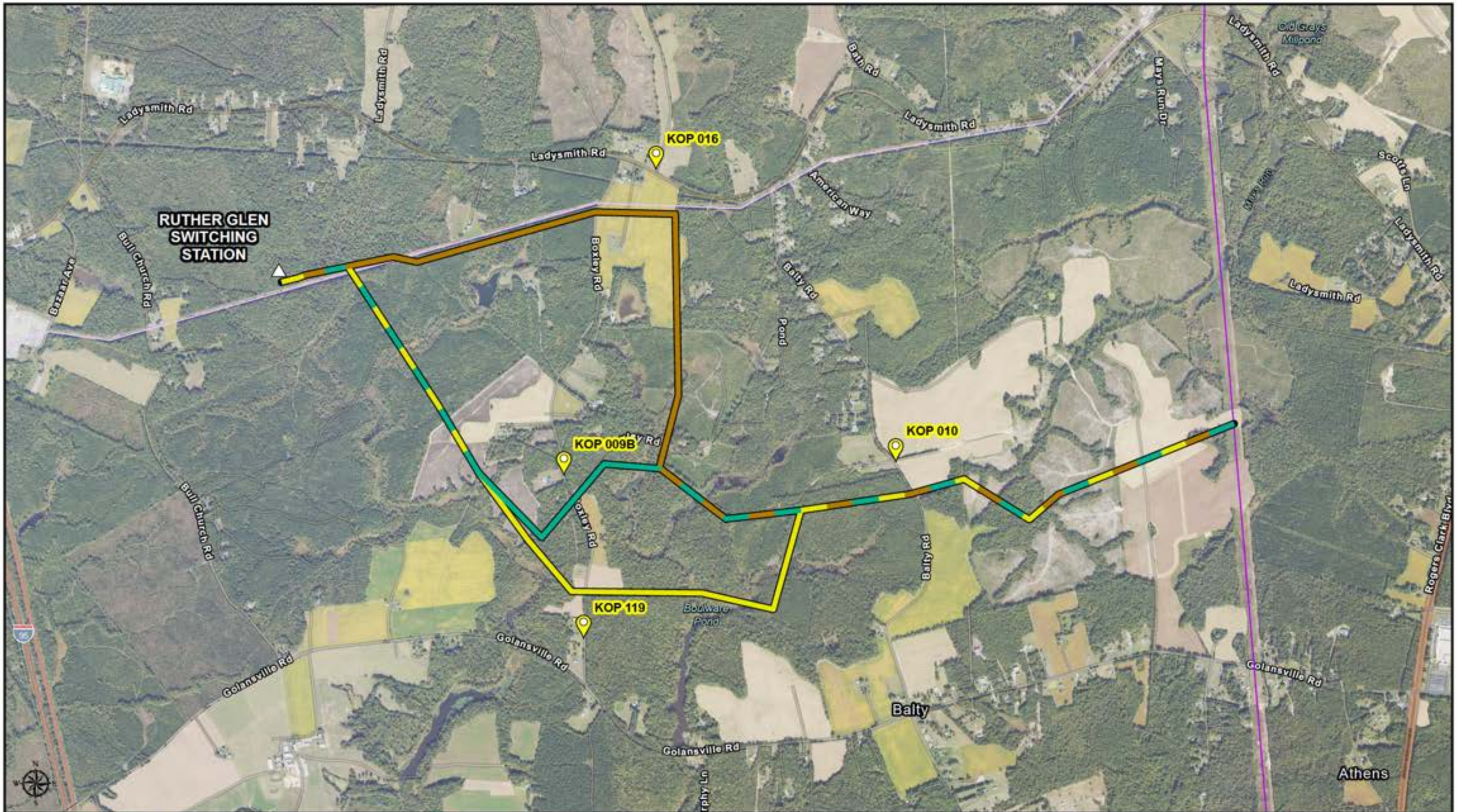


Figure 4.3-2
Key Observation Points
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

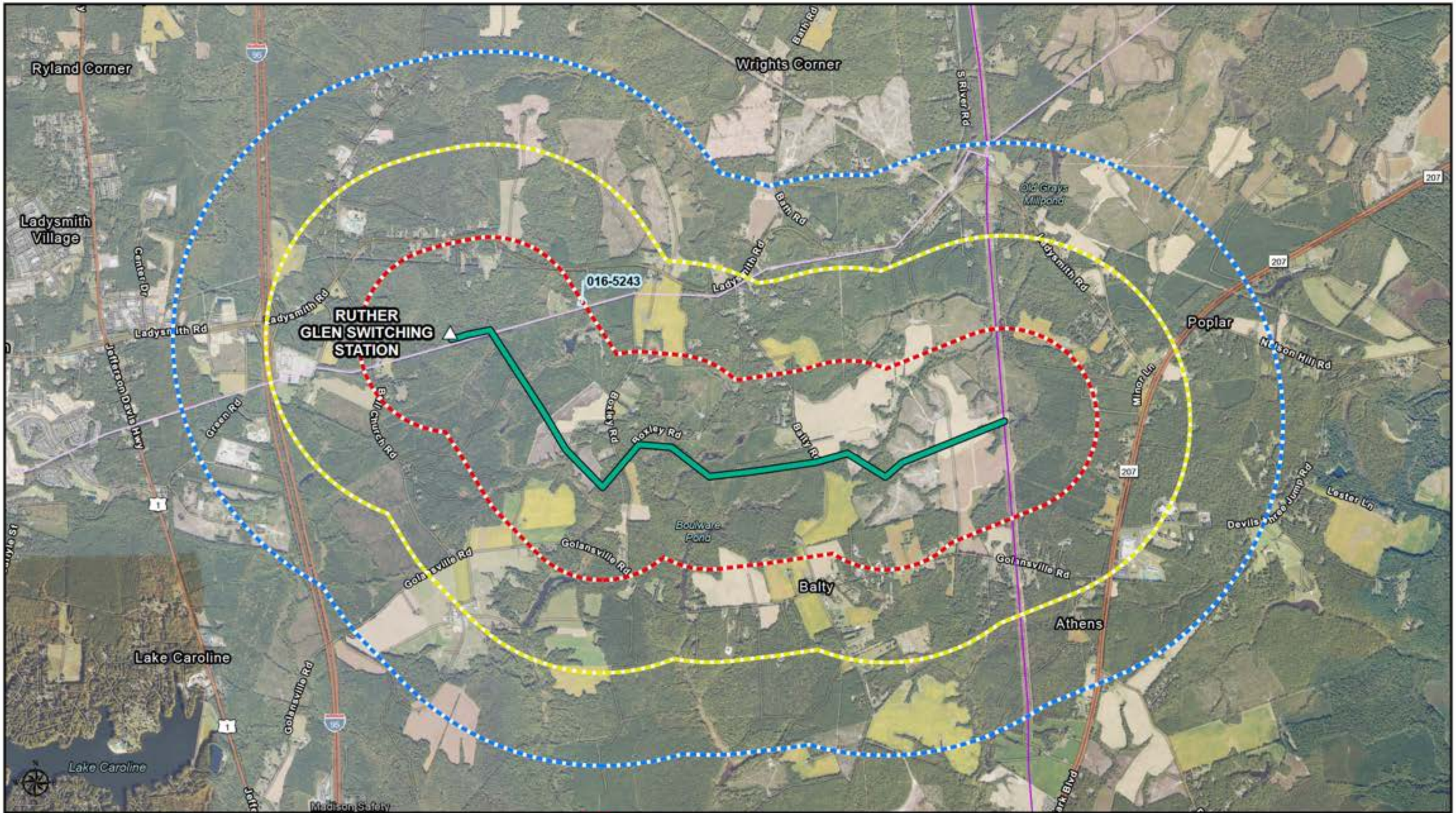


Figure 4.4-1
Locations of Considered and Historic Resources
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

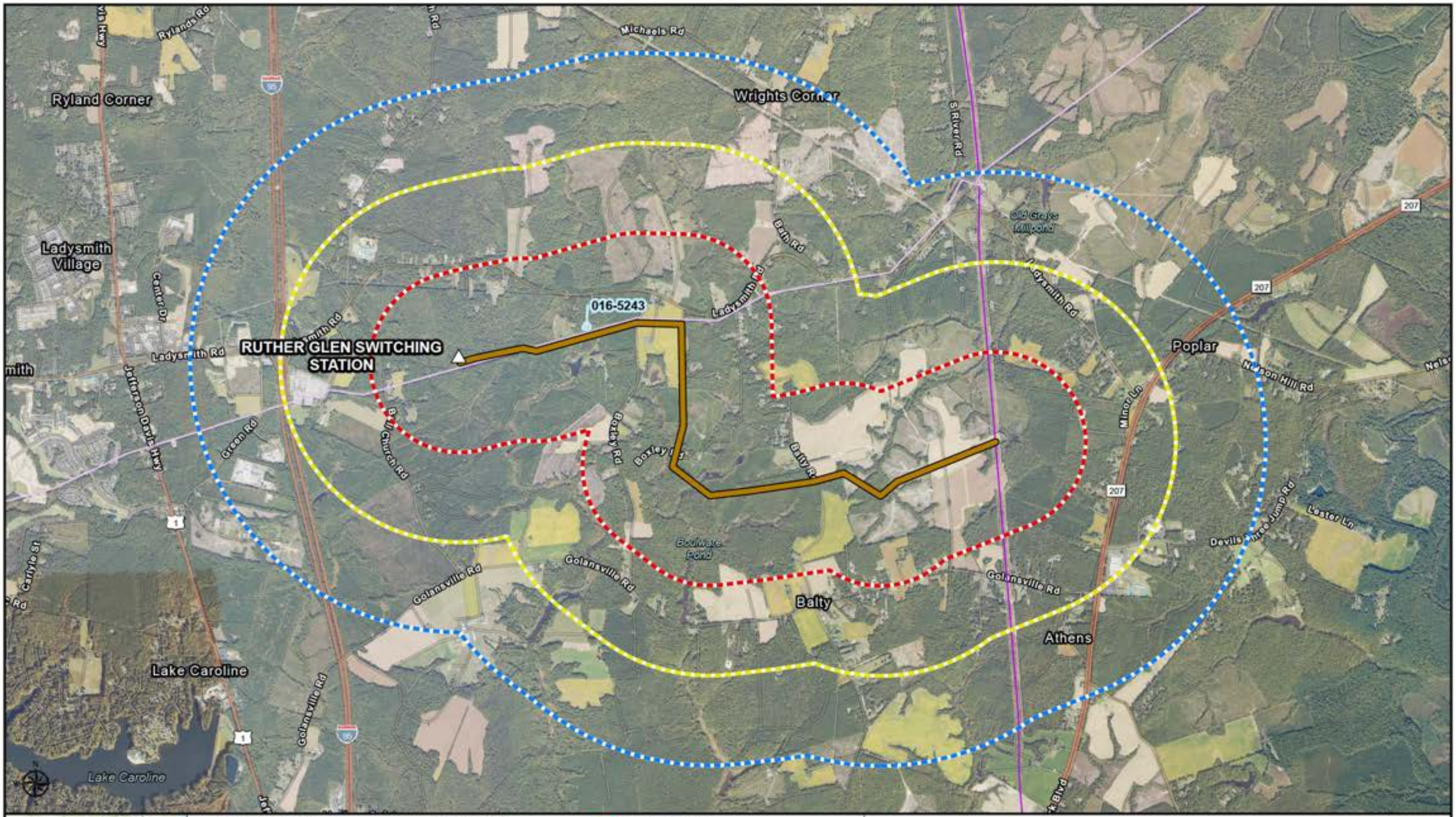


Figure 4.4-1
Locations of Considered and Historic Resources
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

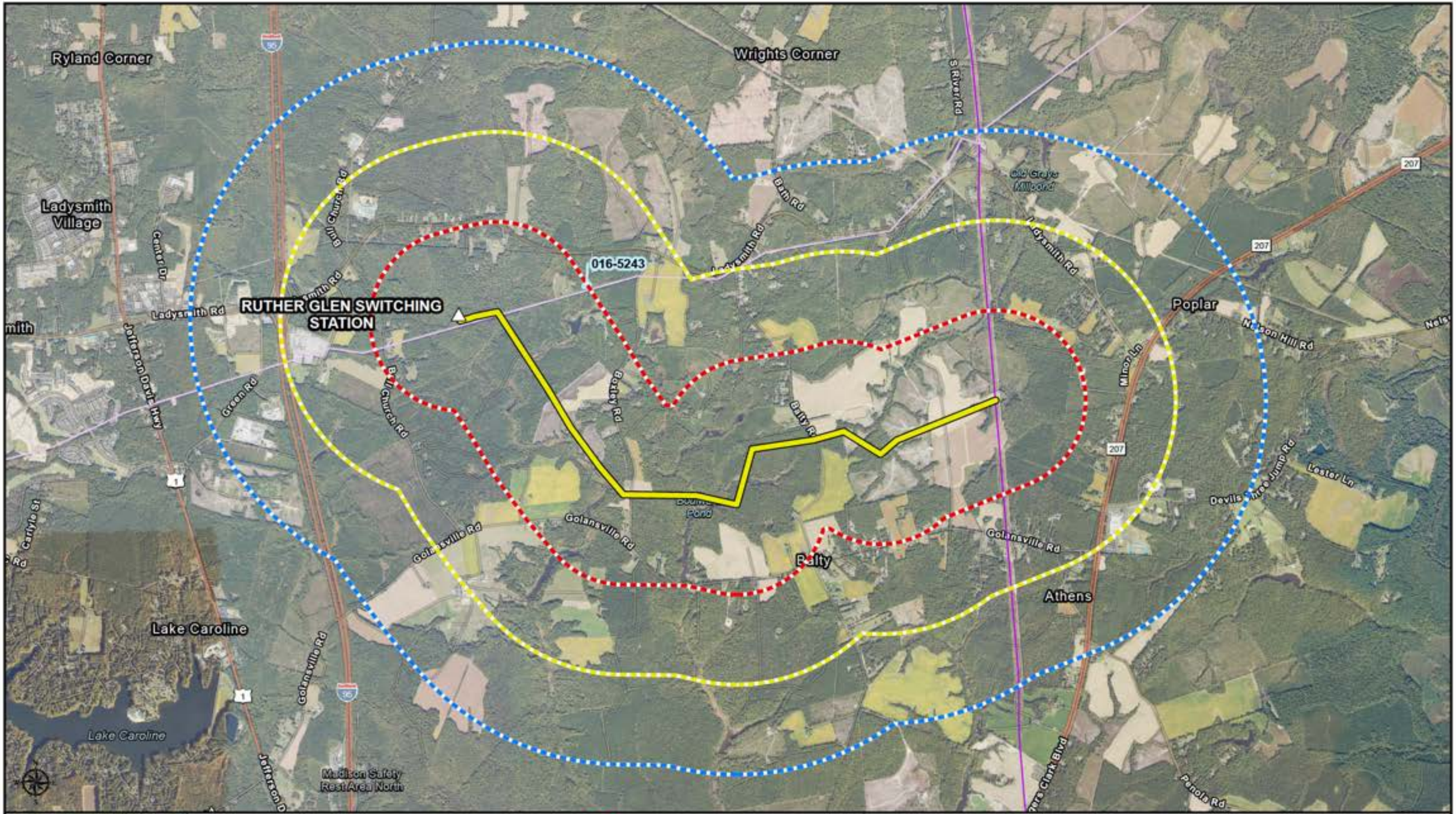


Figure 4.4-1
Locations of Considered and Historic Resources
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

CT 0304.00, BG 2

CT 0305.01, BG 1

CT 0305.02, BG 1

CT 0305.03, BG 1

CT 0305.03, BG 2

CT 0302.01, BG 1

RUTHER GLEN SWITCHING STATION

Wrights Corner

Ladysmith Village

Lake Caroline

Balty

Athens

Old Grays Millpond

Boulware Pond

Lake Caroline

Project Location

Virginia

Proposed Switching Station
Existing Dominion Energy Electric Transmission Line
Existing REC Line
Route 4
Route 5
Route 6
1-Mile Buffer of Project Centerlines
Census Block Group Boundary
Limited English Speaking Households
Populations of Color
Low-Income Populations
Populations of color and low-income populations

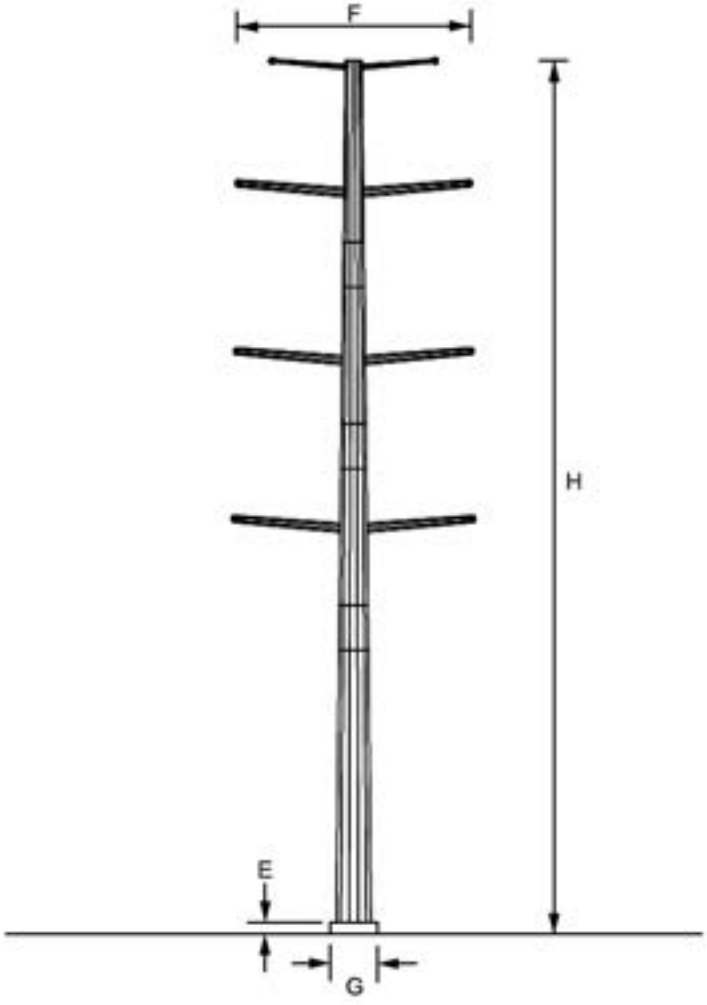
0 1,250 2,500
Feet
1:30,000

Figure 4.5-1
Demographic and Socioeconomic Indicators Within 1-mile of the Project Route Alternatives
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

APPENDIX B 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):	4.0 MILES (13 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):	110' 155' 120'
I. AVERAGE SPAN LENGTH (RANGE):	571' - 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

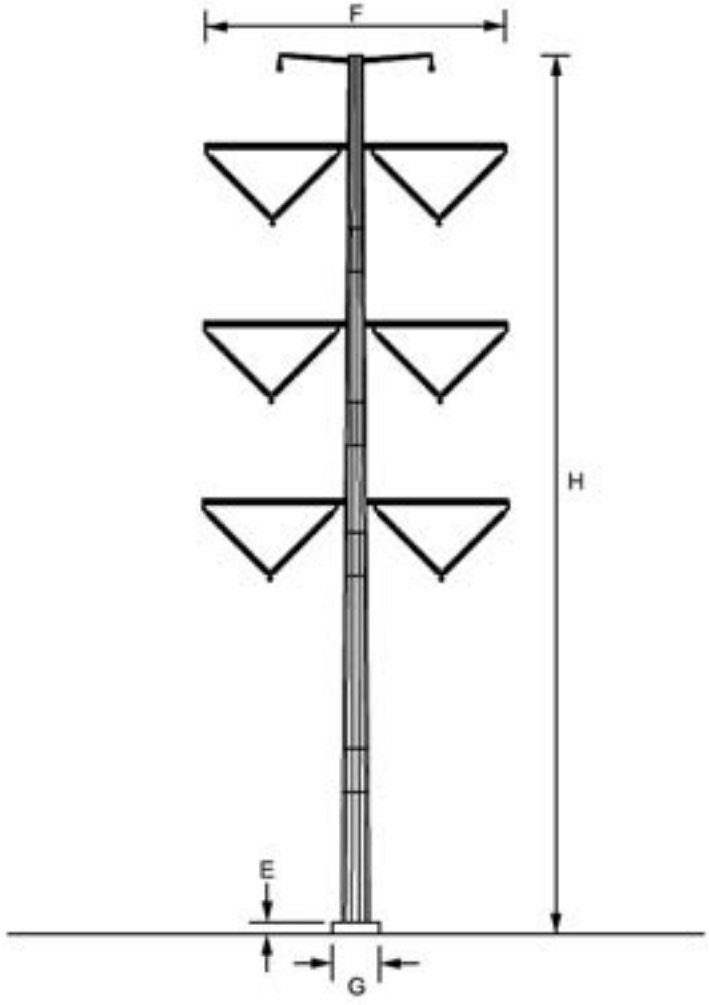
LINES 256, 2410 (ROUTE 5)

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):	4.0 MILES (20 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):	105' 135' 115'
I. AVERAGE SPAN LENGTH (RANGE):	571' - 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

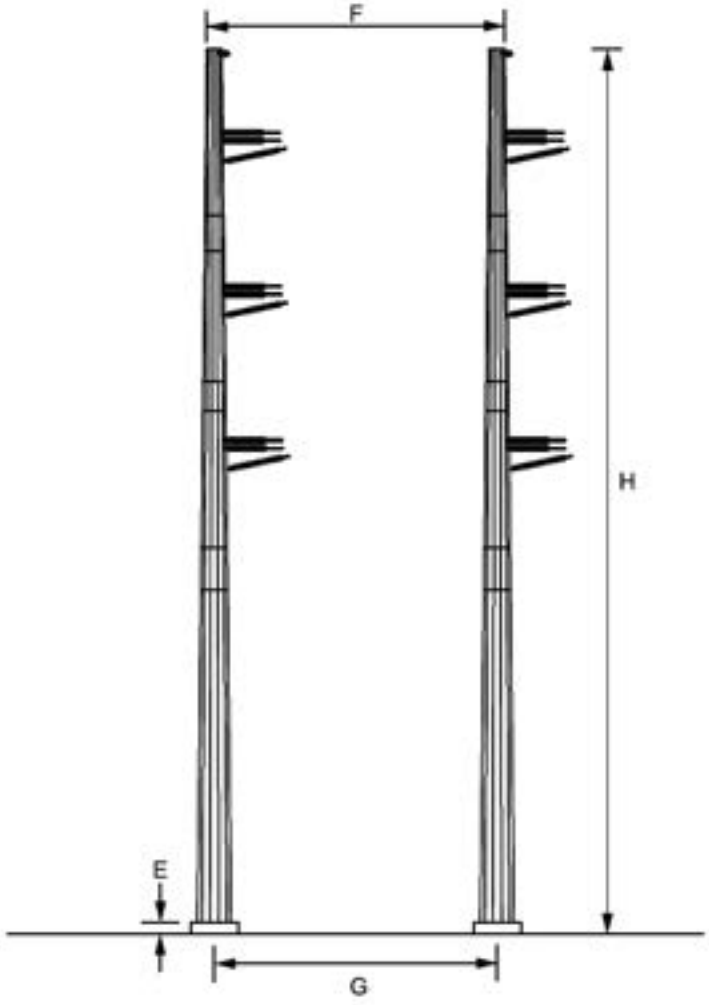
LINES 256, 2410 (ROUTE 5)

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):	4.0 MILES (2 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:	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' 105' 103'
I. AVERAGE SPAN LENGTH (RANGE):	571' - 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 256, 2410 (ROUTE 5)

TYPICAL DC ENGINEERED 2-POLE DOUBLE DEADEND STRUCTURE

ATTACHMENT NO.

II.B.3.c

DRAWN BY: SDH

APPENDIX C AGENCY AND STAKEHOLDER CORRESPONDENCE

MINUTES

LOCATION	Virtual
DATE	May 16, 2024
TIME	11:00 AM
GROUP/TOPIC	Carmel Church/Ruther Glen VDOT Meeting

ATTENDANCE

- Adam Maguire - Dominion Energy Virginia (Dominion)
- Andre May – Dominion
- Ann Gordon Mickel – Dominion
- Lucas Dupont – Dominion
- Tracey McDonald – Dominion
- Roswell Flippen – Virginia Department of Transportation (VDOT)
- Shane Lupo – VDOT
- Carolyn Oster – VDOT
- James Rice – VDOT
- Samuel Adjebeng – VDOT
- Rachel Tippett – Environmental Resource Management (ERM)
- Alexis Hoggard - ERM

1. AGENDA ITEMS

- Ann Gorden Mickel with Dominion Energy Virginia (Dominion) started the meeting with a brief introduction of the project team members present during the call and the timeline for the project. Ruther Glen and Carmel Church are two separate projects; however, outreach for the projects will be conducted together. The projects are expected to file with the SCC in the Fall, while construction is expected to begin in Spring 2026 and conclude in 2027.
- Rachel Tippett with Environmental Resources Management (ERM) proceeded to describe the study area for the Carmel Church project and discuss the project need.

- Rachel then went on to discuss constraints in the project study, noting that I-95 is the biggest routing constraint.
    - Rachel also noted that the rezoning application filed by the developer outlined a preliminary crossing of I-95 North and South and that the area along the corridor where the proposed crossings locate is mostly undeveloped.
- Carolyn Oster with the Virginia Department of Transportation (VDOT) asked if the project team had met with Caroline County already, and Rachel and Ann Gorden stated that they had already met with the Caroline County Planning, Economic Development, and Public Works Departments prior to today's meeting.
    - Carolyn stated that VDOT prefers to meet alongside the County to discuss these matters.
- Carolyn then asked if any of the proposed routes were in VDOT right-of-way (ROW), how routes propose to cross I-95, and if any of the proposed routes were underground.
    - Rachel stated that the routes fully locate on either the developer's property or private property; the routes only span VDOT ROW, and no underground routes have been proposed at this time.
    - Tracey McDonald then briefly explained how the routes would cross I-95 and that, as of right now, no structures are proposed in VDOT's ROW.
- Rachel then moved to discuss the routes that parallel I-95, the crossing of Route 1 and Jerricho Road, and any proposed VDOT improvements in these areas.
    - Carolyn stated a data center is proposed near the crossing of Route 1.
    - Carolyn noted there were no VDOT proposed improvements in any of the areas outlined by Rachel besides a proposed realignment associated with the Luck Stone Development off Jericho Road and plans for Rogers Clark Boulevard.
- Rachel then proceeded to discuss the Ruther Glen project study area and constraints.
    - She noted the residential area west of I-95 as a constraint; however, the area is much less developed than the Carmel Church project.
- Rachel moved to discuss the proposed routes for the Ruther Glen project and stated that all options parallel I-95 on private property and VDOT ROW would only need to be spanned.
    - Carolyn stated that VDOT advises all VDOT ROW crossings to be as narrow as possible, cross VDOT ROW at 90 degrees, and no permanent structures to locate in VDOT ROW. She also noted that the proposed Teal (Route 6) and Brown (Route 3) routes should be revised to cross VDOT ROW at a 90-degree angle.
- Rachel then asked about any planned road improvements in the Ruther Glen study area.

- Carolyn noted two data center developments in the area. She noted that the proposed Carmel Church Data Center had submitted a traffic study to VDOT, and the other development was working through its traffic impact study, which will need to be reviewed by VDOT to determine any necessary improvements.
- Carolyn then stated that their planner is reviewing project information and is verifying there are no proposed VDOT projects in either project's study area, and would provide that information once it is prepared.

From: samuel.l.griffin@dominionenergy.com
To: Ann Gordon Mickel (DEV Trans Distribution - 1); Adam S Maguire; Blair Parks (Services - 6); Rachel Tippett
Subject: RE: Carmel Church and Ruther Glen Project Update
Date: Thursday, September 5, 2024 11:27:38 AM
Attachments: image003.png

EXTERNAL MESSAGE

Good morning Ann,

You're correct about eminent domain. While it's true that we are not affiliated with the state or any county, as a public utility we do still have the right to condemn properties via eminent domain provided those properties are not either county/state/federal government owned or owned by another public utility. Please let me know if there's any additional information I can provide.

Thanks and have a great day!

Dominion Energy

Samuel Lee Griffin
Real Estate Specialist
Dominion Energy Virginia
5000 Dominion Blvd.
Glen Allen, VA 23060
(804) 241-5787 (mobile)

From: Ann Gordon Mickel (DEV Trans Distribution - 1) <Ann.Gordon.Mickel@dominionenergy.com>
Sent: Thursday, September 5, 2024 11:17 AM
To: Adam S Maguire (Services - 6) <Adam.S.Maguire@dominionenergy.com>; Blair Parks (Services - 6) <blair.parks@dominionenergy.com>; Rachel Tippett <Rachel.Tippett@erm.com>; Samuel L Griffin (Services - 6) <samuel.l.griffin@dominionenergy.com>
Subject: RE: Carmel Church and Ruther Glen Project Update

Team- please see the below message from Mr. Farrish. He attended our first community meeting and owns several parcels east of where the purple route crosses 95.

Rachel- can you please let us know what our options or limitations are there to adjust the route?

Others – please see my response and let me know if you have any issues with it/ particularly the part about eminent domain.

Hi Mr. Farrish,

Thank you for responding and letting me know your concerns. Can you please confirm if the parcel below you are concerned about is 53-8-4? I will share this information with our

routing team and see if there are any alternatives to crossing at this location.

This is one of several routes under consideration, and may or may not be selected as our preferred route. However, you are doing the right thing to make us aware before we file with the SCC. While we do our best to avoid the use of eminent domain, should the SCC approve the project and this particular route, we do have the rights to acquire easements to construct the route. However, as I mentioned, we work very hard to avoid doing that.

Thank you,
Ann Gordon

From: Keith Farrish <kfarrish@farrishproperties.com>
Sent: Thursday, September 5, 2024 10:08 AM
To: Ann Gordon Mickel (DEV Trans Distribution - 1) <Ann.Gordon.Mickel@dominionenergy.com>; Powerline <Powerline@dominionenergy.com>
Subject: [EXTERNAL] Re: Carmel Church and Ruther Glen Project Update

Regretfully I am unable to allow this project to locate on/thru my property, which is under the name of Farrish Development. I currently have two separate buyers that both want to combine the two adjoining 10 acre properties to the south of me(along Ladysmith road), and your proposed transmission lines would nullify the sale.

I am a developer and use the best land use attorneys in the state, being your transmission lines are not a form of state or county eminent domain, I will defend the rights to my land to the fullest extent of the law.

My land, along with the other two adjoining 10 acres to my south make up the Northeast quadrant of the 95 exit 110, which is the last undeveloped exit on 95 between Richmond and Northern Virginia, your proposal would significantly hinder the development opportunities that this interstate exit has to offer, and I won't allow that to happen, at all cost.

Best,

Keith Farrish
Farrish properties and acquisitions

From: Ann.Gordon.Mickel@dominionenergy.com <Ann.Gordon.Mickel@dominionenergy.com>
Sent: Wednesday, September 4, 2024 3:32:57 PM

To: Powerline@dominionenergy.com <Powerline@dominionenergy.com>
Subject: Carmel Church and Ruther Glen Project Update

Dear Neighbor,

I'm reaching out as we have scheduled our second community meeting for the Carmel Church and Ruther Glen projects. The meeting will take place at Caroline High School on Tuesday, Sept. 17, 2024 from 5-7 p.m. A digital copy of the invitation is attached.

We will begin a brief presentation at 5:15 p.m. to review changes to the routes based on community feedback, and discuss project next steps. Once the presentation concludes, we will proceed into open house-style until 7 p.m. We will record the presentation and add it to the website if you are unable to make it to the meeting.

Thank you,
Ann Gordon

Ann Gordon Mickel
Communications Consultant
Electric Transmission

Dominion Energy
5000 Dominion Boulevard, Glen Allen, VA 23060

CONFIDENTIALITY NOTICE: This electronic message contains information which may be legally confidential and or privileged and does not in any case represent a firm ENERGY COMMODITY bid or offer relating thereto which binds the sender without an additional express written confirmation to that effect. The information is intended solely for the individual or entity named above and access by anyone else is unauthorized. If you are not the intended recipient, any disclosure, copying, distribution, or use of the contents of this information is prohibited and may be unlawful. If you have received this electronic transmission in error, please reply immediately to the sender that you have received the message in error, and delete it. Thank you.

From: Ann.Gordon.Mickel@dominionenergy.com
To: Julie Yandura; Powerline@dominionenergy.com
Cc: Matthew Yandura
Subject: RE: Carmel Church and Ruther Glen Community Meeting Follow Up
Date: Tuesday, July 30, 2024 1:40:46 PM
Attachments: image002.png
image003.png

EXTERNAL MESSAGE

Hi Julie,

Thank you for following up. It was nice meeting you as well, and we're appreciative of your engagement with the project team so we can work on new solutions that are more suitable for you and your neighbors. Our routing team is working on making updates based on your feedback. We will probably not have anything ready to share this week, but we can certainly meet prior to the Aug. 13 board meeting.

Here are some other answers to your questions:

- What is the purpose of the substation? The substation is needed due to new data center load in Caroline County. Although Dominion Energy does not provide distribution service to this area, we provide the transmission service to serve REC. Who will the substation be supplying power to? The substation will supply power to REC, which in turn will supply distribution power to the area. Since the data center customer is not directly our customer, I am unsure of which company it is.
- Will the project provide a better power service to the people living in the area? The project should not change your electric reliability. While building new transmission infrastructure is good for the grid because it provides more networked options to serve areas, you would not necessarily notice better service as a result of this project. Outages are typically found at the distribution level – storms knocking down branches, etc. Transmission lines require a cleared right of way and rarely experience outages due to weather events. It's also a networked system, so if one line is out, we will have alternate options to serve the area, which is why more lines mean a stronger transmission system. The new transmission infrastructure will allow us to maintain reliability while accommodating the new load on the system.
- Who will be paying for the project? Electric transmission costs that are eligible for recovery across territories and load-serving entities are distributed amongst Dominion Energy Virginia, electric cooperatives, and others. For Dominion Energy customers, costs are charged under a transmission rider on Dominion Energy bills. I'm not sure how this may show up on an REC bill, but I'm happy to look into this further if you would like.
- I understand that you will be presenting to the board of supervisors on Aug 13th. Is this informational or are you seeking approval? Is this a public hearing? This is an informational presentation. We are not seeking approval for the project, just providing an opportunity to share how we plan for new projects and a little bit about our routing process. Our main approval process is the Virginia State Corporation Commission (SCC). Our goal is to file with the SCC this fall.
- I live on parcel 53-A-85A, where the current suggested route is very impactful. I provided feedback about my parcel on Tuesday verbally and written. I am also providing that information here. When will I receive information about the updated routes? Will it be before the board presentation on Aug 13th? I will make sure our team is ready to meet with you prior to Aug. 13. Are there any times that work for you to have a virtual call next Wednesday or Thursday of next week?

Thank you,
Ann Gordon

From: Julie Yandura <JYandura@outlook.com>
Sent: Friday, July 26, 2024 8:45 AM
To: Ann Gordon Mickel (DEV Trans Distribution - 1) <Ann.Gordon.Mickel@dominionenergy.com>; Powerline <Powerline@dominionenergy.com>
Cc: Matthew Yandura <Mjyandura@live.com>
Subject: [EXTERNAL] Re: Carmel Church and Ruther Glen Community Meeting Follow Up

Hello Ann,

It was nice to meet you at the event on Tuesday.

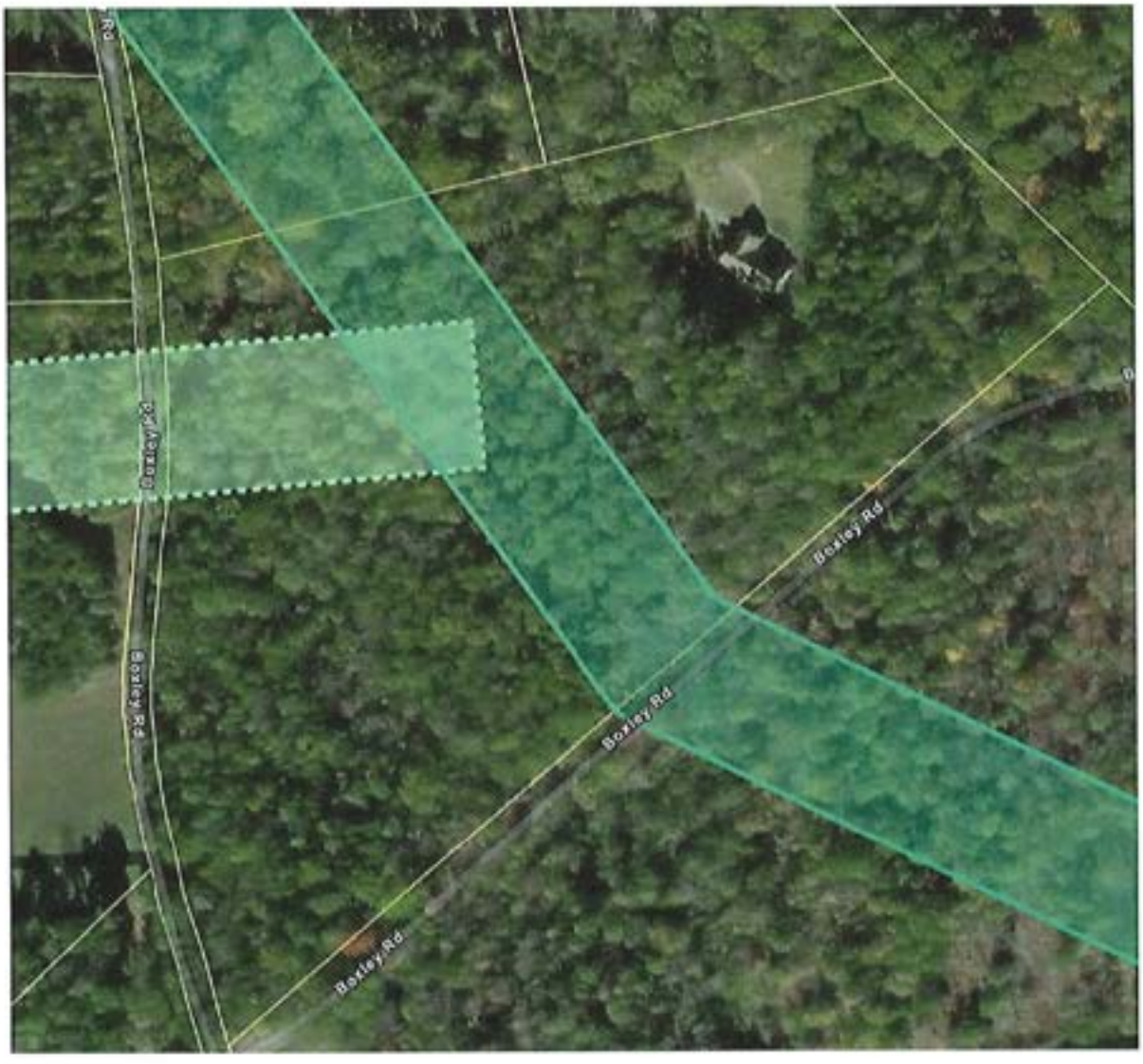
I do have some follow up questions from the event. I have listed them below but I would be happy to meet with you over the phone, virtually, or in person to discuss. My questions are specifically about the Ruther Glen location.

- What is the purpose of the substation? Who will the substation be supplying power to?

- Will the project provide a better power service to the people living in the area?
- Who will be paying for the project?
- I understand that you will be presenting to the board of supervisors on Aug 13th. Is this informational or are you seeking approval? Is this a public hearing?
- I live on parcel 53-A-85A, where the current suggested route is very impactful. I provided feedback about my parcel on Tuesday verbally and written. I am also providing that information here. When will I receive information about the updated routes? Will it be before the board presentation on Aug 13th?

Notes on impact to my property:

- 18369 Boxley Road, Ruther Glen - 53-A-85A
- Solution 3 - Routes 4 and 4 Alternative both significantly impact my property taking 2.5-3 acres of my 12 acre lot
- The routes
    - Place lines less than 300 feet from my house
        - Note the will be visible from my house as your map does not denote the section of land that has been cleared since the satellite images were taken
    - Go over a wet land on my property (not noted on your online map)
    - Is over an existing chicken coop
    - Makes the only suitable flat section of my land that I plan to use for future development unusable
    - Crosses my driveway



Thank You,

Julia Yandura

From: Ann.Gordon.Mickel@dominionenergy.com <Ann.Gordon.Mickel@dominionenergy.com>
Sent: Wednesday, July 24, 2024 1:51 PM
To: Powerline@dominionenergy.com <Powerline@dominionenergy.com>
Subject: Carmel Church and Ruther Glen Community Meeting Follow Up

Dear Neighbor,

I would like to thank you for your attendance at our Carmel Church and Ruther Glen community meeting yesterday. We heard great feedback on the different routes. We are now organizing this feedback and working through routing revisions. If you are waiting to hear back from us regarding route adjustments or general project questions, please know we will follow up with you as soon as we can.

If you have questions or concerns in the meantime, or if you would like to add information to feedback you already provided, please contact me or powerline@dominionenergy.com. It is most helpful if you include your name, address and/or parcel ID and your preferred method of contact.

Again, thank you for your participation. Hearing from our neighbors allows us to better understand the area and how we can improve our plans. We will hold another community meeting, likely in September, prior to filing our application with the State

Corporation Commission (SCC). At the meeting, we will share any changes to the routes, and continue gathering feedback. Community meetings are not the only way to engage with our team. If you would like to have a smaller group meeting or have other feedback to share, please reach out to me.

Thank you,
Ann Gordon

Ann Gordon Mickel
Communications Consultant
Electric Transmission

Dominion Energy
5000 Dominion Boulevard, Glen Allen, VA 23060

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From: Rachel Tippett
To: wsledge@co.caroline.va.us
Subject: Re: Caroline County - Important Farmlands
Date: Tuesday, October 1, 2024 4:44:42 PM
Attachments: image001.png
image002.png
ecdff6e6-a5f4-482b-bd63-46c0fa011d76_ERM_Logo_160_x2.png

Thanks for this!

Based on the map provided, it appears that our projects (I95 at Rogers Clark Blvd) and (I95 at Ladysmith Road) would be out of those designated areas which are more located in the western and northern areas of the County.

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Rachel Tippett, AICP
Managing Consultant, Planner
She/Her/Hers

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From: wsledge@co.caroline.va.us <wsledge@co.caroline.va.us>
Sent: Tuesday, October 1, 2024 10:24 AM
To: Rachel Tippett <rachel.tippett@erm.com>
Subject: RE: Caroline County - Important Farmlands

EXTERNAL MESSAGE

Here is what I have been able to gather for the important farmlands. Currently there is a layer on GIS called Resource Sensitive Overlay, but there is additional land the county has designated as Agricultural preservation. Below I have linked chapter 8 of the counties comprehensive plan and on page 8 there is the definition given for it and page 9 has a county map with it highlighted. I believe both of these areas meet your definition for important farmlands. If you need a better map I can put you in contact with our GIS tech.

Land Use.pub (caroline.va.us)

Walker Sledge
Environmental Planner
Caroline County Planning and Building Department

From: Rachel Tippett <rachel.tippett@erm.com>
Sent: Tuesday, October 1, 2024 10:09 AM
To: Sledge, Walker <wsledge@co.caroline.va.us>
Subject: Re: Caroline County - Important Farmlands

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.
Good morning,

I wanted to follow up on the request below regarding important farmlands within the County. Please let me know either way if Caroline County has any classification that pertains to this.

thanks!
Rachel

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Rachel Tippett, AICP
Managing Consultant, Planner
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From: Rachel Tippett <rachel.tippett@erm.com>
Sent: Wednesday, September 25, 2024 2:29 PM
To: wsledge@co.caroline.va.us <wsledge@co.caroline.va.us>
Subject: Caroline County - Important Farmlands

Good afternoon,

I am working on the Dominion Energy transmission line projects (Carmel Church and Ruther Glen) and as a part of our routing review, we have to determine whether the county has any designated important farmland (§ 3.2-205 B of the Virginia Code, link below). This is separate from the SSURGO soils farmlands of statewide important designation and is something that is specifically designated by a county. Most counties we contact are not familiar with this, so it could be that you don't have any, but we do have to confirm.

https://law.lis.virginia.gov/vacode/title3.2/chapter2/section3.2-205/

"B. The governing body of each locality, with the cooperation of the U.S. Department of Agriculture, may designate the important farmlands within its jurisdiction. In designating important farmlands, the governing body shall demonstrate that adequate provision has been made for nonagricultural uses within its jurisdiction."

If there are any such farmlands, we would be looking for a map or way to determine whether the project would impact them at all. Could you assist with this, or point me in the right direction of someone who could?

Thanks,
Rachel Tippett

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APPENDIX D FEATURES CROSSING TABLE

FEATURE CROSSINGS TABLE FOR THE RUTHER GLEN PROJECT

Environmental Feature [a, b]	Unit	Route 4	Route 5	Route 6	Switching Station
ROUTE LENGTH AND CONSTRUCTION FOOTPRINT					
Centerline Length	miles	3.7	4.0	3.9	-
Construction Footprint	acres	70.7	77.1	74.1	7.5
ROUTING OPPORTUNITIES					
Collocation (total)	miles	0.4	1.3	0.2	-
Road Collocation	miles	0.1	0.0	0.0	-
Utility Collocation	miles	0.2	1.3	0.2	-
LAND USE					
Land Ownership					
Parcels Crossed by ROW (total)	number	14	19	15	1
Private	number	14	19	15	1
Public	number	0	0	0	0
Total Landowners Crossed by ROW	number	10	16	10	1
Conservation Easements Crossed	acres	0.0	0.0	0.0	0.0
Land Use/Land Cover [c]					
Forested	acres	45.7	43.9	46.8	7.5
Agricultural	acres	8.7	17.4	10.5	0.0
Developed	acres	0.4	0.8	0.2	0.0
Open Space	acres	14.9	14.4	14.6	<0.1
Open Water	acres	0.0	0.0	0.4	0.0
Wetland	acres	1.0	0.7	1.6	0.0
Recreation Areas (total)	number	0	0	0	0
Resource Protection Areas and Resource Management Areas	miles	0.7	0.5	1.2	-
Residences and Other Structures					
Dwellings within ROW	number	0	0	0	0
Dwellings within 60 Feet of ROW	number	0	0	0	0
Dwellings within 100 Feet of Centerline	number	0	0	0	0

Environmental Feature [a, b]	Unit	Route 4	Route 5	Route 6	Switching Station
Dwellings within 250 Feet of Centerline	number	1	1	1	0
Dwellings within 500 Feet of Centerline	number	5	4	3	0
Non-residential Buildings within ROW	number	0	0	0	0
Non-residential Buildings within 500 Feet of Centerline	number	2	5	3	0
Cemeteries, Schools, and Places of Worship					
Cemeteries within 500 Feet of Centerline	number	0	1	0	0
Schools within 500 Feet of Centerline	number	0	0	0	0
Places of Worship within 500 Feet of Centerline	number	0	0	0	0
Zoning Districts					
Rural Preservation (RP)	acres miles	56.3 2.9	69.3 3.6	59.7 3.1	0.0 0.0
Industrial District, Manufacturing, Rural Preservation (M1RP)	acres miles	14.2 0.8	7.6 0.4	14.2 0.8	7.5 -
Planned Developments					
Industrial Parcel	acres	7.5	7.5	7.5	0.0
Lady Smith Property	acres	29.3	22.7	29.3	0.0
Transportation					
Existing Road Crossings (total)	number	2	2	2	-
Local Road Crossings	number	2	2	2	-
Highways Crossings	number	0	0	0	-
NATURAL RESOURCES					
Wetlands [d]					
Wetlands Affected (total)	acres miles	4.4 0.4	4.9 0.2	5.1 0.3	NA NA
Palustrine Forested	acres	2.9	2.9	2.9	NA
Palustrine Scrub-Shrub	acres	NA	NA	NA	NA
Palustrine Emergent	acres	0.7	0.7	0.8	NA
Palustrine Unconsolidated Bottom	acres	0.5	1.1	0.8	NA
Riverine	acres	0.2	0.2	0.5	NA

Environmental Feature [a, b]	Unit	Route 4	Route 5	Route 6	Switching Station
Waterbodies [c]					
Waterbody (total)	number	7	6	9	0
Perennial	number	2	1	0	0
Intermittent	number	5	5	7	0
Lake/Pond	number	0	0	2	0
Natural Heritage Resources					
Ecological Cores					
C4: Moderate	number acres	2 32.2	2 36.6	2 32.8	0 -
C5: General	number acres	3 13.4	1 5.6	3 14.6	1 6.8
Forest Conservation Value					
Average (1)	acres	12.1	15.8	11.7	0.0
Moderate (2)	acres	14.3	10.7	14.8	4.2
High (3)	acres	15.1	12.8	16.2	3.4
Very High (4)	acres	16.6	19.2	19.8	0.0
Outstanding (5)	acres	2.5	1.8	1.3	0.0
NRCS Soil Classification (SSURGO)					
Prime Farmland	acres	16.6	30.7	20.1	0.9
Farmland of Statewide Importance	acres	45.8	43.0	39.5	6.6
Protected Species					
New Jersey Rush Predicted Suitable Habitat	acres	10.4	12.5	13.3	0.0
Bald Eagle Nests within 330 Feet	number	0	0	0	0
Bald Eagle Nests within 660 Feet	number	0	0	0	0
CULTURAL RESOURCES					
Archaeological Sites within ROW	number	0	0	0	0
NRHP Eligible and NRHP Listed Properties, NHLs, Battlefields, and Historic Landscapes within ROW	number	0	0	0	0
NRHP Eligible and NRHP Listed Properties, NHLs, Battlefields,	number	0	0	0	0

Environmental Feature [a, b]	Unit	Route 4	Route 5	Route 6	Switching Station
and Historic Landscapes within 0.5 Mile					
NRHP Listed Properties, NHLs, Battlefields, Historic Landscapes, and NHLs between 0.5 and 1.0 Mile	number	0	0	0	0
NHLs between 1.0 and 1.5 Miles	number	0	0	0	0
Historic Districts Crossed	number	0	0	0	0
NRHP Listed Battlefields Crossed	number	0	0	0	0
NRHP Eligible Battlefields Crossed	number	0	0	0	0
VDHR Easements Crossed	number	0	0	0	0
Battlefields (National Park Service ABPP) Crossed	number	0	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.

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 E WETLAND AND WATERBODY DESKTOP STUDY

ERM

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Suite 2900
Minneapolis, Minnesota 55402

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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
RUTHER GLEN 230 KV LINE EXTENSION PROJECT

REFERENCE
0721582

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 Ruther Glen 230 kV (kilovolt) Line Extension (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:

- Two new, double circuit, overhead 230 kV transmission lines (Ruther Glen Line #256) in new rights-of-way will cut the existing Dominion Line #256 and connect to the proposed Ruther Glen Switching Station; and
- Two new 230 kV delivery point switching stations (Ruther Glen Switching Stations, Phase 1 and Phase II) 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 future 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.

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 (i.e., the proposed Project) 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 intersection of Cedon Road at Route 1 to the north;
- The Legacy Park sports complex and the Caroline County Agricultural Fairgrounds to the south;
- The existing Dominion line #256 transmission corridor to the east; and
- The existing Dominion line #574 transmission corridor to the west.

The study area identified for the Project contains approximately 31,270 acres (48.9 square miles) wholly within Caroline County. The Project origin is the Company's existing Ladysmith CT – St. Johns Line (line #256), terminating at the proposed Ruther Glen Switching Station located approximately 0.8 mile east of the Ladysmith Road interchange on Interstate 95 (I-95). There are no incorporated cities within the study area.

Land use and land cover within the study area consists of low amounts of developed land as well as a mix of agricultural land and forested areas along the waterbodies within the study area, including Hobby Swamp, South River, Reedy Swamp, Polecat Creek, and DeJarnette Mill Run, and associated tributaries. The largest forested/undeveloped areas are associated with riparian areas along South River waterways in the northeast portion of the study area, and riparian areas along Polecat Creek waterways in the southeastern portion of the study area. A commercial development, consisting of a recent or future data center campus, is within the study area. The study area is shown in Attachment 1.

Within the study area, ERM initially identified five 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 to the west. Seven routes were proposed to connect to existing Line #256 and two routes were proposed to connect to existing Line #574. Of these, two potential cut-in locations (both on existing Line #256) and three associated routes (Routes 4, 5, and 6) were retained for analysis, while the others were eliminated. Descriptions of the routes are provided in the subsections below and shown on Attachment 1.

ROUTE ALTERNATIVES

ROUTE 4

Route 4 taps the Company's existing Line #256 approximately 0.8 mile due north of Golansville Road and extends west for approximately 1.1 miles across agricultural fields, forested land, a Columbia Gas Natural Gas easement and Balty Road. Following property lines west of Balty Road, Route 4 passes through forested parcels and crosses Dejarnette Mill Run twice before turning southwest to cross Boxley Road approximately 0.6 mile north of Golansville Road. West of Boxley Road, Route 4 turns northwest for an approximate 1.1 miles through forested land east of Reedy Swamp and west of rural residential properties before turning west to enter the proposed Ruther Glen Switching Station.

Route 4 measures approximately 3.7 miles long. The cumulative right-of-way for this alternative (70.7 acres) and the proposed Ruther Glen Switching Station site (7.5 acres) would encompass a combined 78.2 acres.

ROUTE 5

Route 5 taps the Company's existing Line #256 in the same location as Route 4 and follows the same path as Route 4 for the first approximately 2.0 miles. At this point, Route 5 turns north to cross Bath Road/Pond Road and extends north for approximately 0.80 mile through forested parcels and along the eastern edge of an agricultural parcel. Route 5 then turns west to run parallel to and south of the existing REC 115 kV easement for approximately 0.8 mile through agricultural and then forested land. Route 5 then crosses and runs parallel to the north side of the REC easement for approximately 0.4 mile through forested land before entering the Ruther Glen Switching Station.

Route 5 measures approximately 4.0 miles long. The cumulative right-of-way for this alternative (77.1 acres) and the proposed Ruther Glen Switching Station site (7.5 acres) would encompass a combined 84.6 acres.

ROUTE 6

Route 6 taps the Company's existing Line #256 in the same location as Route 4 and follows the same path as Route 4 for the first approximately 1.5 miles. At this point, Route 6 turns south for approximately 0.3 mile and then west for approximately 0.6 mile before crossing Boxley Road. This segment of Route 6 runs through forested land and crosses Dejarnette Mill Run three times, including two crossings north of Boulware Pond. After crossing BOxley Road, Route 6 turns northwest for approximately 1.2 miles through forested areas east of Reedy Swamp and west of rural residential properties along Boxley Road. Route 6 then crosses the existing REC 115kV easement and turns west to enter the proposed Ruther Glen Switching Station.

Route 6 measures approximately 3.9 miles long. The cumulative right-of-way for this alternative (74.1 acres) and the proposed Ruther Glen Switching Station site (7.5 acres) would encompass a combined 81.6 acres.

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 2023)
- 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 2023). 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 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 Wetland Studies and Solutions, Inc. summer (between July and August) 2024 on the parcel containing the proposed Ruther Glen Switching Stations, which identified aquatic resources along Route 4 between MP 3.0 and the Switching Stations, Route 5 between MP 3.7 and the proposed Ruther Glen Switching Stations, and Route 5 between MP 3.2 and the Switching Stations (Wetland Studies and Solutions, Inc. 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 probability and type displayed on color base map images.

ERM

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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 15.1-acre Ruther Glen Switching Station footprints.

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

Probability	Total Within Right-of-way (acres)	Wetland and Waterbody type (acres)				
		PEM (Emergent)	PFO (Forested)	PSS (Scrub Shrub)	PUB (Freshwater pond)	Riverine (Stream)
Route 4						
High	0.8	NA	0.3	NA	0.5	NA
Medium/High	0.7	0.3	0.3	NA	0.1	0.0
Medium	2.9	0.4	2.3	NA	0.0	0.2
Medium/Low	0.0	0.0	0.0	NA	0.0	0.0
Low	NA	NA	NA	NA	NA	NA
Very Low	NA	NA	NA	NA	NA	NA
Route 5						
High	0.5	NA	NA	NA	0.5	
Medium/High	0.7	0.1	0.1	NA	0.5	0.0
Medium	3.7	0.6	2.8	NA	0.1	0.2
Medium/Low	0.0	NA	NA	NA	0.0	0.0
Low	NA	NA	NA	NA	NA	NA
Very Low	NA	NA	NA	NA	NA	NA

Probability	Total Within Right-of-way (acres)	Wetland and Waterbody type (acres)				
		PEM (Emergent)	PFO (Forested)	PSS (Scrub Shrub)	PUB (Freshwater pond)	Riverine (Stream)
Route 6						
High	1.7	0.4	0.3	NA	0.6	0.3
Medium/High	0.6	0.1	0.3	NA	0.2	0.0
Medium	2.8	0.3	2.3	NA	0.0	0.2
Medium/Low	0.2	0.0	0.0	NA	0.1	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.

WETLAND CROSSINGS

Within the study area, most wetlands are forested and are generally concentrated around the South River in the northern half of the study area and Reedy Swamp and Lake Caroline in the southern half of the study area. Riverine (stream) features and PUB (open water) features are described in the Waterbody Crossings section below.

ROUTE 4

The length of the corridor for Ruther Glen Route 4 is approximately 3.7 miles and encompasses a total of approximately 70.7 acres of existing ROW (not including the 15.1-acre Ruther Glen Switching Station footprints). Based on the methodology discussed above, the right-of-way footprint will encompass approximately 6.2 percent (4.4 acres) of land with a medium or higher probability of containing wetlands and waterbodies. Of these 4.4 acres, 2.9 acres consist of PFO and 0.7 acre consist of PEM wetlands, and 0.5 acre consist of PUB open water and 0.2 acre consist of riverine features.

ROUTE 5

The length of the corridor for Ruther Glen Route 5 is approximately 4.0 miles and encompasses a total of approximately 77.1 acres of existing ROW (not including the 15.1-acre Ruther Glen Switching Station footprints). Based on the methodology discussed above, the right-of-way footprint will encompass approximately 6.3 percent (4.9 acres) of land with a medium or higher probability of containing wetlands and waterbodies. Of these 4.9 acres, 2.9 acres consist of PFO and 0.7 acre consist of PEM wetlands, and 1.1 acre consist of PUB open water and 0.2 acre consist of riverine features.

ROUTE 6

The length of the corridor for Ruther Glen Route 6 is approximately 3.9 miles and encompasses a total of approximately 74.1 acres of existing ROW (not including the 15.1-acre Ruther Glen Switching Station footprints). Based on the methodology discussed above, the right-of-way footprint will encompass approximately 6.9 percent (5.1 acres) of land with a medium or higher probability of containing wetlands and waterbodies. Of these 5.3 acres, 2.9 acres consist of PFO and 0.8 acre consist of PEM wetlands, and 0.8 acre consist of PUB open water and 0.5 acre consist 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 Ruther Glen Routes include DeJarnette Mill Run, Reedy Swamp, unnamed, intermittent tributaries to these waterbodies, and open waterbody features. No waterbodies were identified within the Ruther Glen Switching Station footprints.

TABLE 3: WATERBODIES CROSSED BY THE ROUTE ALTERNATIVES

Waterbodies Crossed	Unit	Route 4	Route 5	Route 6
NHD-Mapped Perennial Streams/Rivers	Number	2	1	0
NHD-Mapped Intermittent Streams/Rivers	Number	5	5	7
NHD-Mapped Perennial Lakes/Ponds	Number	0	0	2
Total	Number	7	6	9

Source: USGS NHD (NHD 2023)

ROUTE 4

Route 4 would have a total of seven NHD-mapped waterbody crossings, including 2 perennial waterbodies (DeJarnette Mill Run and Reedy Swamp), and 5 unnamed, intermittent streams. As described above, based on ERM's desktop wetland and waterbody analysis, the right-of-way for Route 4 would encompass approximately 0.5 acre of PUB open water features and 0.2 acre of riverine features.

ROUTE 5

Route 5 would have a total of six NHD-mapped waterbody crossings, including 1 perennial waterbody (Reedy Swamp), and 5 unnamed, intermittent streams. As described above, based on ERM's desktop wetland and waterbody analysis, the right-of-way for Route 5 would encompass approximately 1.1 acres of PUB open water features and 0.2 acre of riverine features.

ROUTE 6

Route 6 would have a total of nine NHD-mapped waterbody crossings, including 2 perennial lakes/ponds, and 7 unnamed, intermittent streams. As described above, based on ERM's desktop wetland and waterbody analysis, the right-of-way for Route 6 would encompass approximately 0.8 acre of PUB open water features and 0.5 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.

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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 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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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

RUTHER GLEN SWITCHING STATION

Cedon
Blantons
Davis Corner
Ryland Corner
Wrights Corner
Ladysmith Village
Ladysmith
Lake Land'O
Lake Landor
Pendleton Golf Club
Chilesburg
Lake Caroline
Lake Caroline
Balty
Athens
Poplar
Milford

Cedon Rd
Gatewood Rd
Rylands Rd
Bull Church Rd
Michaels Rd
S River Rd
Paige Rd
Ladysmith Rd
Durrette Rd
Green Rd
Golansville Rd
Countryline Church Rd
Goose Hill Rd
Parrow Rd
C C C Rd
Cedar Fork Rd
Polecat Creek
Nelson Hill Rd
Lester Ln
Pemola Rd
Industrial Dr

South River
Mattaponi River
Stevens Mill Run
Reedy Swamp
Dry Jamette Mill Run

313 ft
254 ft
241 ft
232 ft

SPOTSYLVANIA COUNTY
CAROLINE COUNTY

95
1
207

Project Loaction
OH
WV
KY
Virginia
TN

△ Proposed Switching Station
Existing Dominion Energy Electric Transmission Line
Existing REC Line
Route 4
Route 5
Route 6
Study Area

1:53,000
0 2,500 5,000
Feet

Attachment 1
Overview Map
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM
Dominion Energy

ERM

222 South 9th Street
Suite 2900
Minneapolis, Minnesota 55402

T +0 804 253 1090
F +0 804 253 1091

erm.com

ATTACHMENT 2

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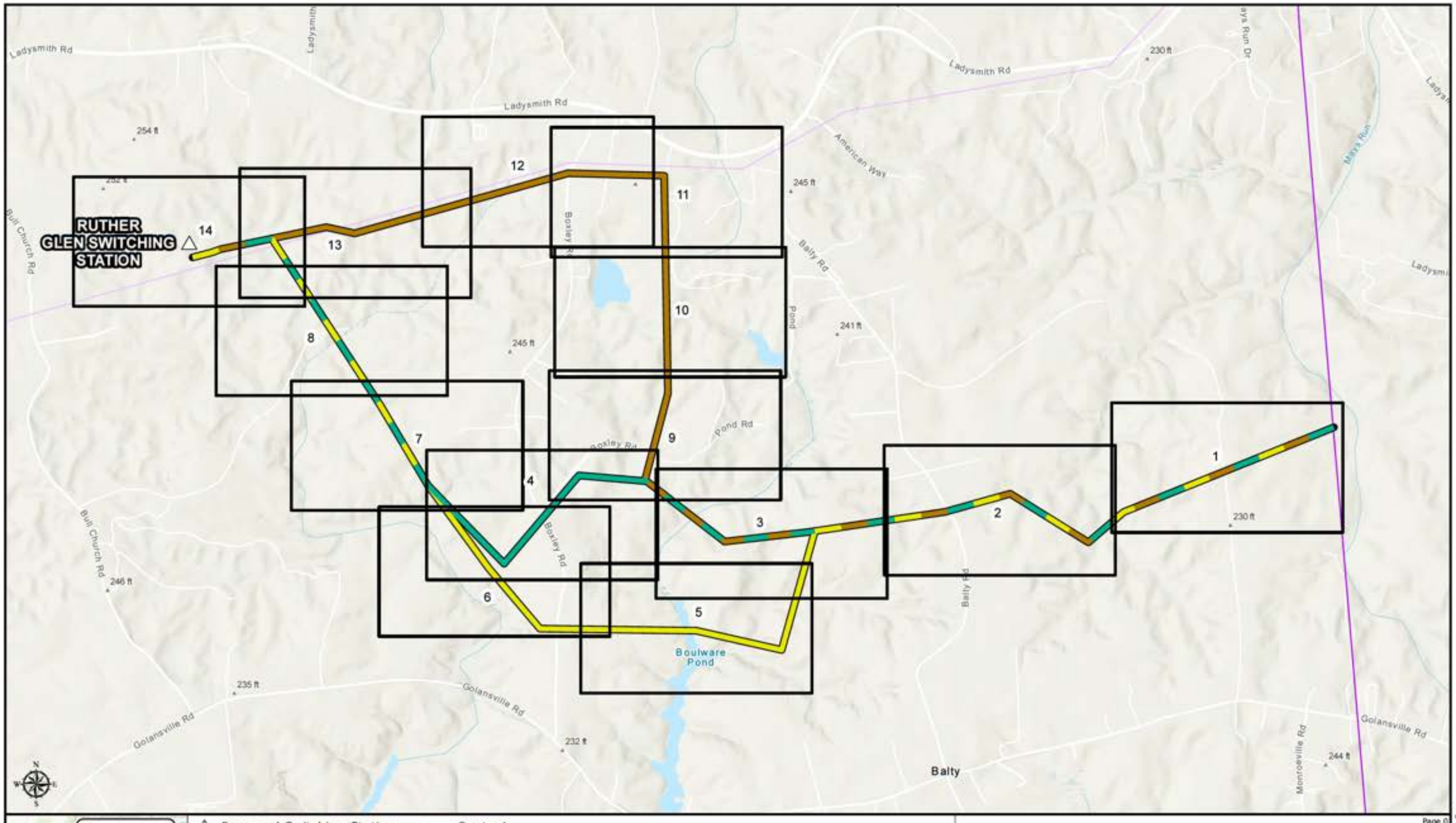

Attachment 2 Index
Wetland Probability Map Set
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

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Existing Dominion Energy Electric Transmission Line
Route 4 MP
Route 5 MP
Route 6 MP
Route 4
Route 5
Route 6
NHD Stream
NWI Wetland
Nonhydric
Predominantly nonhydric
Predominantly hydric
1:2,400
0 100 200
Feet

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

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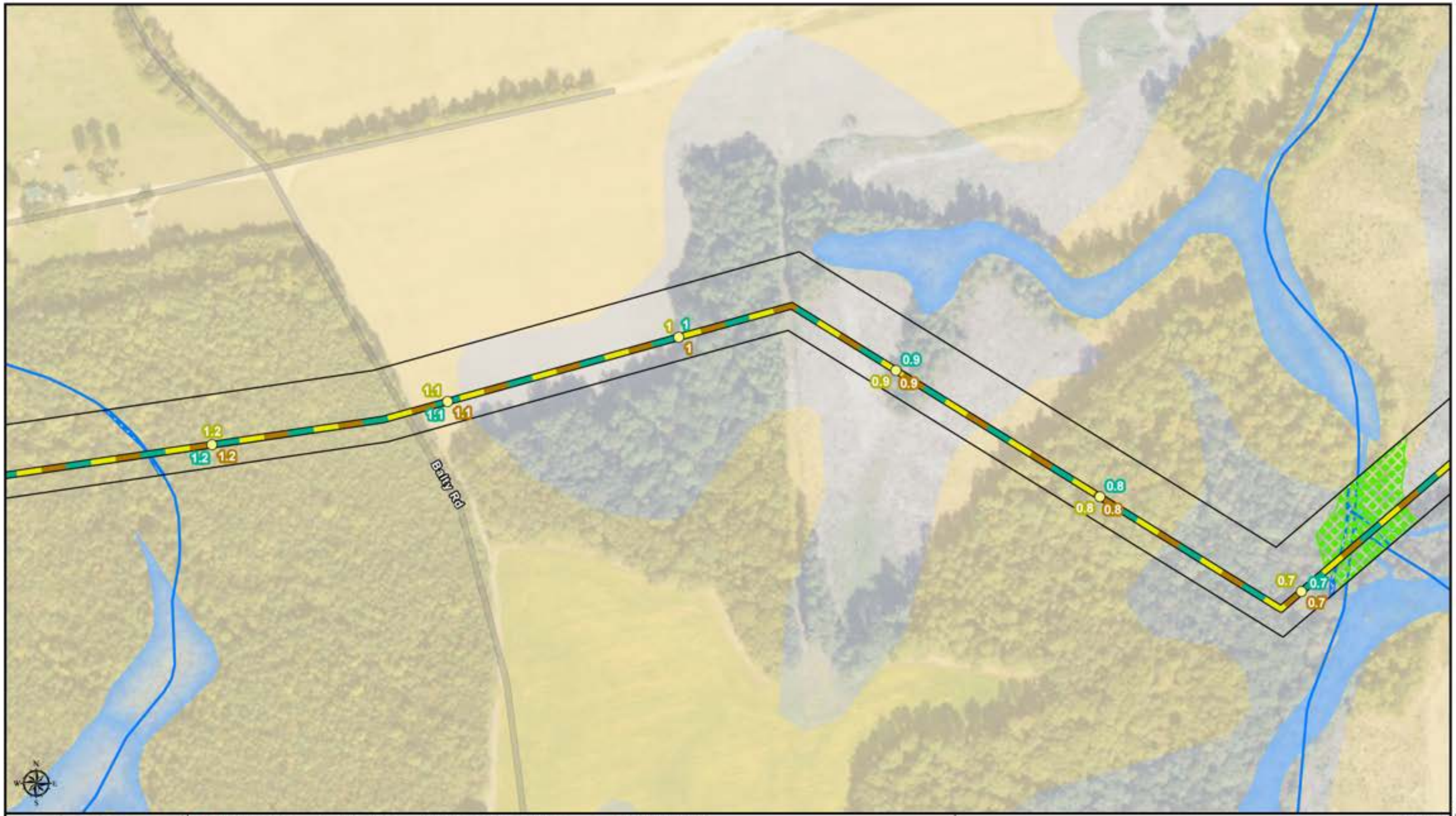

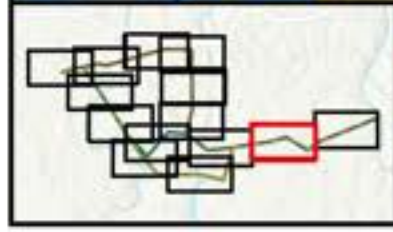

Route 4 MP
Route 5 MP
Route 6 MP
Route 4
Route 5
Route 6

Wetland Cover Type
PFO
Riverine
NHD Stream

NWI Wetland
Nonhydric
Predominantly nonhydric

1:2,400
0 100 200
Feet

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

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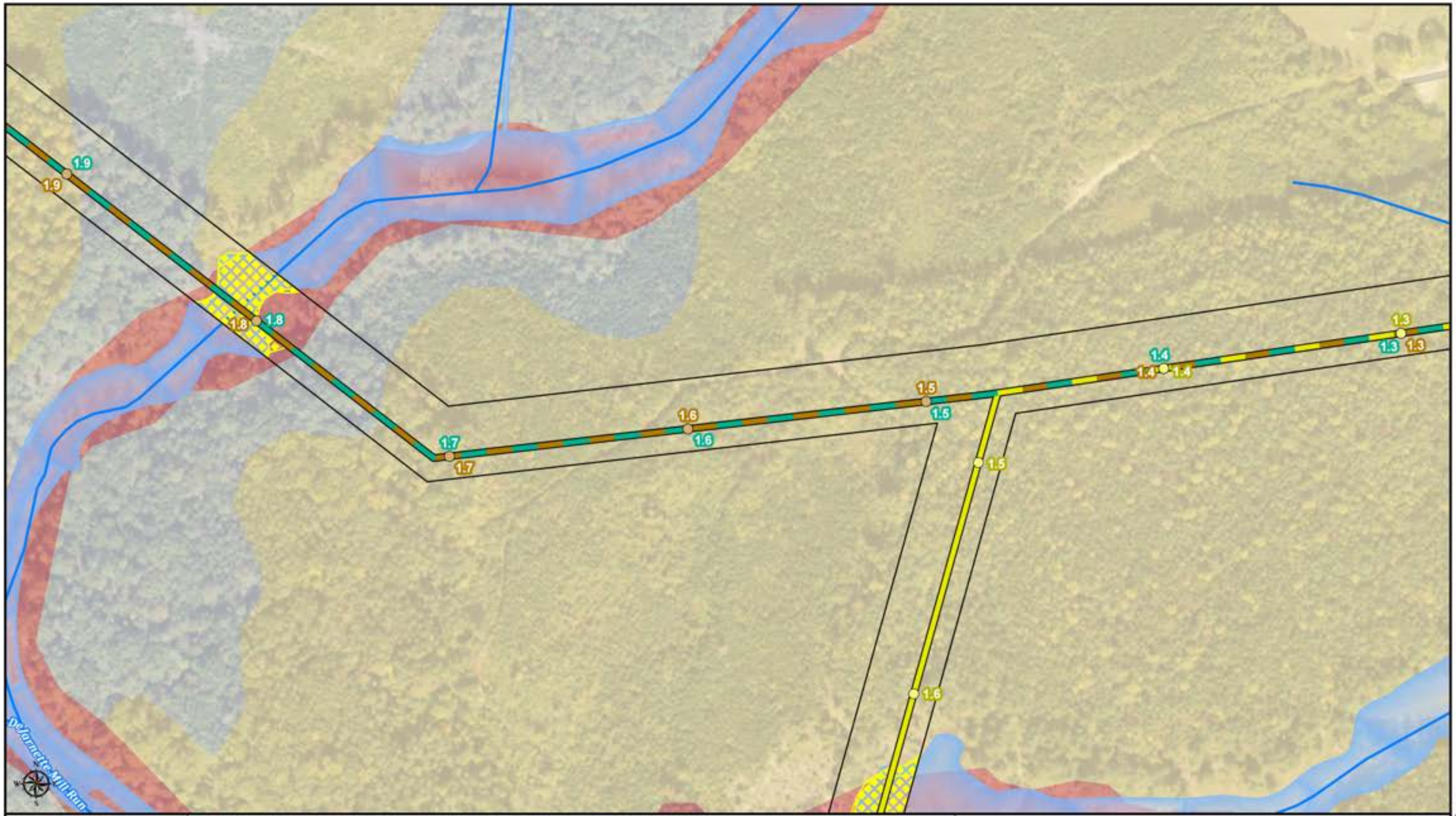

Route 4 MP
Route 5 MP
Route 6 MP
Route 4
Route 5
Route 6

Wetland Cover Type
PUB
NHD Stream

NWI Wetland
Nonhydric
Predominantly nonhydric
Predominantly hydric

1:2,400
0 100 200
Feet

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

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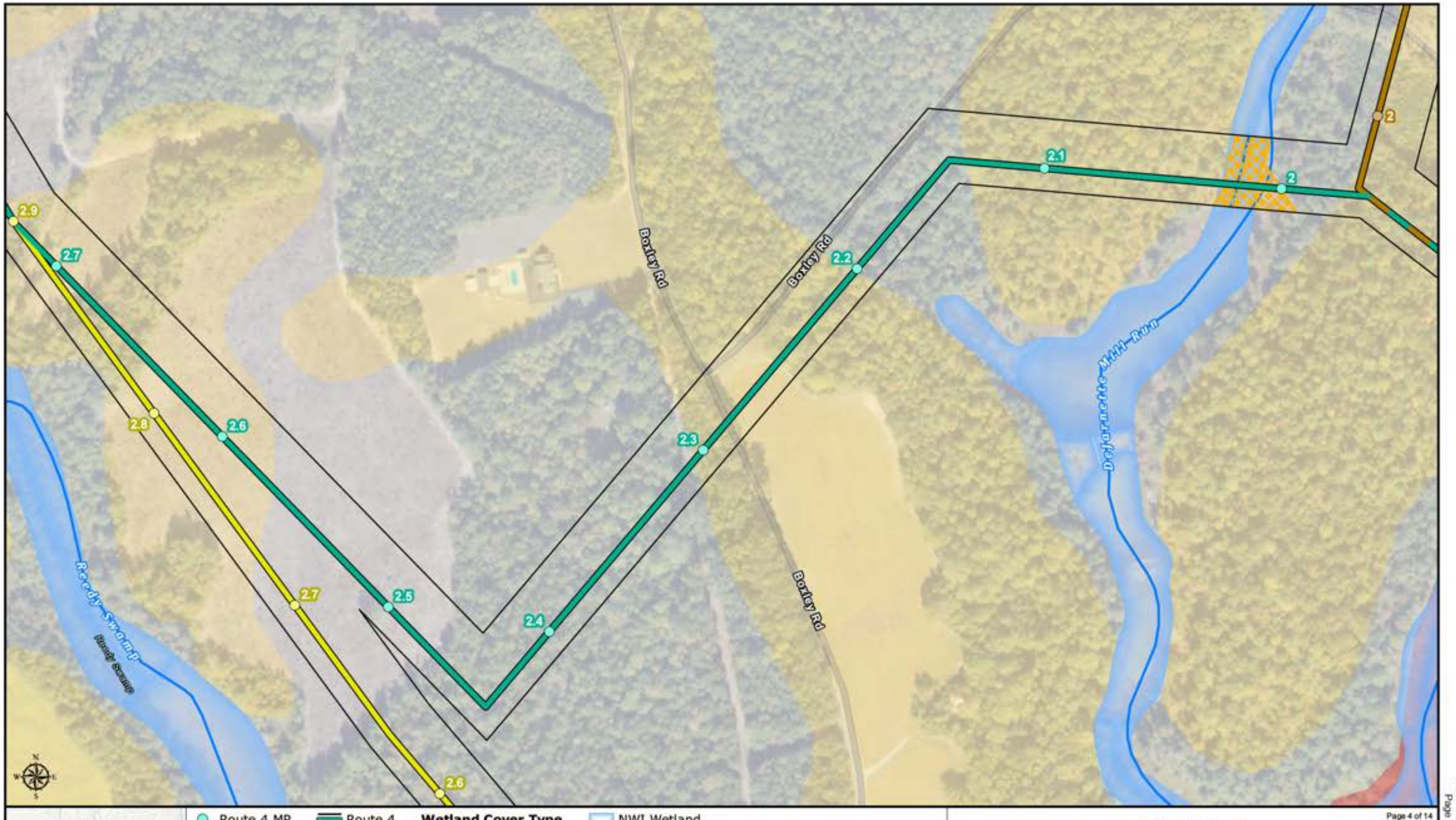

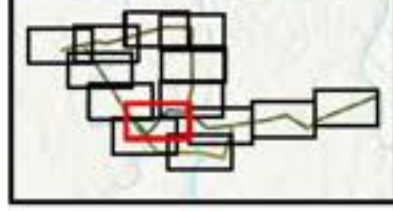

Route 4 MP
Route 5 MP
Route 6 MP
Route 4
Route 5
Route 6

Wetland Cover Type
PEM
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
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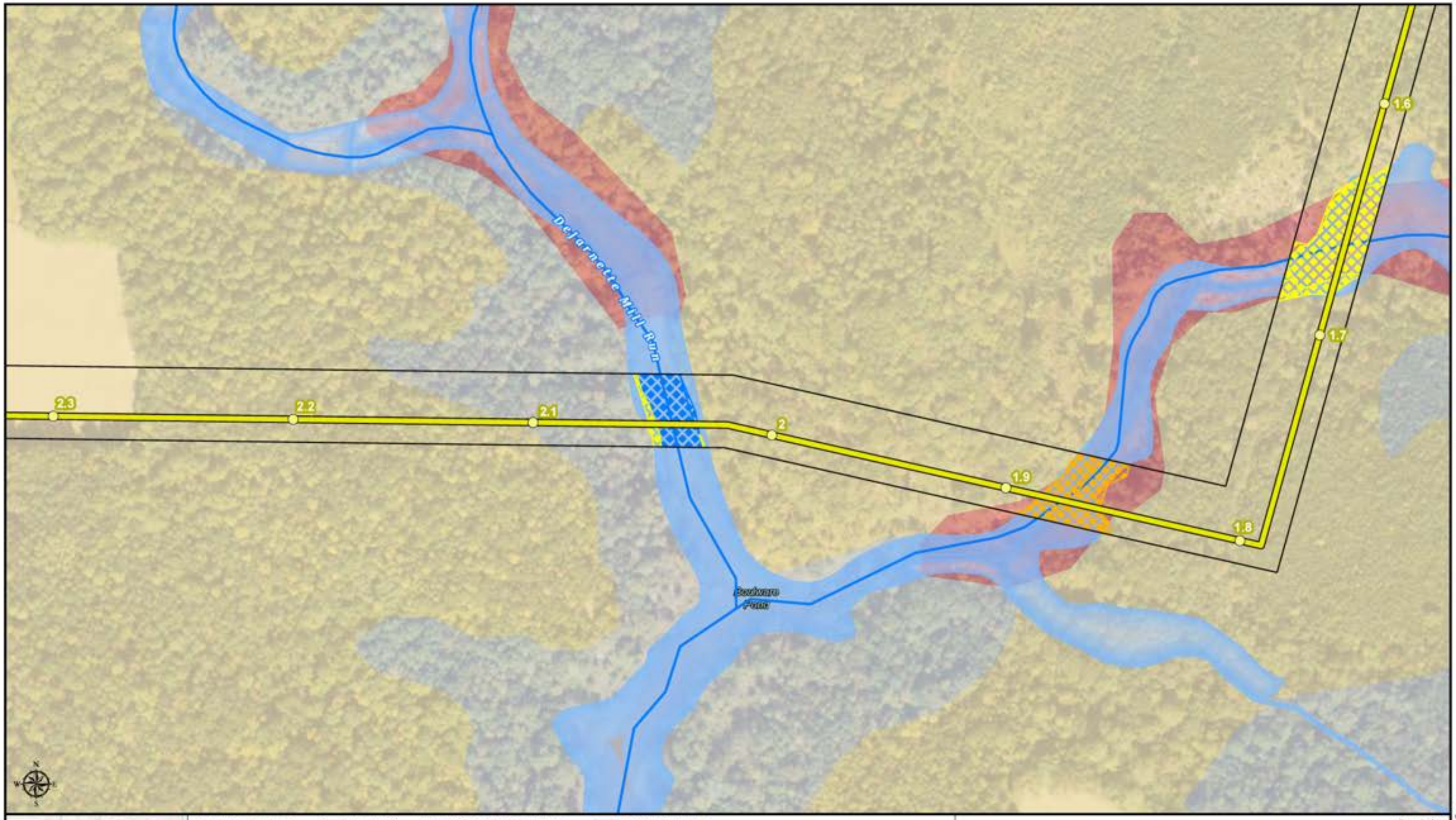

Route 6 MP
Route 6

Wetland Cover Type
PEM
PUB
Riverine
NHD Stream

NWI Wetland
Nonhydric
Predominantly nonhydric
Predominantly hydric

1:2,400
0 100 200
Feet

Page 5 of 14

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

ERM
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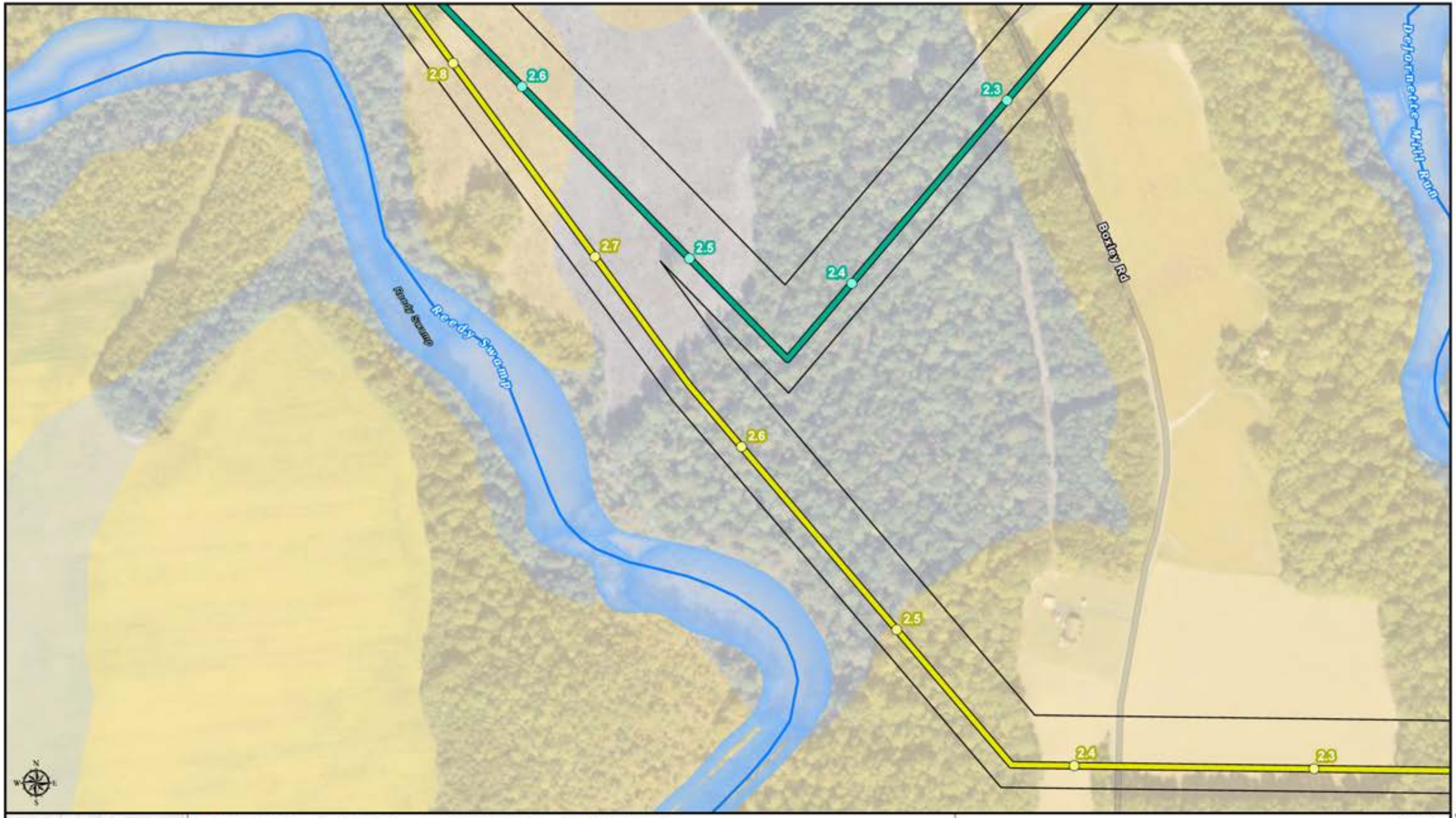

Route 4 MP
Route 6 MP
Route 4
Route 6
NHD Stream
NWI Wetland
Nonhydric
Predominantly nonhydric

1:2,400
0 100 200
Feet

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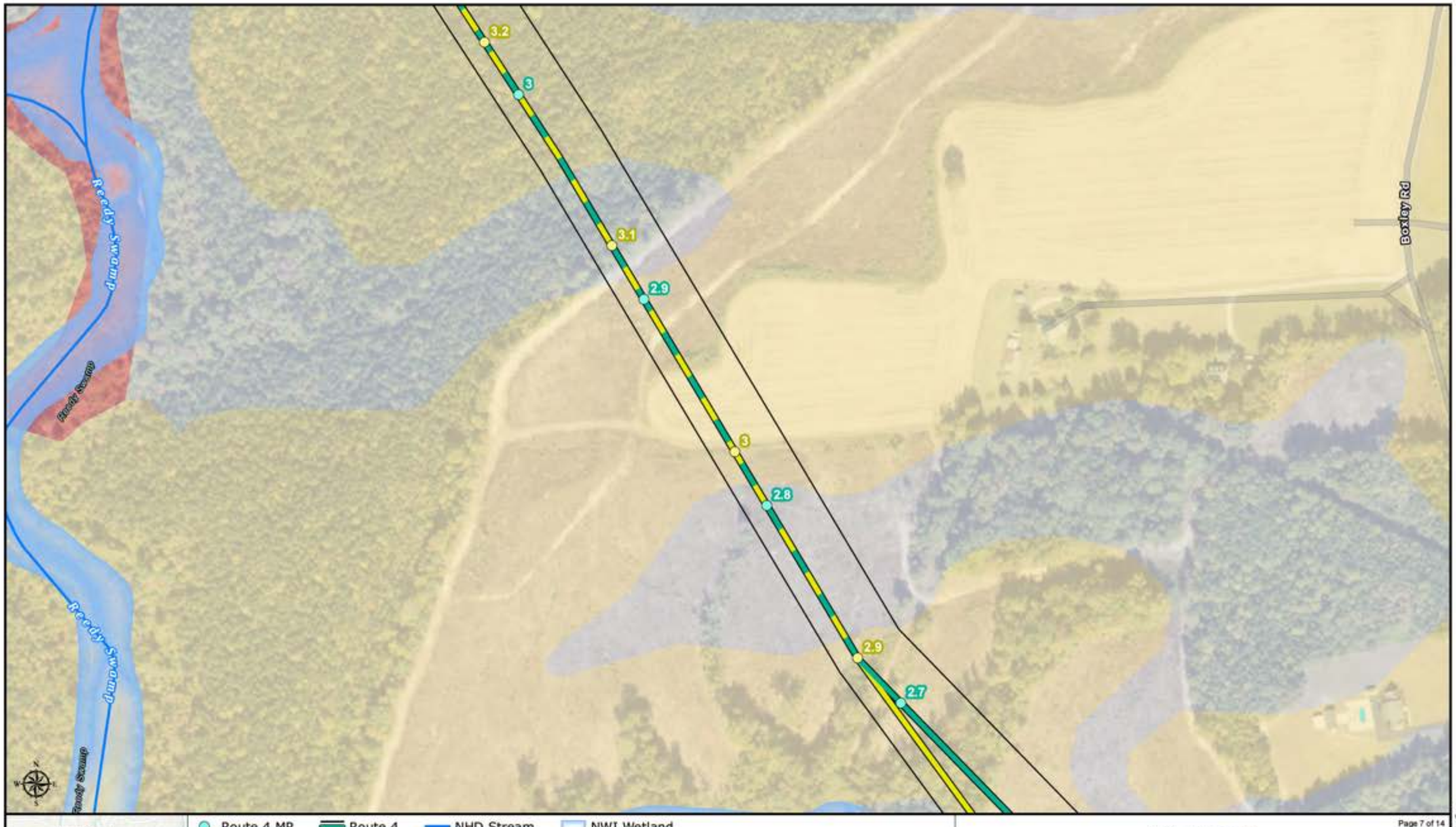

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Attachment 2
Wetland Probability Map Set - Wetland Type
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

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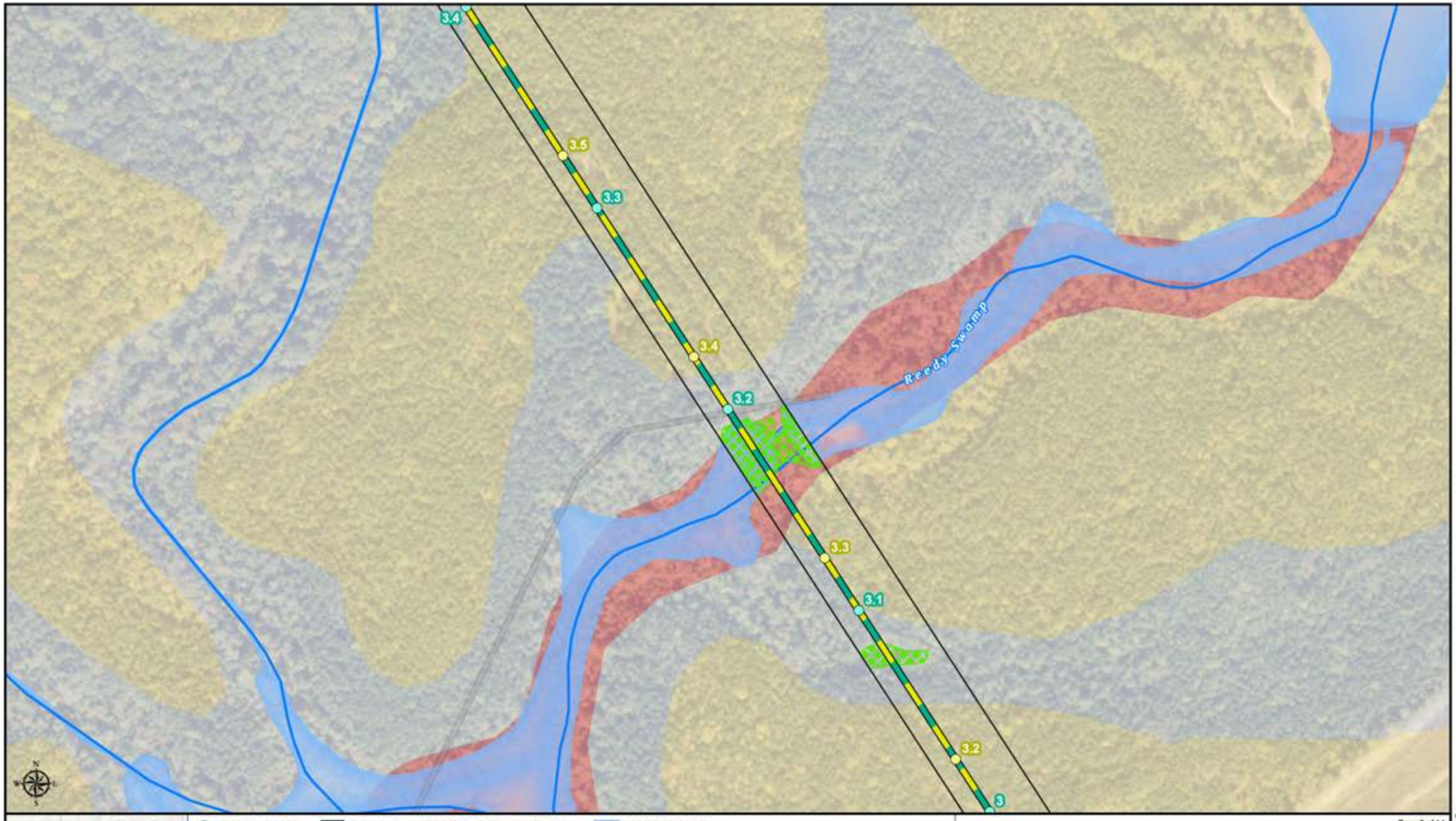

Route 4 MP
Route 6 MP
Route 4
Route 6

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
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

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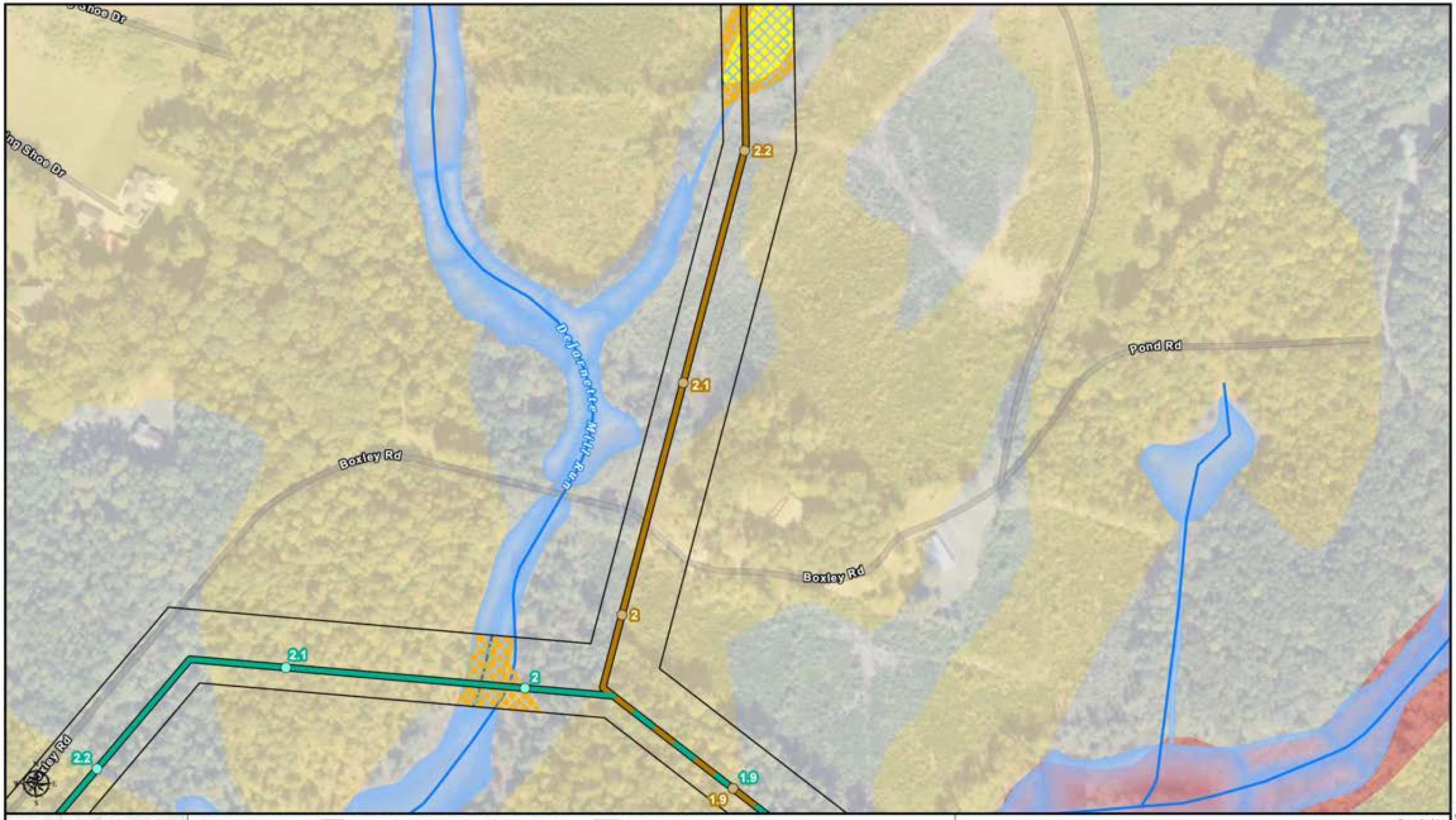

Route 4 MP
Route 5 MP
Route 4
Route 5

Wetland Cover Type
PEM
PUB
Riverine
NHD Stream

NWI Wetland
Nonhydric
Predominantly nonhydric
Predominantly hydric

1:2,400
0 100 200
Feet

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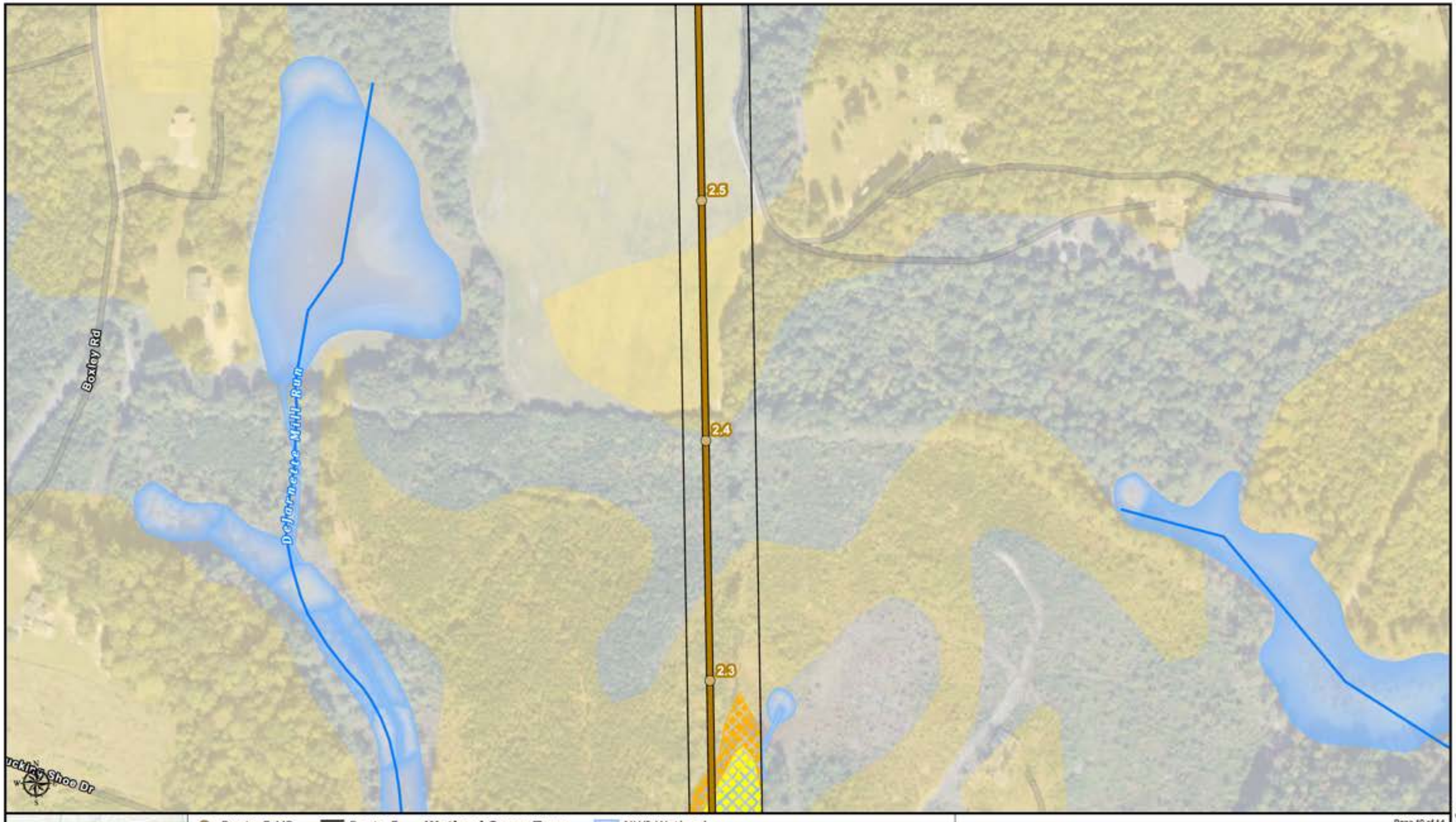

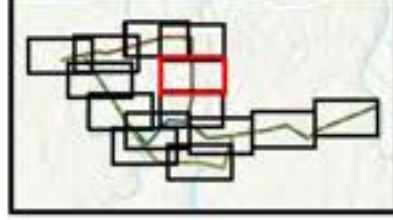

Route 5 MP
Route 5

Wetland Cover Type
PEM
PUB
NHD Stream

NWI Wetland
Nonhydric
Predominantly nonhydric

1:2,400
0 100 200
Feet

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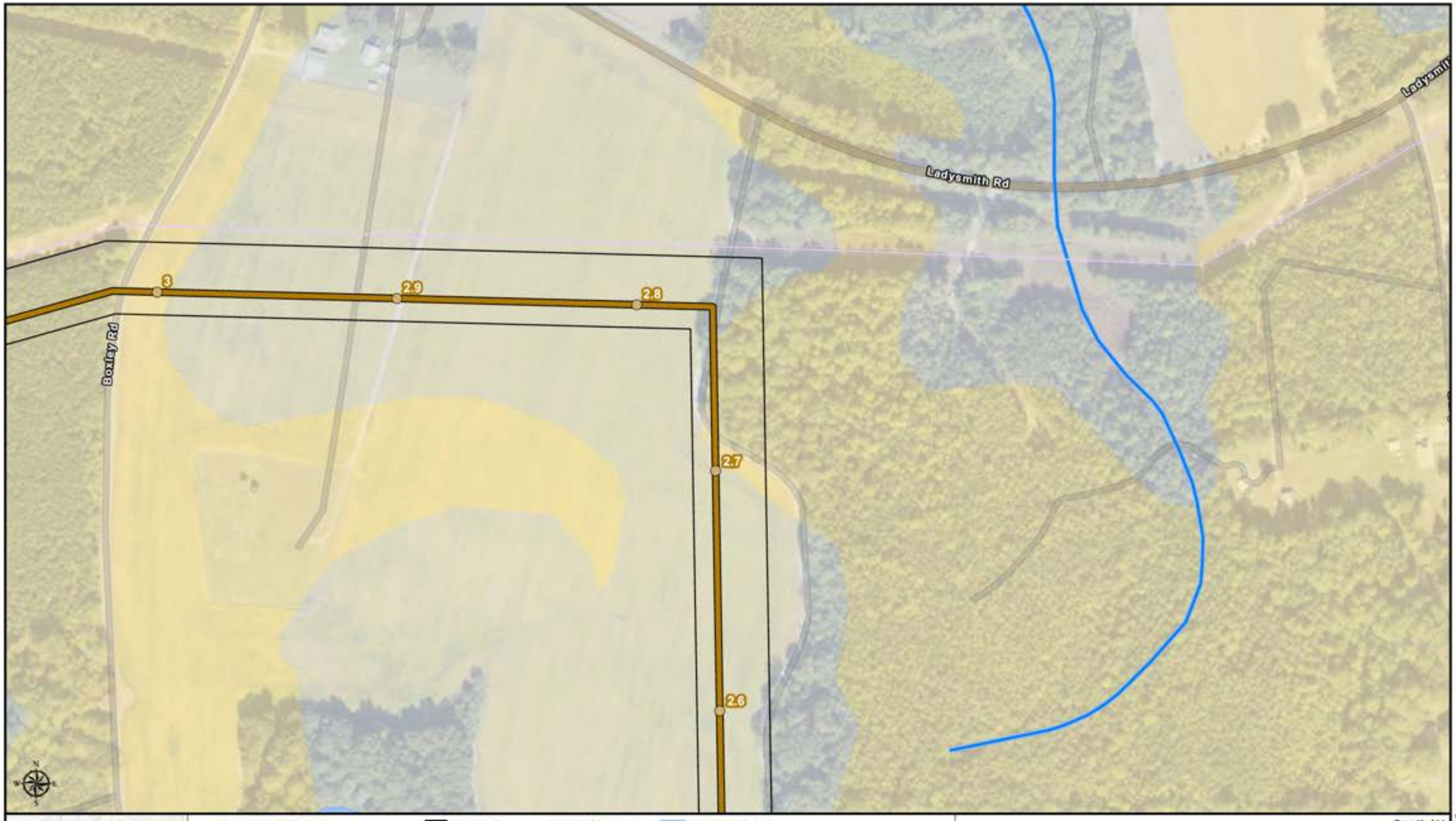

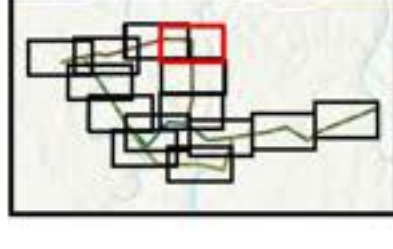

Existing REC Line
Route 5 MP
Route 5
NHD Stream
NWI Wetland
Nonhydric
Predominantly nonhydric

1:2,400
0 100 200
Feet

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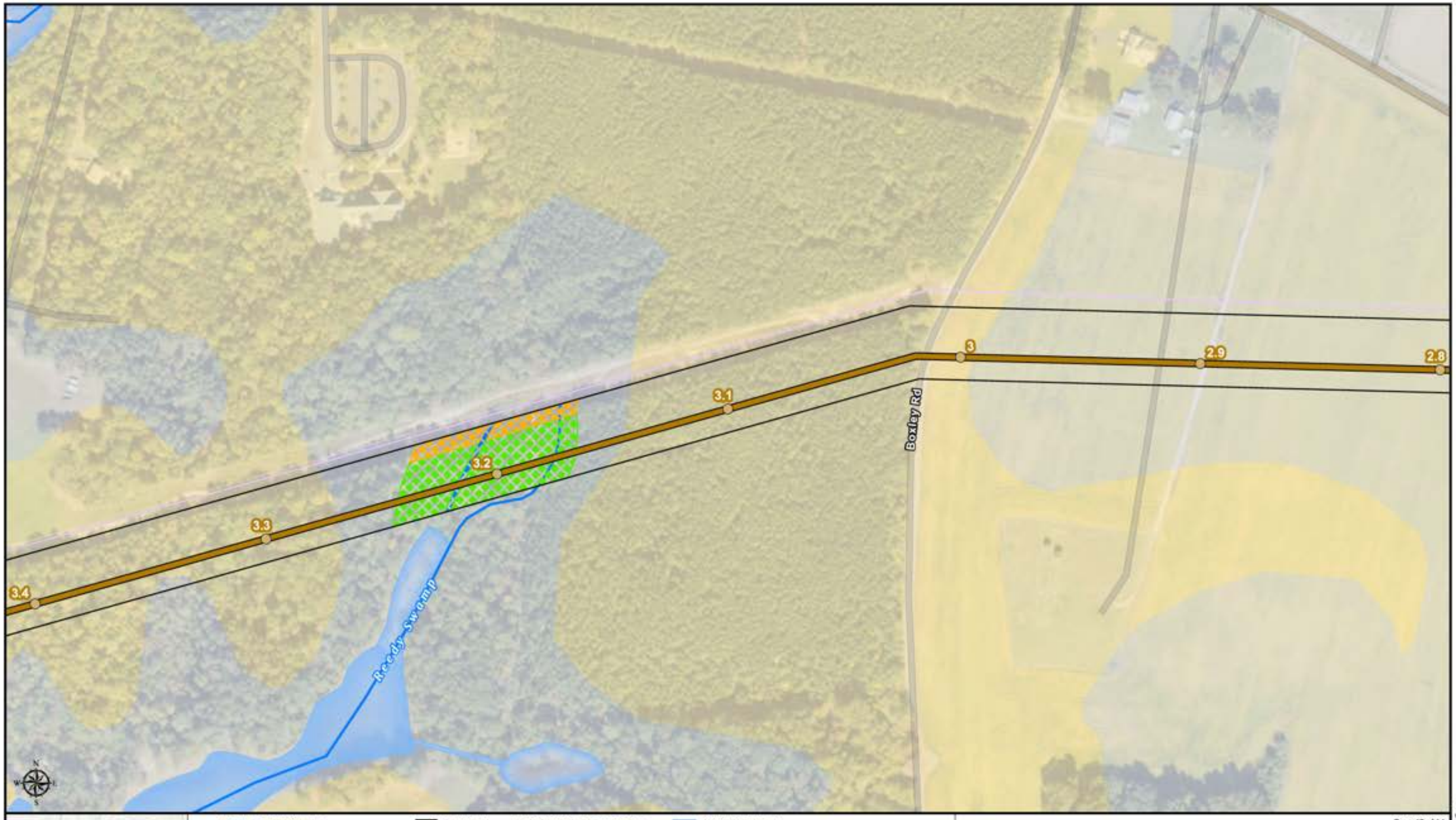

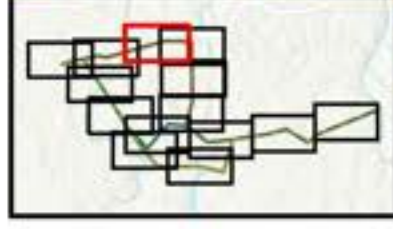

Existing REC Line
Route 5 MP
Route 5

Wetland Cover Type
PEM
PFO
Riverine
NHD Stream

NWI Wetland
Nonhydric
Predominantly nonhydric

1:2,400
0 100 200
Feet

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

ERM

Dominion Energy

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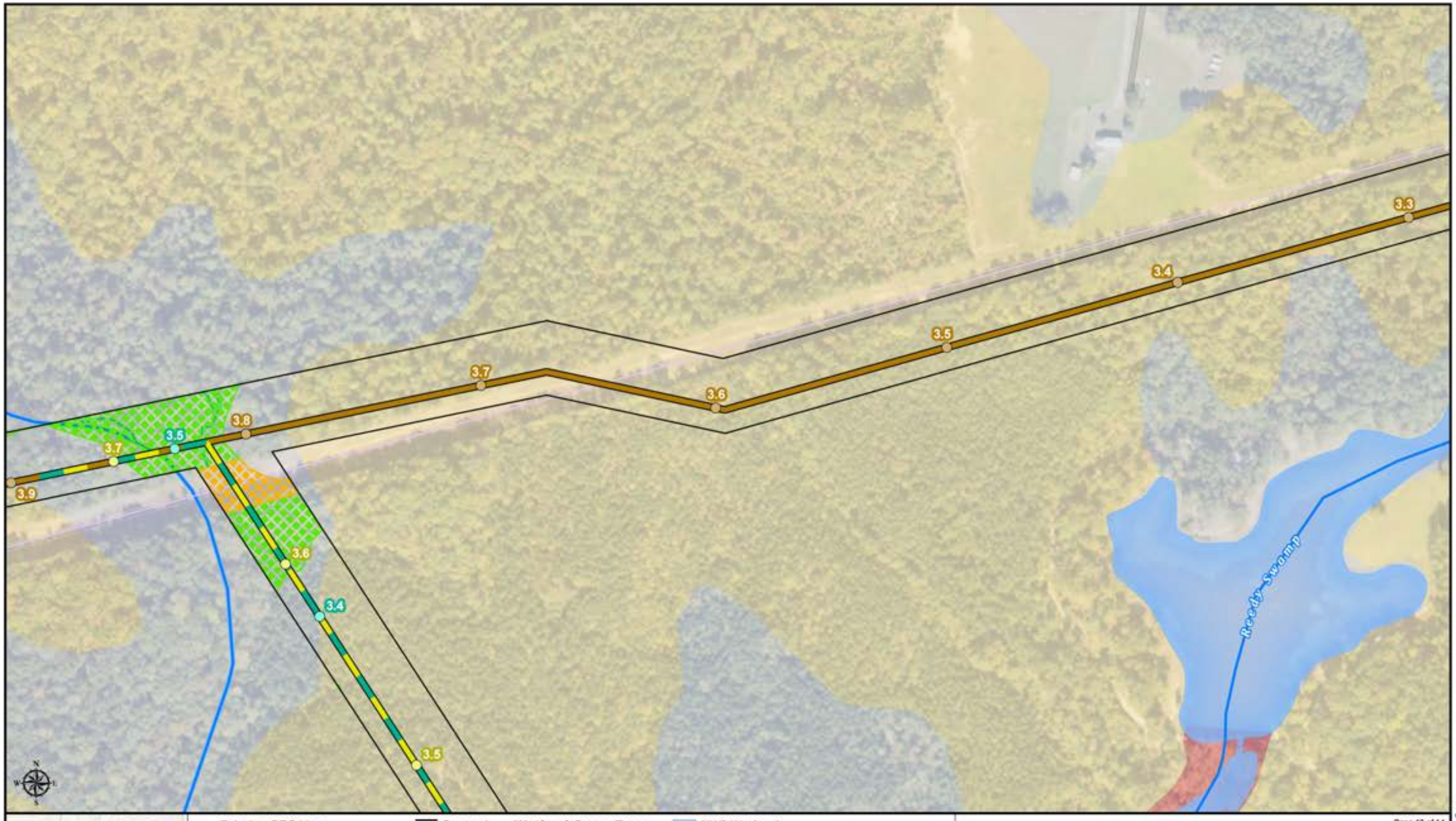

Existing REC Line
Route 4 MP
Route 5 MP
Route 6 MP
Route 4
Route 5
Route 6

Wetland Cover Type
PEM
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
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

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RUTHER GLEN SWITCHING STATION

3.8
3.6
3.9
3.7
3.5
3.8
4
3.6
3.4

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

Wetland Cover Type
PEM
PFO
Riverine
NHD Stream

NWI Wetland
Nonhydric
Predominantly nonhydric

1:2,400
0 100 200
Feet

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

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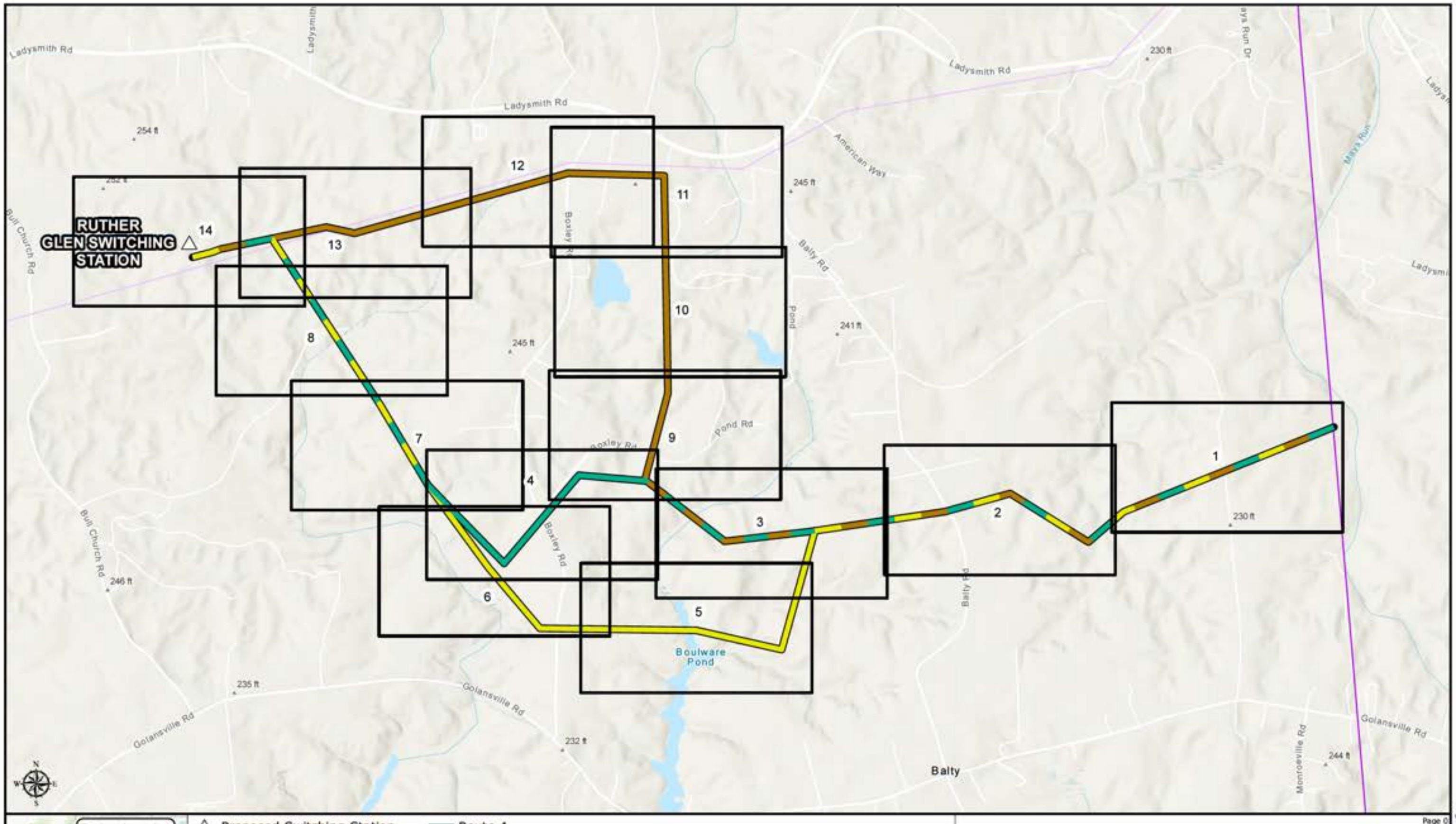

Attachment 2 Index
Wetland Probability Map Set
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

Dominion Energy

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Existing Dominion Energy Electric Transmission Line
Route 4 MP
Route 5 MP
Route 6 MP
Route 4
Route 5
Route 6
NHD Stream
NWI Wetland
Nonhydric
Predominantly nonhydric
Predominantly hydric
1:2,400
0 100 200
Feet

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

ERM

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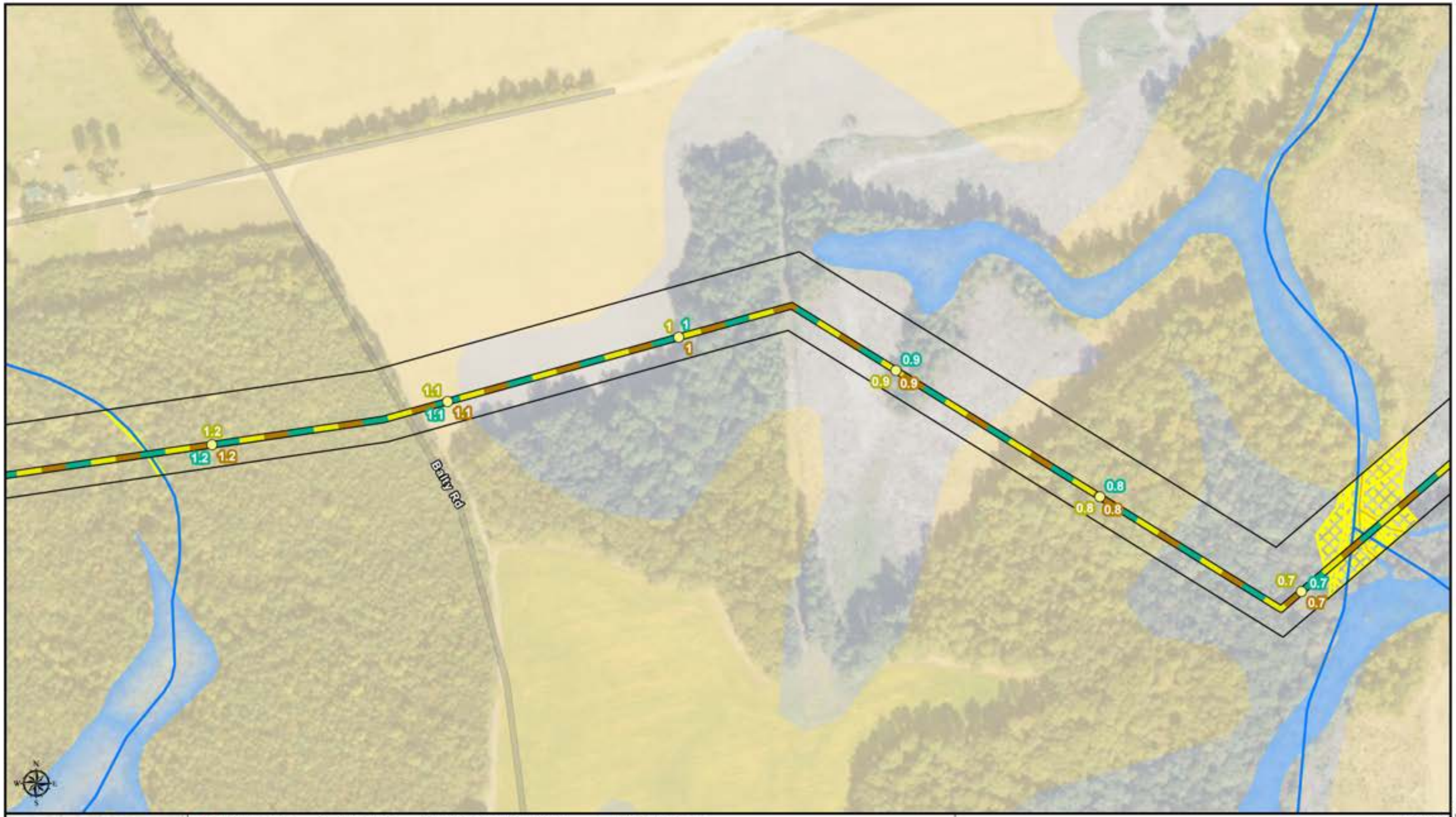

Route 4 MP
Route 5 MP
Route 6 MP
Route 4
Route 5
Route 6

Wetland Probability
Medium/High
Medium
NHD Stream

NWI Wetland
Nonhydric
Predominantly nonhydric

1:2,400
0 100 200
Feet

Page 2 of 14

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

ERM

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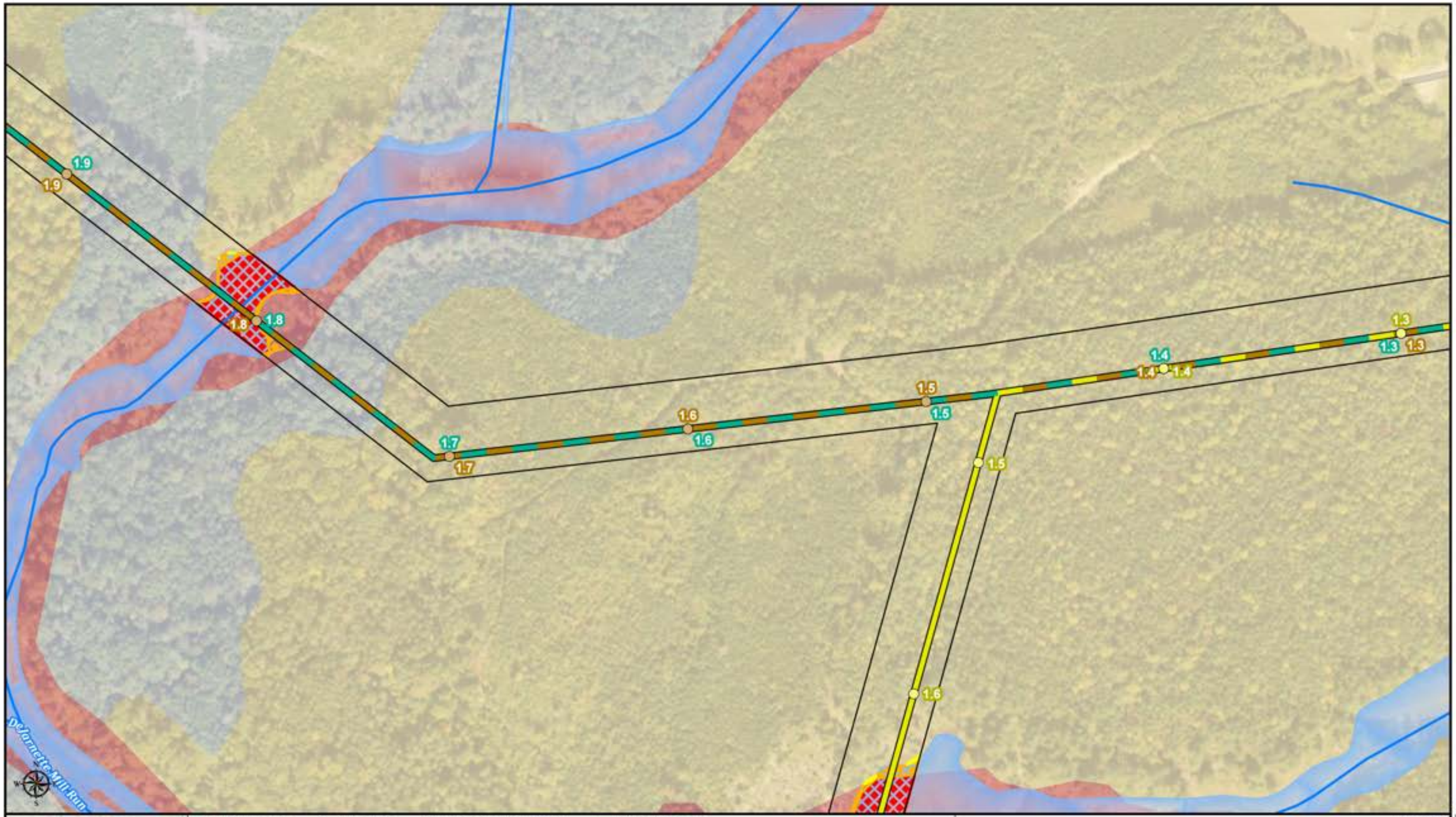

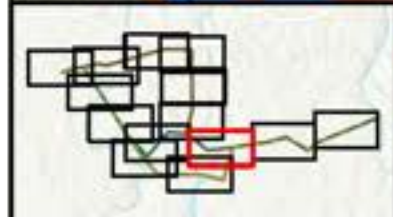

Route 4 MP
Route 5 MP
Route 6 MP
Route 4
Route 5
Route 6

Wetland Probability
High
Medium/High
Medium
NHD Stream

NWI Wetland
Nonhydric
Predominantly nonhydric
Predominantly hydric

1:2,400
0 100 200
Feet

Attachment 2
Wetland Probability Map Set - Probability
Ruther Glen 230 kV Electric Transmission Project
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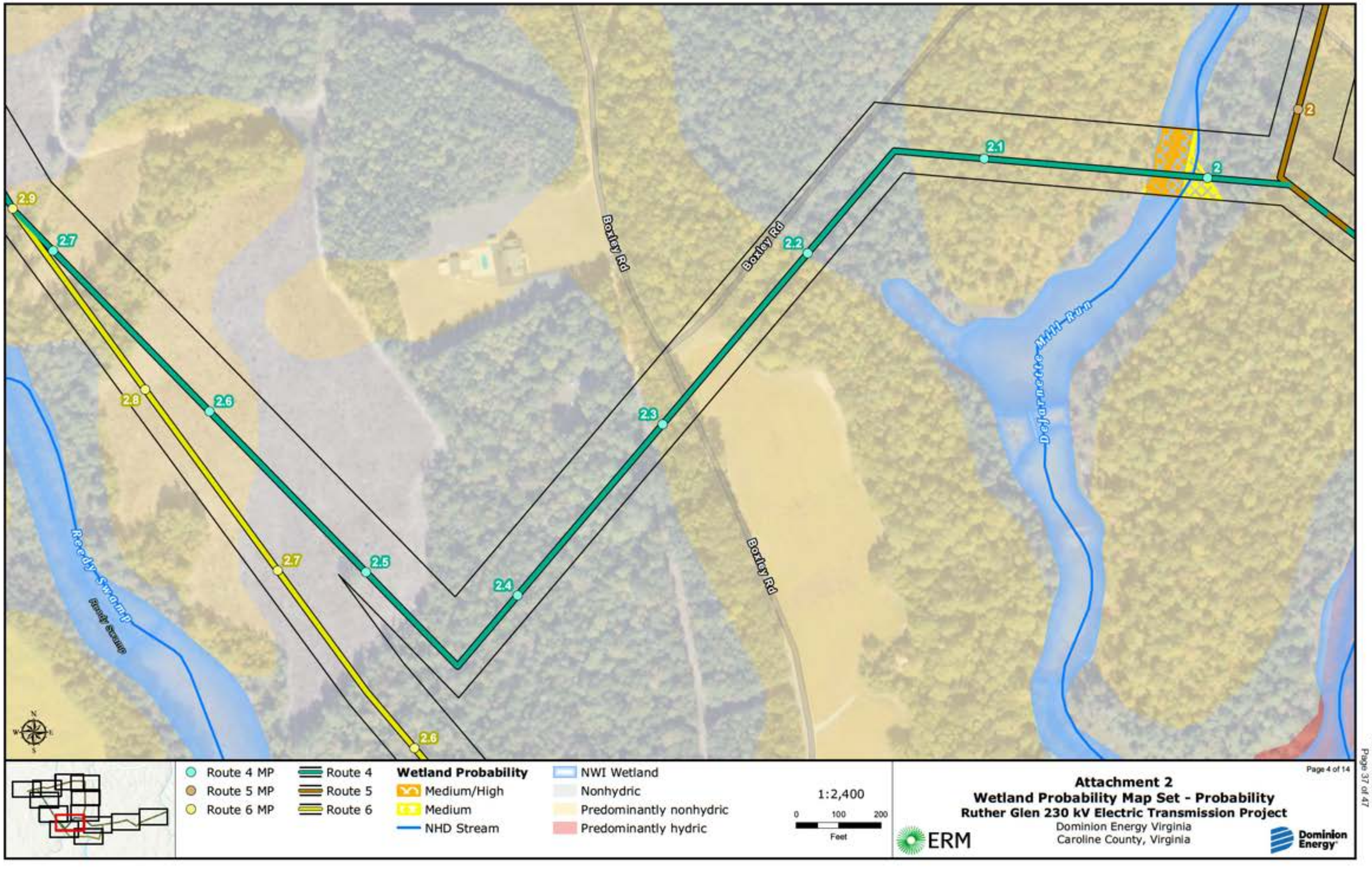

Route 4 MP
Route 5 MP
Route 6 MP
Route 4
Route 5
Route 6
NHD Stream

Wetland Probability
Medium/High
Medium

NWI Wetland
Nonhydric
Predominantly nonhydric
Predominantly hydric

1:2,400
0 100 200
Feet

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

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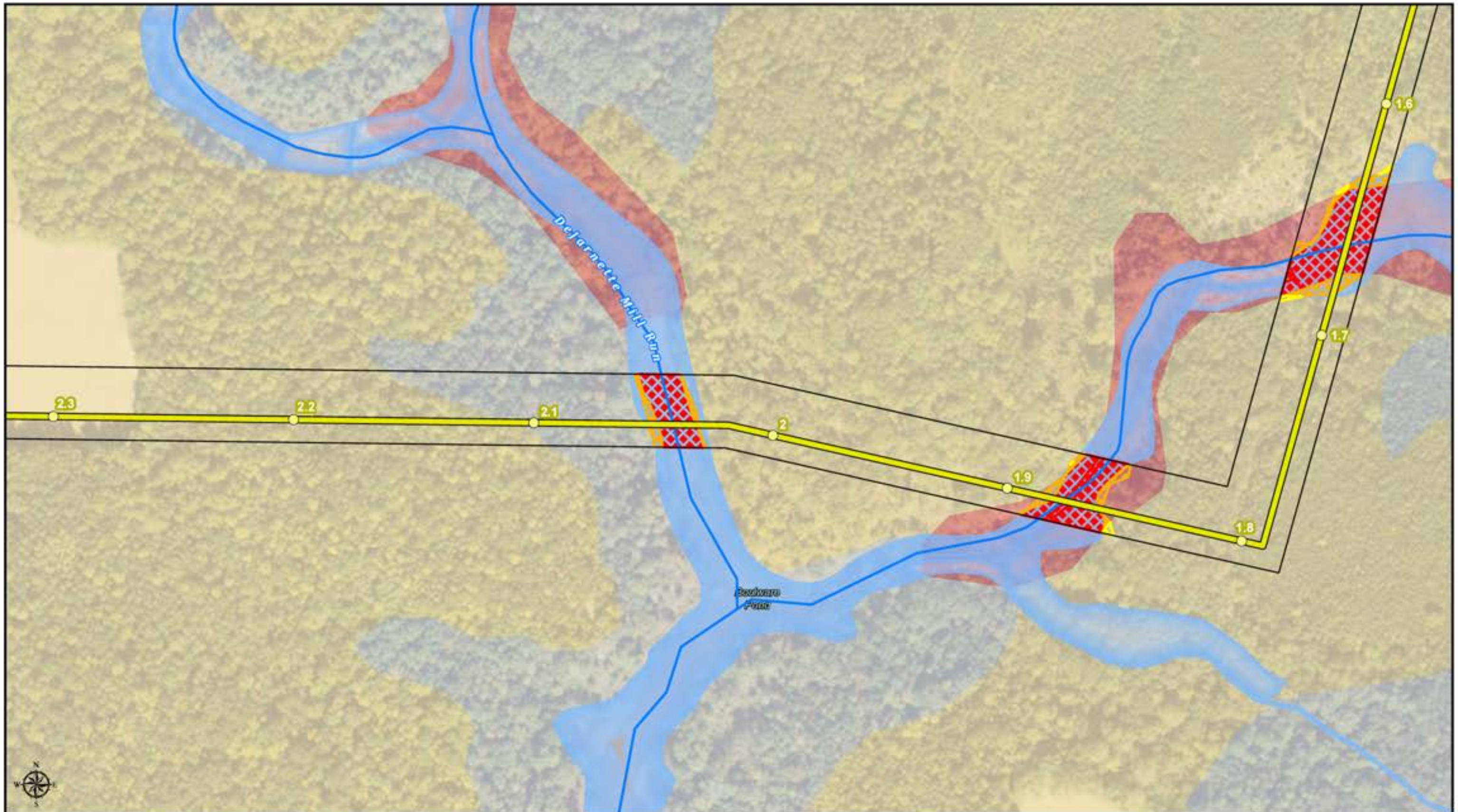

Route 6 MP
Route 6

Wetland Probability
- High
- Medium/High
- Medium
- NHD Stream

- NWI Wetland
- Nonhydric
- Predominantly nonhydric
- Predominantly hydric

1:2,400
0 100 200
Feet

Page 5 of 14

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

ERM

Dominion Energy

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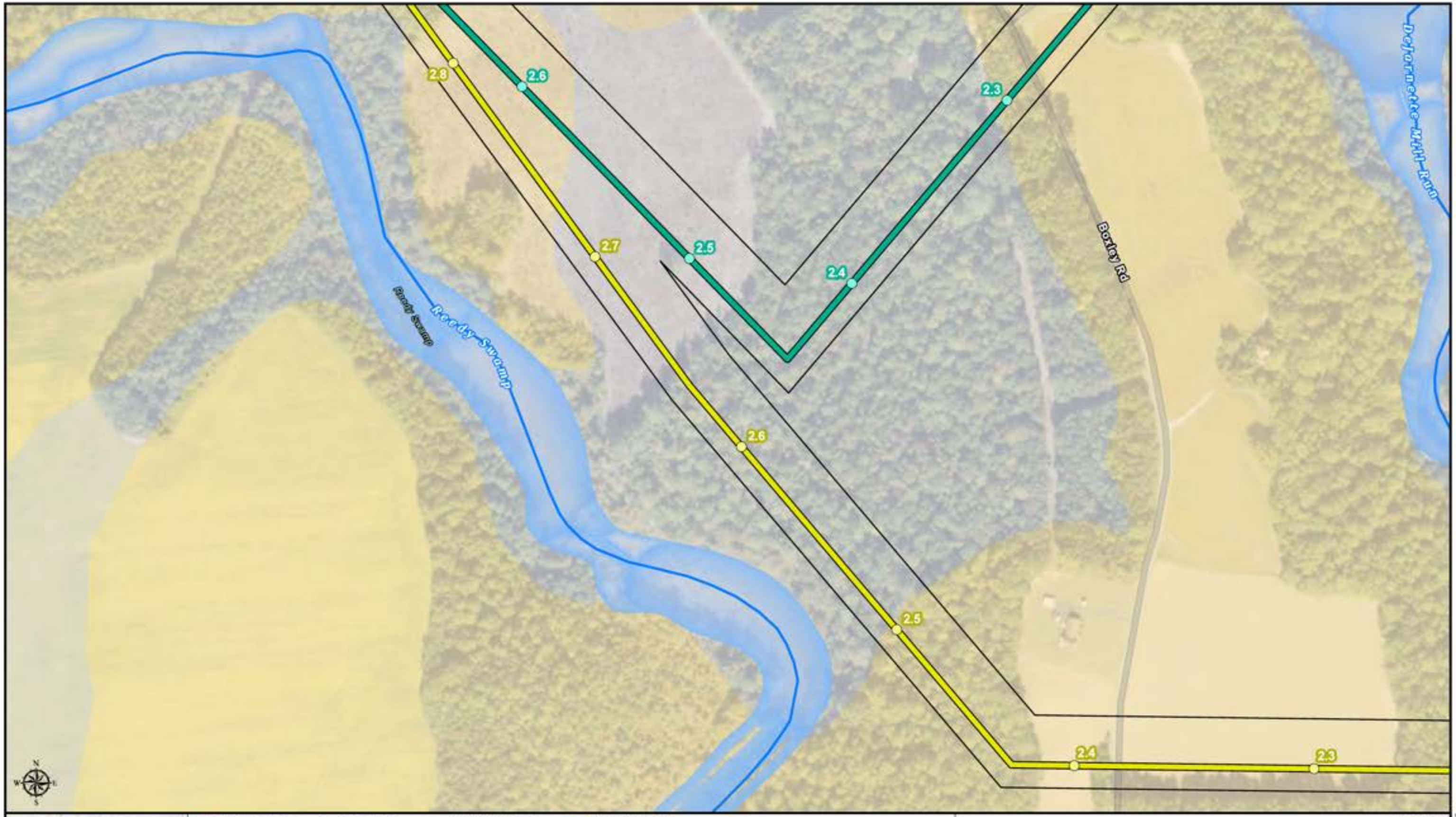

Route 4 MP
Route 6 MP
Route 4
Route 6
NHD Stream
NWI Wetland
Nonhydric
Predominantly nonhydric

1:2,400
0 100 200
Feet

Attachment 2
Wetland Probability Map Set - Probability
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
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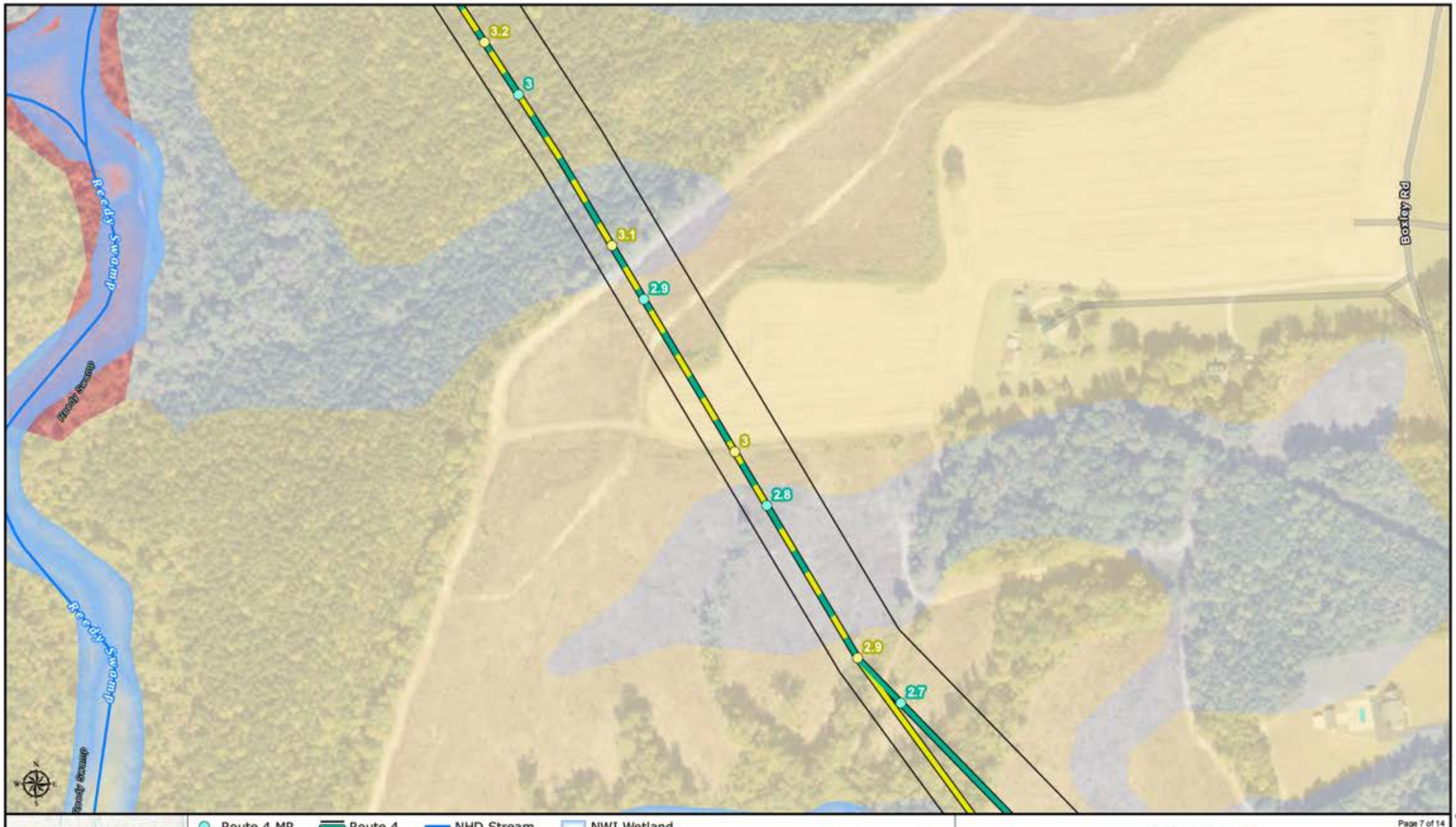

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Attachment 2
Wetland Probability Map Set - Probability
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

ERM

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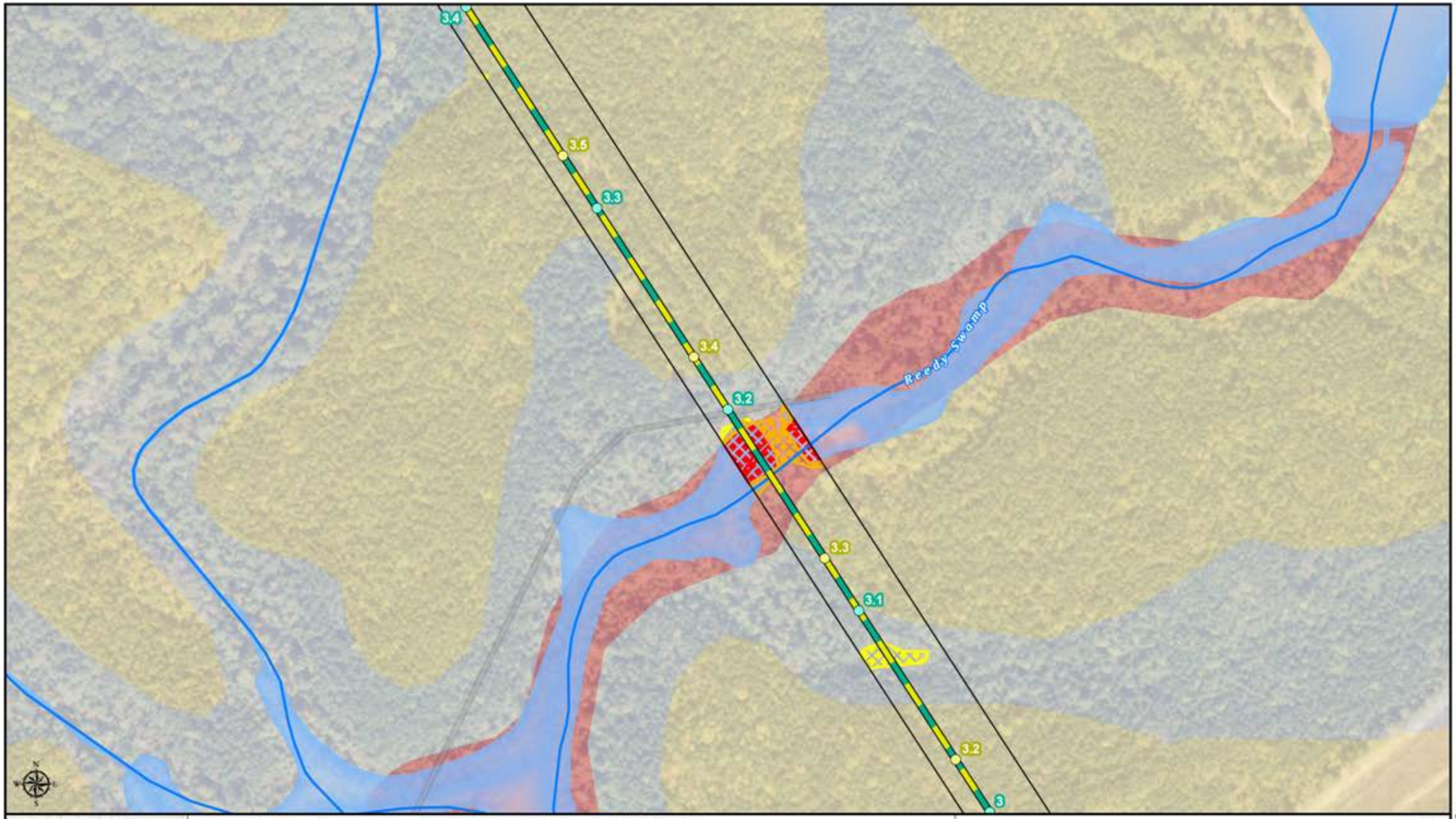

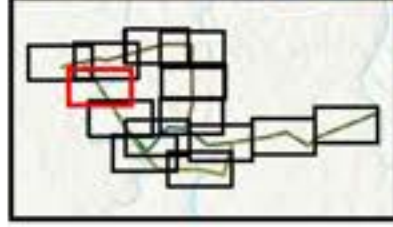

Route 4 MP
Route 6 MP
Route 4
Route 6

Wetland Probability
High
Medium/High
Medium
NHD Stream

NWI Wetland
Nonhydric
Predominantly nonhydric
Predominantly hydric

1:2,400
0 100 200
Feet

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

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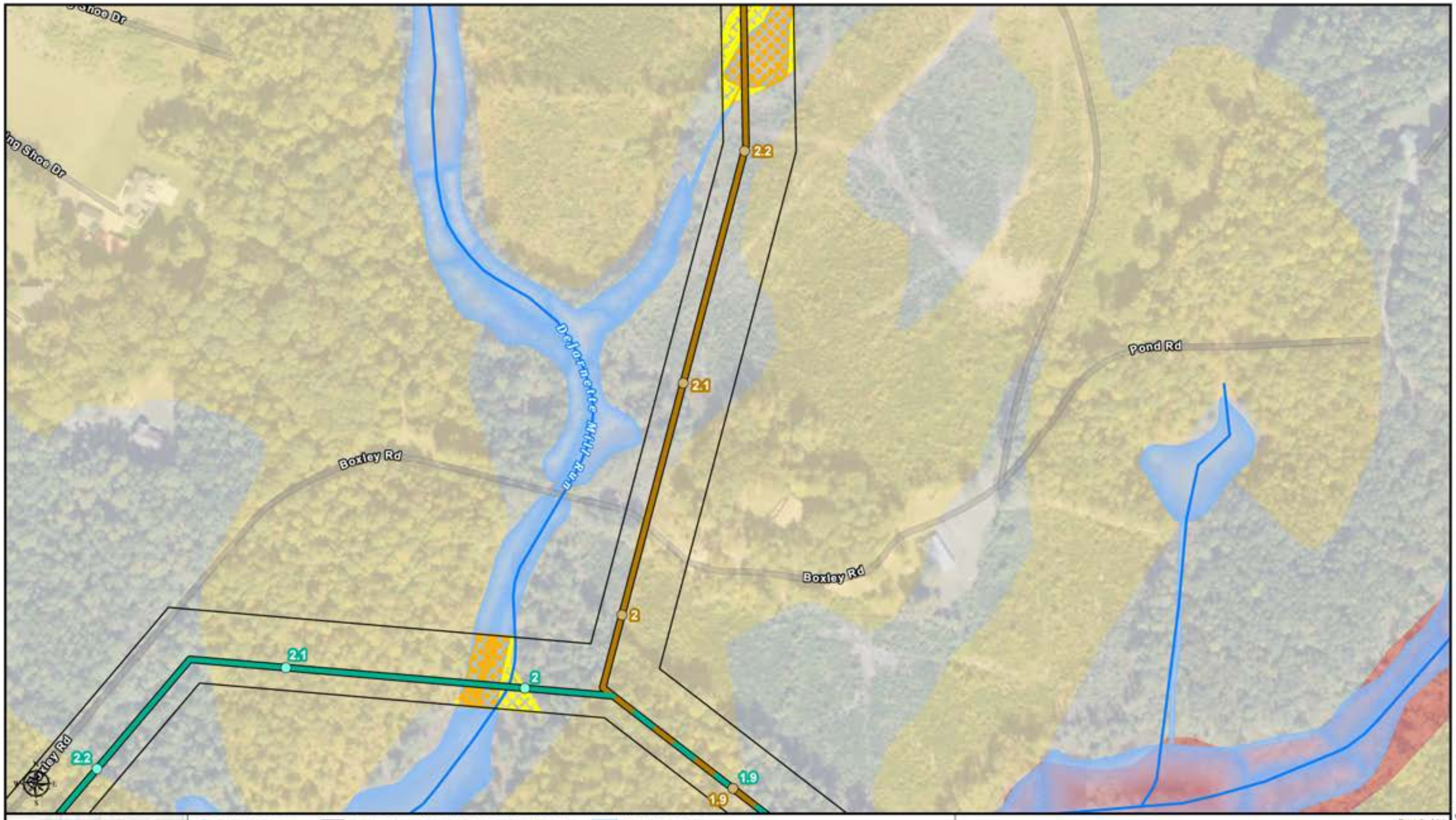

Route 4 MP
Route 5 MP
Route 4
Route 5

Wetland Probability
Medium/High
Medium
NHD Stream

NWI Wetland
Nonhydric
Predominantly nonhydric
Predominantly hydric

1:2,400
0 100 200
Feet

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Wetland Probability Map Set - Probability
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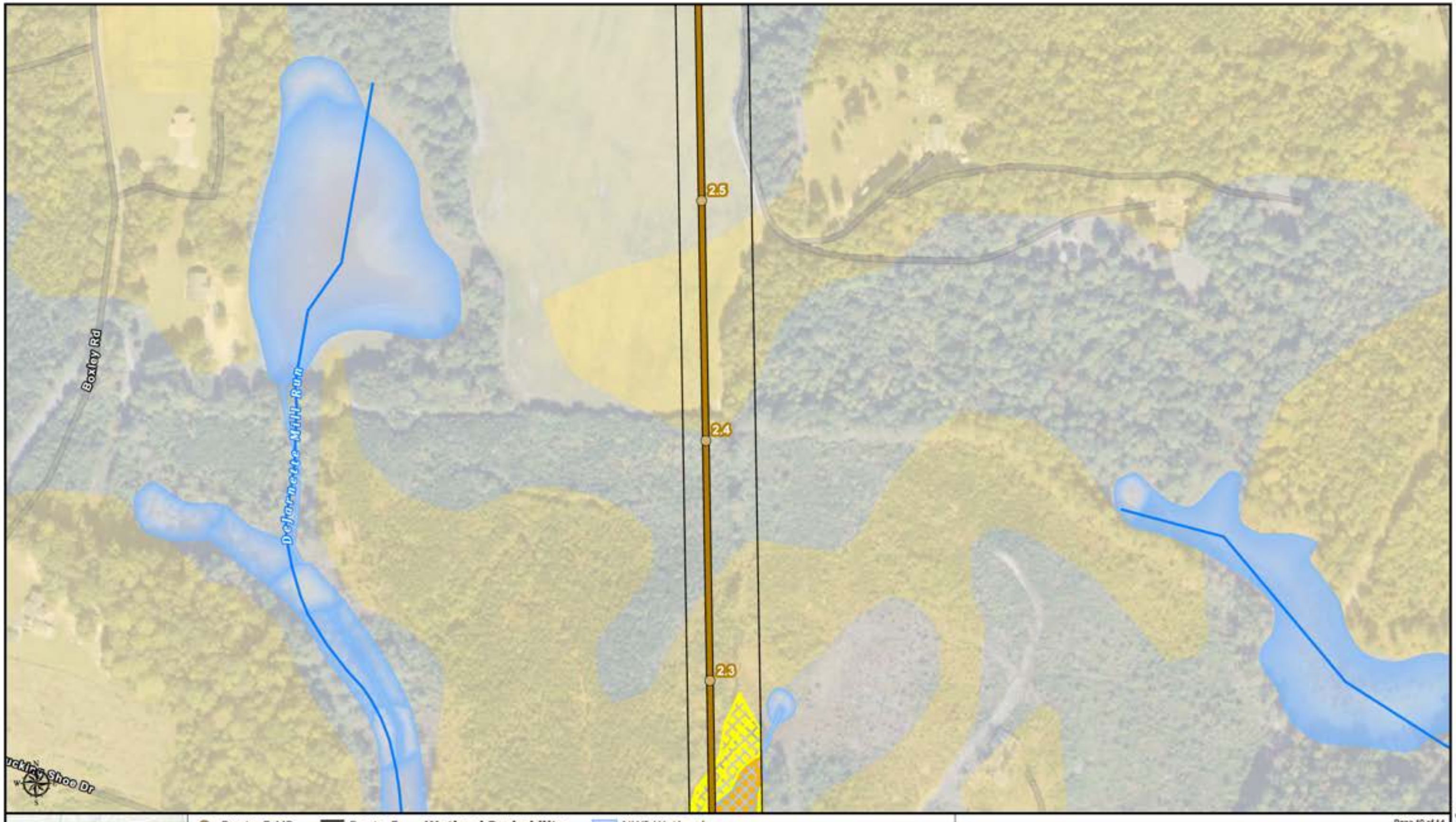

Route 5 MP
Route 5

Wetland Probability
Medium/High
Medium
NHD Stream

NWI Wetland
Nonhydric
Predominantly nonhydric

1:2,400
0 100 200
Feet

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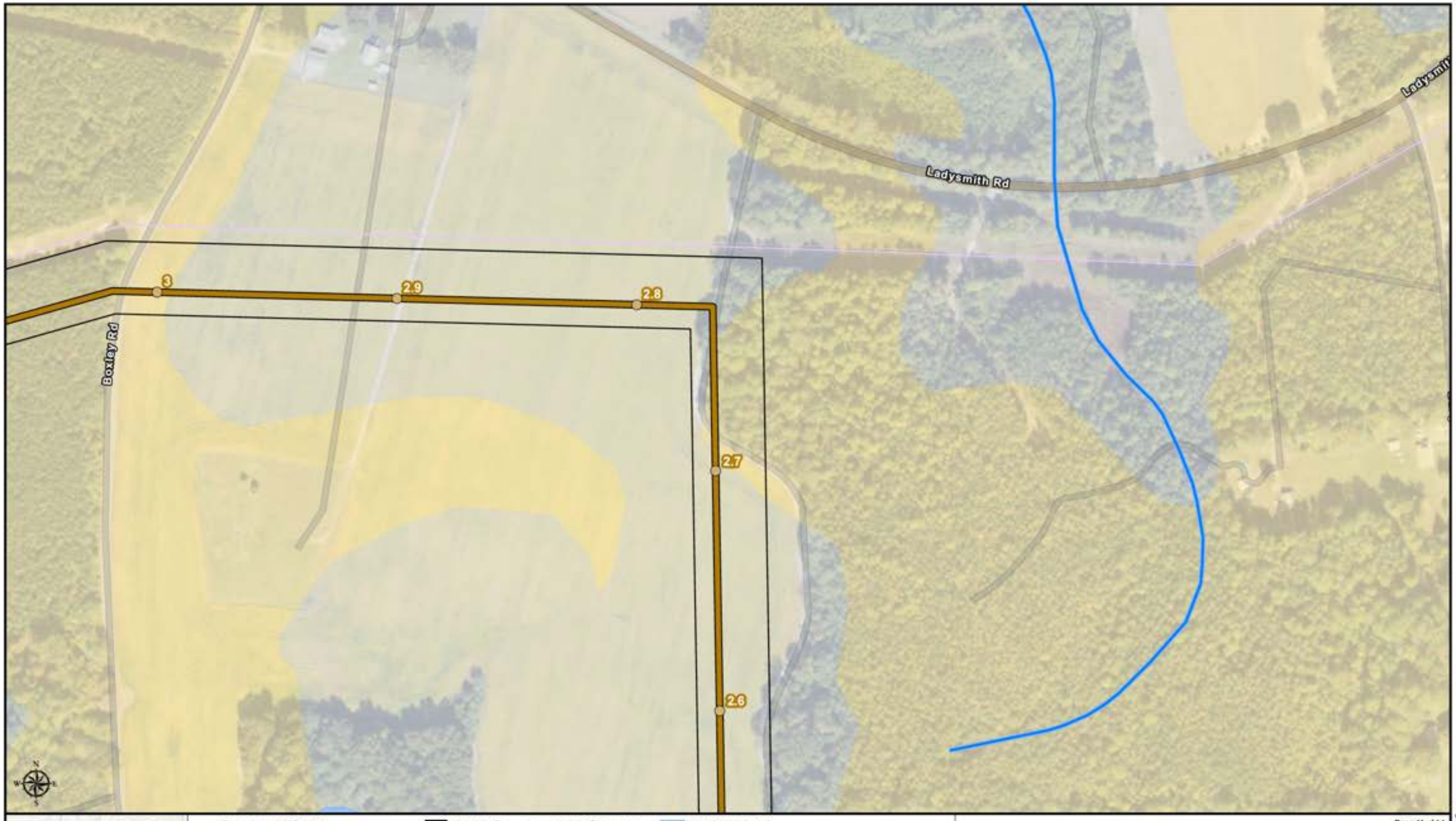

Existing REC Line
Route 5 MP
Route 5
NHD Stream
NWI Wetland
Nonhydric
Predominantly nonhydric

1:2,400
0 100 200
Feet

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

ERM

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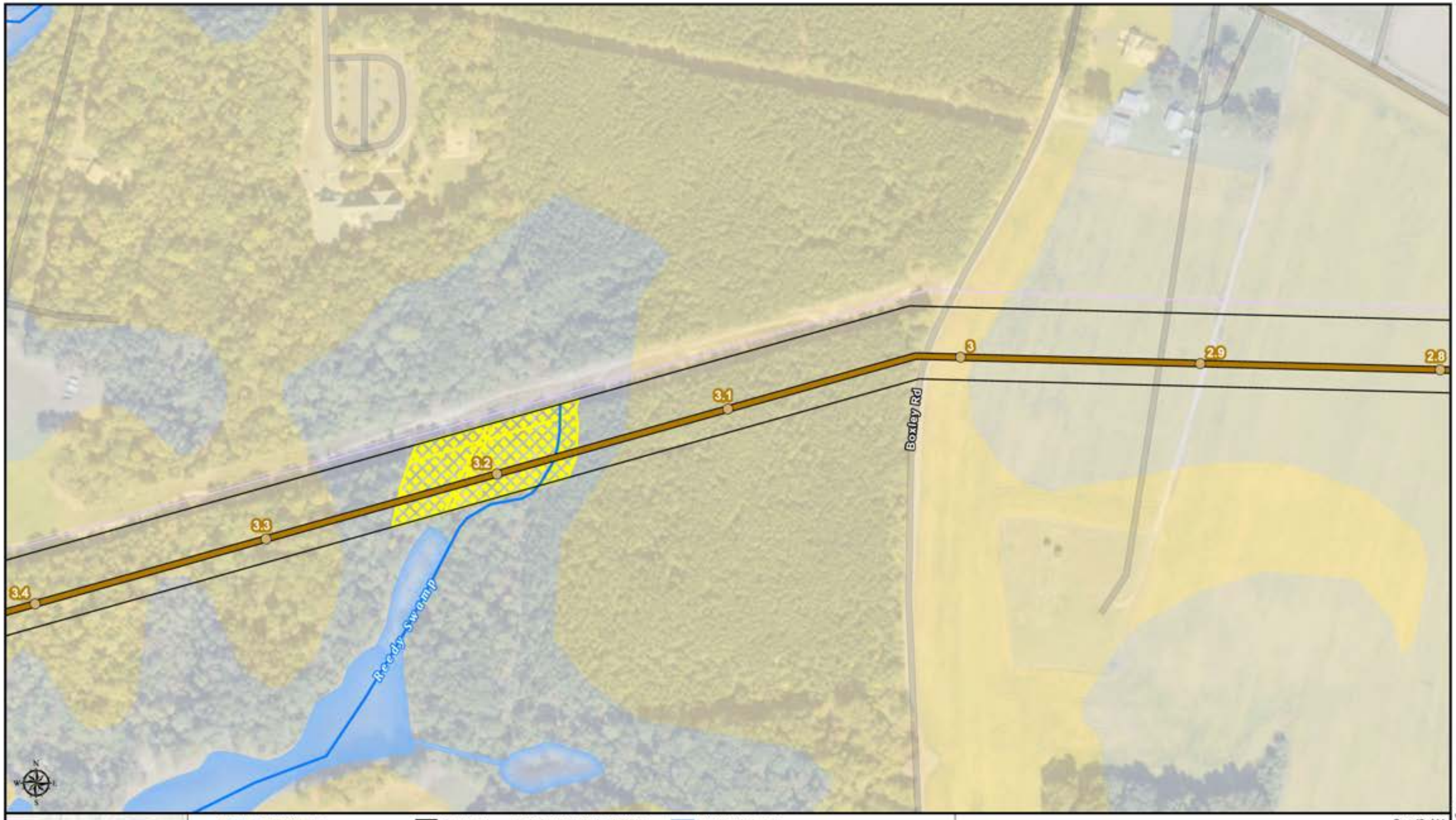

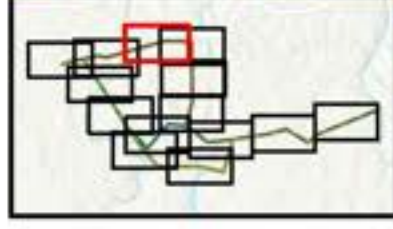

Existing REC Line
Route 5 MP
Route 5
Wetland Probability
Medium
NHD Stream
NWI Wetland
Nonhydric
Predominantly nonhydric
1:2,400
0 100 200
Feet

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

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Existing REC Line
Route 4 MP
Route 5 MP
Route 6 MP
Route 4
Route 5
Route 6
Wetland Probability
Medium/High
Medium
NHD Stream
NWI Wetland
Nonhydric
Predominantly nonhydric
Predominantly hydric
1:2,400
0 100 200
Feet

Attachment 2
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Ruther Glen 230 kV Electric Transmission Project
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Caroline County, Virginia

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RUTHER GLEN SWITCHING STATION

3.8
3.6
3.9
3.7
3.5
3.8
4
3.6
3.4

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

Wetland Probability
Medium/High
Medium
NHD Stream

NWI Wetland
Nonhydric
Predominantly nonhydric

1:2,400
0 100 200
Feet

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

ERM

Dominion Energy

APPENDIX F 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

COMMONWEALTH of VIRGINIA

DEPARTMENT OF CONSERVATION AND RECREATION

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

September 20, 2024

Briana Cooney
Environmental Resources Management, Inc.
222 South 9th Street, South 2900
Minneapolis, MN 55402

Re: 0721582, Ruther Glen 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 Ladysmith North Conservation Site, the Wrights Corner Conservation Site, and the Wrights Corner South 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 (B-rank) based on the rarity, quality, and number of element occurrences they contain; on a scale of 1-5, 1 being most significant.

The Ladysmith North Conservation Site has been assigned a B-rank of B3, which represents a site of high significance. The natural heritage resource associated with this site is:

Isotria medeoloides	Small Whorled Pogonia	G2G3/S2/LT/LE

Small whorled pogonia is a perennial orchid that grows in a variety of woodland habitats in Virginia, but tends to favor mid-aged woodland habitats on gently north or northeast facing slopes often within small draws. It is quite natural for plants of this species to remain dormant in the soil for long periods of time. Direct destruction, as well as habitat loss and alteration, are principal reasons for the species' decline (Ware, 1991). The Virginia Field Office of the U.S. Fish and Wildlife Service (USFWS) recommends that field surveys for this species be conducted in areas of Virginia south of Caroline County from May 25 through July 15 and in areas of Virginia from Caroline County and north from June 1 through July 20 (K. Mayne, pers. com. 1999). Please note that this species is listed as threatened by the United States Fish and Wildlife Service (USFWS) and endangered by the Virginia Department of Agriculture and Consumer Services (VDACS).

The Wrights Corner Conservation Site and the Wrights Corner South Conservation Site have been assigned a B-rank of B3, which represents a site of high significance. The natural heritage resource associated with these sites is:

Juncus caesariensis	New Jersey rush	G2G3/S2/SOC/LT

New Jersey rush a sedge-like herb with a rough surface and narrow leaves, inhabits acidic hardwood swamps, seeps, swales or pond margins. These sites usually contain a persistent seepage of groundwater or perennially reliable flow (Ware, 1991). It has also been documented in seepages within such disturbed areas as powerline rights-of-way. New Jersey rush is restricted to isolated occurrences in the coastal plain of Virginia (TNC et. al., 1999). Threats to this plant include disruptions in its hydrological regime, such as draining or filling wetlands and flooding by beavers, invasions by competitors resulting from clear-cutting of the overstory (Ware, 1991) and succession of its habitat to woody vegetation (Nature Serve 2011). Surveys for New Jersey rush should be conducted during the fruiting period of this plant from August – October. Please note that this species is listed as threatened by the Virginia Department of Agriculture and Consumer Services (VDACS). It is also classified as a species of concern by the United States Fish and Wildlife Service (USFWS); however, this designation has no official legal status.

In addition, Sheep laurel (*Kalmia angustifolia*, G5/S2/NL/NL) has been documented within the project area and Purple pitcher plant (*Sarracenia purpurea*, G5/S2/NL/NL) has been historically documented within the project area.

Sheep laurel is a state rare plant found primarily in acidic soils. Its range stretches from Newfoundland and Labrador to Virginia, and as far west as Michigan and Ontario. This plant blooms from May to July. While common across the eastern seaboard, sheep-laurel is very rare and imperiled in Virginia (Gleason and Cronquist, 1991), with 13 remaining extant local occurrences as of 2024. Purple pitcher plant is a state rare perennial that inhabits bogs, pinelands and such disturbed areas as powerline rights-of-way (TNC, 1996). This species blooms from April to July (Weakley, in prep.). In Virginia, purple pitcher-plants are currently known from 25 extant occurrences in the coastal plain region as of 2024.

To minimize adverse impacts to the documented natural heritage resources listed above, DCR recommends avoidance of the conservation sites and the occurrences of Sheep laurel and Purple pitcher plant that occur outside of the conservation sites.

Furthermore, according to a DCR biologist, there is a potential for additional populations of Small whorled pogonia, New Jersey rush, Sheep laurel and Purple pitcher plant to occur in the project area if suitable habitat exists on site, as well as potential for Brown Bog Sedge (*Carex buxbaumii*, G5/S2/NL/NL), Blood panic grass (*Dichanthelium consanguineum*, G5/S1S2/NL/NL), Epling's Hedge-nettle (*Stachys eplingii*, G1G2/S1/SOC/NL) and Larkspur coreopsis (*Coreopsis delphiniifolia*, G3?/S1/NL/NL) to occur.

Due to the potential for this site to support additional populations of natural heritage resources, DCR recommends an inventory for the resources listed above in the study area. With the survey results we can more accurately evaluate potential impacts to natural heritage resources and offer specific protection recommendations for minimizing impacts to the documented resources.

DCR-Division of Natural Heritage biologists are qualified to conduct inventories for rare, threatened, and endangered species. Please contact Anne Chazal, Natural Heritage Chief Biologist, at anne.chazal@dcr.virginia.gov or 804-786-9014 to discuss availability and rates for field work. For a list of

USFWS-approved surveyors in Virginia visit https://www.fws.gov/media/collection-approved-surveyor-lists-project-review-process-virginia.

Due to the legal status of Small whorled pogonia, DCR also recommends coordination with USFWS to ensure compliance with protected species legislation.

DCR also recommends the development and implementation of an invasive species plan to be included as part of the maintenance practices for the right-of-way (ROW). The invasive species plan should include an invasive species inventory for the project area based on the current DCR Invasive Species List (http://www.dcr.virginia.gov/natural-heritage/document/nh-invasive-plant-list-2014.pdf) and methods for treating the invasives. DCR also recommends the ROW restoration and maintenance practices planned include appropriate revegetation using native species in a mix of grasses and forbs to the extent that it is consistent with erosion and sediment control requirements, robust monitoring, and an adaptive management plan to provide guidance if initial revegetation efforts are unsuccessful or if invasive species outbreaks occur.

In addition, the proposed project may impact Ecological Cores **(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. Survey results should be coordinated with DCR-DNH and USFWS. Upon review of the results, if it is determined the species is present, and there is a likelihood of a

negative impact on the species, DCR-DNH will recommend coordination with VDACS to ensure compliance with Virginia's Endangered Plant and Insect Species Act.

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 https://services.dwr.virginia.gov/fwis/ or contact Amy Martin at 804-367-2211 or amy.martin@dwr.virginia.gov.

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

Tyler Meader
Natural Heritage Locality Liaison

Literature Cited

Gleason, H., and Cronquist, A. 1991. Manual of Vascular Plants of Northeastern United States and Adjacent Canada, Second Edition. The New York Botanical Garden, Bronx, New York. p.205

NatureServe. 2011. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: July 25, 2011).

The Nature Conservancy. 1996. Biological and Conservation Data System. Arlington, Virginia, USA.

Ware, D.M.E. 1991. Small whorled pogonia. In Virginia's Endangered Species: Proceedings of a Symposium. K. Terwilliger ed. The McDonald and Woodward Publishing Company, Blacksburg, Virginia.

Ware, D.M.E. 1991. New Jersey rush. In Virginia's Endangered Species: Proceedings of a Symposium. K. Terwilliger ed. The McDonald and Woodward Publishing Company, Blacksburg, Virginia.

Weakley, A.S. In prep. Flora of the Carolina's and Virginia. The Nature Conservancy, Southeastern Regional Office. p. 14-8.

Site Location

37,58,02.3 -77,25,08.5
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
Color Aerial Photography

Map Overlay Choices
Current List: Position, Search, BECAR, BAEANests, TEWaters, TierII, Habitat, Trout, Anadromous

Map Overlay Legend

T & E Waters
Federal
State

Predicted Habitat WAP Tier I & II
Aquatic
Terrestrial

Trout Waters
Class I - IV
Class V - VI

Anadromous Fish Reach
Confirmed
Potential

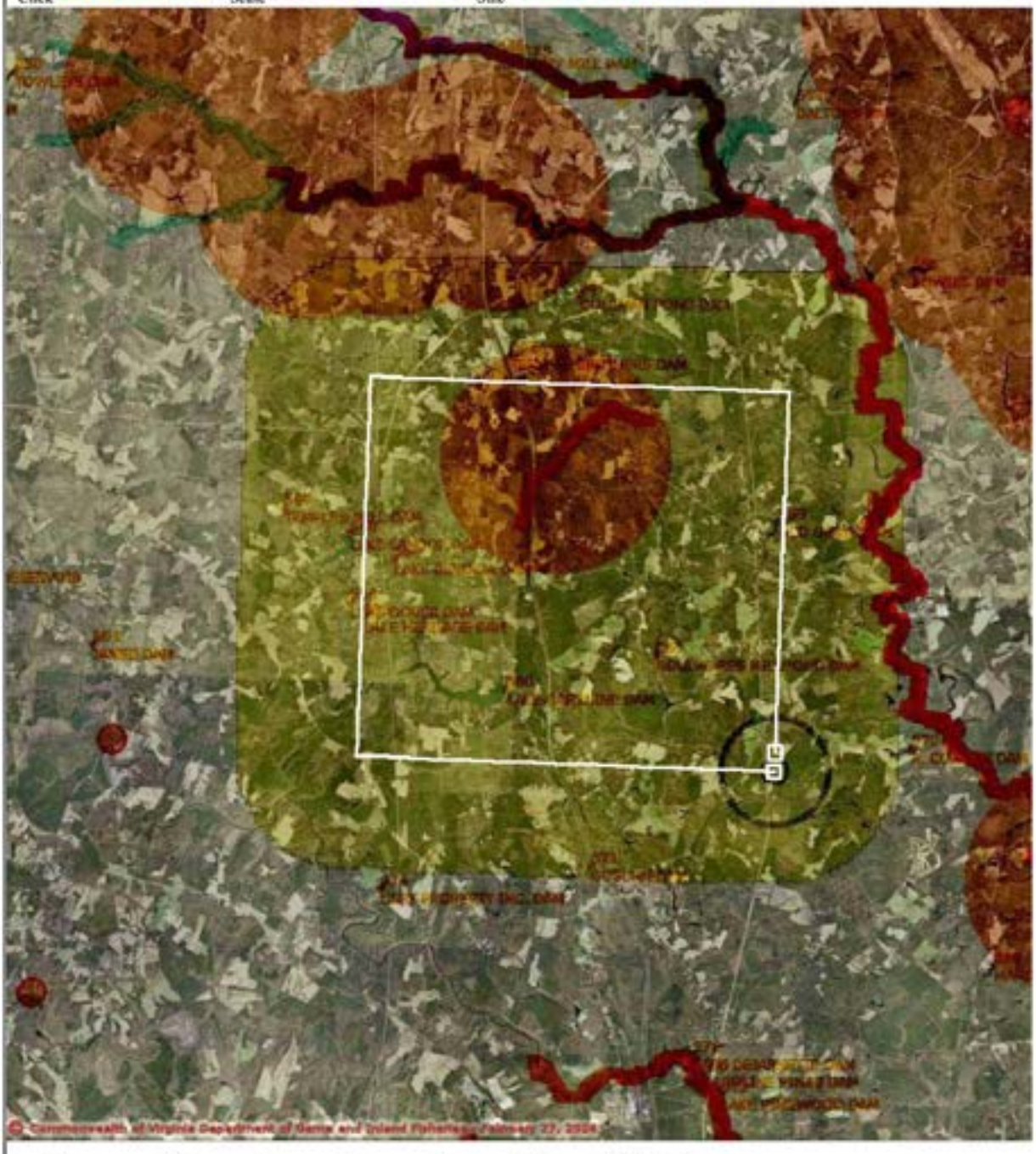
Impediment

Position Rings 1 mile and 1/4 mile at the Search Point

2 mile radius Search Area

Bald Eagle Concentration Areas and Roosts

back
Map Click Pan
Map Scale In Zoom Out
Refresh Browser Page
Screen Size Small Size Big
Help



Point of Search 37,58,02.3 -77,25,08.5
Map Location 38,00,58.7 -77,29,08.2

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: Color Aerial Photography 2002 - Virginia Base Mapping Program, Virginia Geographic Information Network

Map projection is UTM Zone 18 NAD 1983 with left 265802 and top 4226541. Pixel size is 30. .
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 2024-02-27 15:33:06 (qa/qc March 21, 2016 12:20 - tn=1817824.0 dist=3218 l)
$poi=37.9673200 -77.4190499

VaFWIS Search Report Compiled on 2/27/2024, 3:31:42 PM

Help

Known or likely to occur within a **2 mile buffer around polygon; center 37.9673200 -77.4190499** in **033 Caroline County, 085 Hanover County, 177 Spotsylvania County, VA**

View Map of Site Location

538 Known or Likely Species ordered by Status Concern for Conservation (displaying first 27) (27 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,HU6
010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes	BOVA,TEWaters
060029	FTST	IIa	Lance, yellow	Elliptio lanceolata	Yes	BOVA,TEWaters,SppObs,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		BOVA,HU6
010077		Ia	Shiner, bridle	Notropis bifrenatus		BOVA,HU6
100248		Ia	Fritillary, regal	Speyeria idalia idalia		BOVA,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		BOVA,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
060175		IIb	Slabshell, Roanoke	Elliptio roanokensis		BOVA

To view **All 538 species** View 538

*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 (1 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

Impediments to Fish Passage (11 records)

View Map of All Fish Impediments

ID	Name	River	View Map
569	BOULWARES MILLPOND DAM	DE JARNETTE MILL RUN	Yes
571	COBURN DAM	TR-POLECAT CREEK	Yes
561	COLEMAN POND DAM	WHITE RUN	Yes

560	LAKE CAROLINE DAM	STEVENS MILL RUN	Yes
564	LAKE DEVOLIA DAM	TR-SOUTH RIVER	Yes
566	LAKE DOVER DAM	TR-STEVENS MILL CREEK	Yes
565	LAKE HERITAGE DAM	TR-STEVENS MILL CREEK	Yes
548	LAKE LANDOR DAM	TR-SOUTH RIVER	Yes
559	OLD GRAYS DAM	MAYS RUN	Yes
549	TEMPLES MILL DAM	SOUTH RIVER	Yes
563	TERRELL BROTHERS DAM	TR-MATTA RIVER	Yes

Colonial Water Bird Survey

N/A

Threatened and Endangered Waters (40 Reaches - displaying first 20) 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 (0109732)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
Mattaponi River (0111648)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
Mattaponi River (0120358)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
Mattaponi River (0120489)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
Mattaponi River (0121011)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
Mattaponi River (0121717)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
Mattaponi River (0123323)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
Mattaponi River (0123642)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
Mattaponi River (0124192)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
Mattaponi River (0125418)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
Mattaponi River (0127062)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes

Mattaponi River (0127240)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
Mattaponi River (0127968)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
Mattaponi River (0128004)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
Mattaponi River (0128136)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
Mattaponi River (0130253)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
Mattaponi River (0131002)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
Mattaponi River (0131377)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
Mattaponi River (0131572)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
Mattaponi River (0132510)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
Mattaponi River (0132797)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
Mattaponi River (0133713)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
Mattaponi River (0135887)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes

To view **All 40 Threatened and Endangered Waters records** View 40

Managed Trout Streams

N/A

Bald Eagle Concentration Areas and Roosts

N/A

Bald Eagle Nests

N/A

Species Observations (294 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**	
7626	SppObs	Oct 22 1994	PHILIP H. STEVENSON	2	FTST	II	Yes
617391	SppObs	Jun 24 2012	Kory; Steele| Emily ; Steele	6		III	Yes
617388	SppObs	Jun 24 2012	Susan; Watson| Paul; Sattler| Kelly ; Geer	5		III	Yes
617371	SppObs	Jun 23 2012	Paul ; Sattler| John ; Orr| John; White| Kelly ; Geer	4		III	Yes
617376	SppObs	Jun 23 2012	Paul ; Sattler| John ; Orr| John; White| Kelly ; Geer	4		III	Yes
617385	SppObs	Jun 23 2012	Susan; Watson| Caroline ; Seitz	5		III	Yes
617377	SppObs	Jun 23 2012	Paul ; Sattler| John ; Orr| John; White| Kelly ; Geer	4		III	Yes
617381	SppObs	Jun 23 2012	Susan; Watson| Caroline ; Seitz	10		III	Yes
617372	SppObs	Jun 23 2012	Paul ; Sattler| John ; Orr| John; White| Kelly ; Geer	6		III	Yes
617375	SppObs	Jun 23 2012	Kory ; Steele| Emily ; Steele| David ; Perry	6		III	Yes
617370	SppObs	Jun 22 2012	Susan; Watson| Paul; Sattler	1		III	Yes
303268	SppObs	Apr 22 2003	Alex Barron	3		III	Yes
426488	SppObs	Dec 18 2001	VCU - INSTAR	12		III	Yes
426381	SppObs	Oct 24 2001	VCU - INSTAR	12		III	Yes
426432	SppObs	Oct 24 2001	VCU - INSTAR	5		III	Yes
426486	SppObs	Oct 16 2001	VCU - INSTAR	6		III	Yes
426483	SppObs	Oct 16 2001	VCU - INSTAR	9		III	Yes
426322	SppObs	Jul 12 2001	VCU - INSTAR	13		III	Yes
426431	SppObs	Jul 11 2001	VCU - INSTAR	12		III	Yes

426380	SppObs	Jul 11 2001	VCU - INSTAR	9		III	Yes

Displayed 20 Species Observations

Selected 294 Observations View all 294 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 (4 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**	
50136	Ladysmith, SE	60		III	Yes
50135	Ladysmith, SW	8		III	Yes
51134	Woodford, CE	43		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
177	Spotsylvania	379	FESE	I

USGS 7.5' Quadrangles:
Hewlett
Ladysmith
Ruther Glen
Woodford

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
YO23	North Anna River-Hawkins Creek	59	SE	I
YO26	North Anna River-Long Creek	58	SE	I
YO45	Matta River	58	FESE	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 2/27/2024, 3:31:42 PM I1817824.0 report=all searchType= P dist= 3218 poi= 37.9673200 -77.4190499 sinuDD= 37.9673276 -77.4190513;37.9673901 -77.4257763;37.9674523 -77.4325014;37.9675140 -77.4392266;37.9675753 -77.4459515;37.9676362 -77.4526766;37.9676968 -77.4594017;37.9677569 -77.4661269;37.9678167 -77.4728520;37.9678761 -77.4795771;37.9679351 -77.4863023;37.9679937 -77.4930275;37.9680519 -77.4997526;37.9681097 -77.5064778;37.9681671 -77.5132030;37.9682241 -77.5199282;37.9682808 -77.5266534;37.9683370 -77.5333787;37.9683929 -77.5401039;37.9684484 -77.5468292;37.9685035 -77.5535544;37.9733415 -77.5534284;37.9830177 -77.5533654;37.9878558 -77.5533023;37.9926938 -77.5532393;37.9975319 -77.5531762;38.0023700 -77.5531132;38.0072081 -77.5530501;38.0120462 -77.5529870;38.0168842 -77.5529239;38.0217223 -77.5528608;38.0265604 -77.5527977;38.0313985 -77.5527346;38.0362366 -77.5526715;38.0410746 -77.5526084;38.0459127 -77.5525452;38.0507508 -77.5524821;38.0555889 -77.5524189;38.0604270 -77.5523558;38.0652650 -77.5522926;38.0652099 -77.5455584;38.0651543 -77.5388241;38.0650984 -77.5320899;38.0650421 -77.5253558;38.0649853 -77.5186216;38.0649282 -77.5118874;38.0648707 -77.5051532;38.0648128 -77.4984191;38.0647545 -77.4916849;38.0646959 -77.4849508;38.0646368 -77.4782167;38.0645774 -77.4714826;38.0645175 -77.4647485;38.0644573 -77.4580144;38.0643966 -77.4512803;38.0643356 -77.4445463;38.0642742 -77.4378122;38.0642124 -77.4310782;38.0641502 -77.4243441;38.0640877 -77.4176101;38.0592497 -77.4176823;38.0544117 -77.4177544;38.0495737 -77.4178265;38.0447356 -77.4178987;38.0398976 -77.4179708;38.0350596 -77.4180429;38.0302216 -77.4181150;38.0253836 -77.4181870;38.0205456 -77.4182591;38.0157076 -77.4183312;38.0108696 -77.4184032;38.0060316 -77.4184753;38.0011936 -77.4185473;37.9963556 -77.4186193;37.9915176 -77.4186913;37.9866796 -77.4187633;37.9818416 -77.4188353;37.9770036 -77.4189073;37.9721656 -77.4189793

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Threatened and Endangered Waters where Sturgeon, Atlantic (010032) observed

37,58,02.3 -77,25,08.5
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

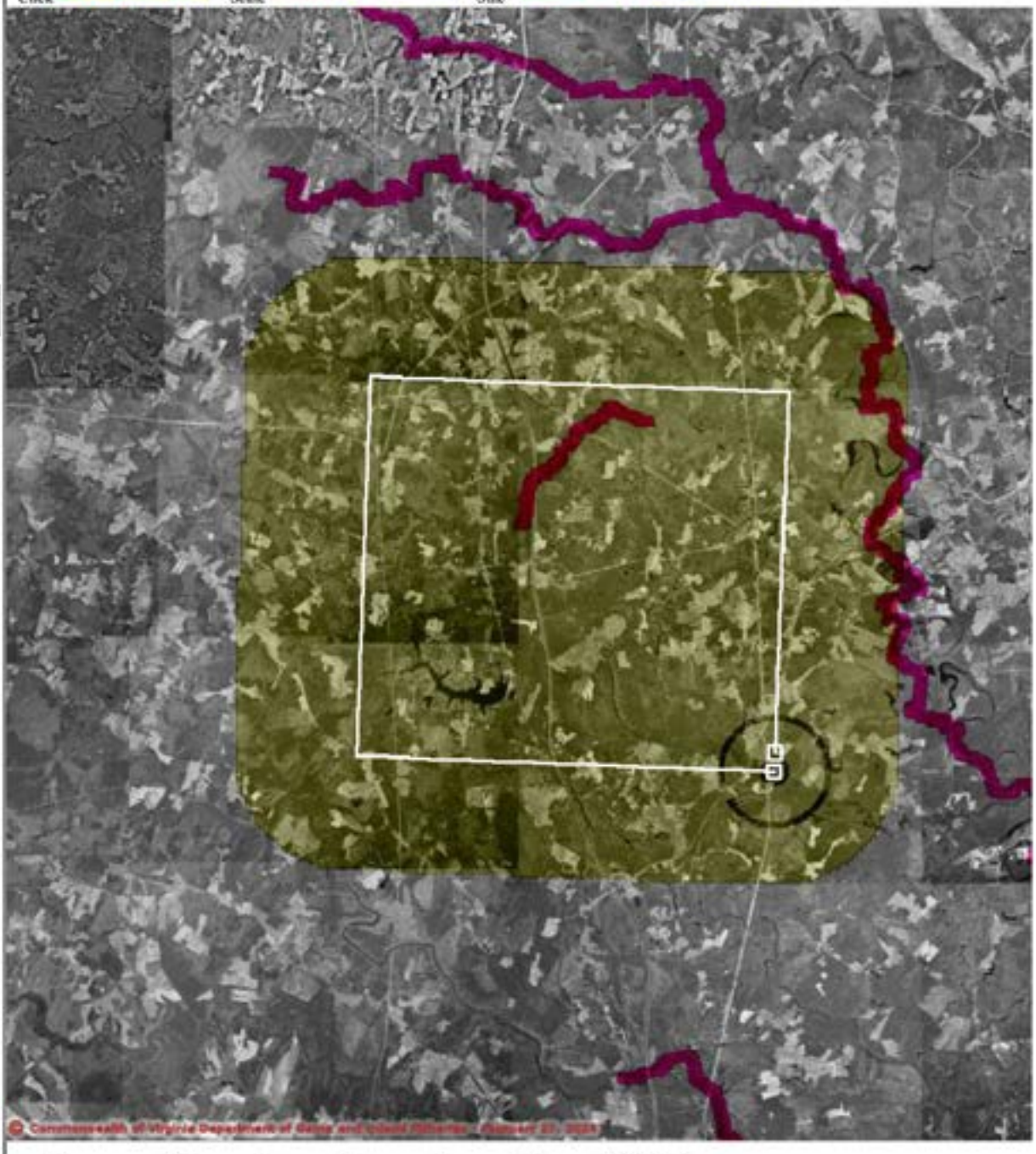
Map Overlay Legend

T & E Waters
Federal
State

Position Rings
1 mile and 1/4 mile at the Search Point

2 mile radius Search Area

back | Map Click Pan | Map Scale In Zoom Out | Refresh Browser Page | Screen Size Small Size Big | Help



Point of Search 37,58,02.3 -77,25,08.5
Map Location 38,00,58.7 -77,29,08.2

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 265802 and top 4226541. Pixel size is 30. .
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+-
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http://www.national.geographic.com/topo
All other map products are from the Commonwealth of Virginia Department of Wildlife Resources.

map assembled 2024-02-27 15:47:43 (qa/qc March 21, 2016 12:20 - tn=1817824.1 dist=3218 l)
$poi=37.9673200 -77.4190499

Threatened and Endangered Waters where Lance, yellow (060029) observed

37,58,02.3 -77,25,08.5
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

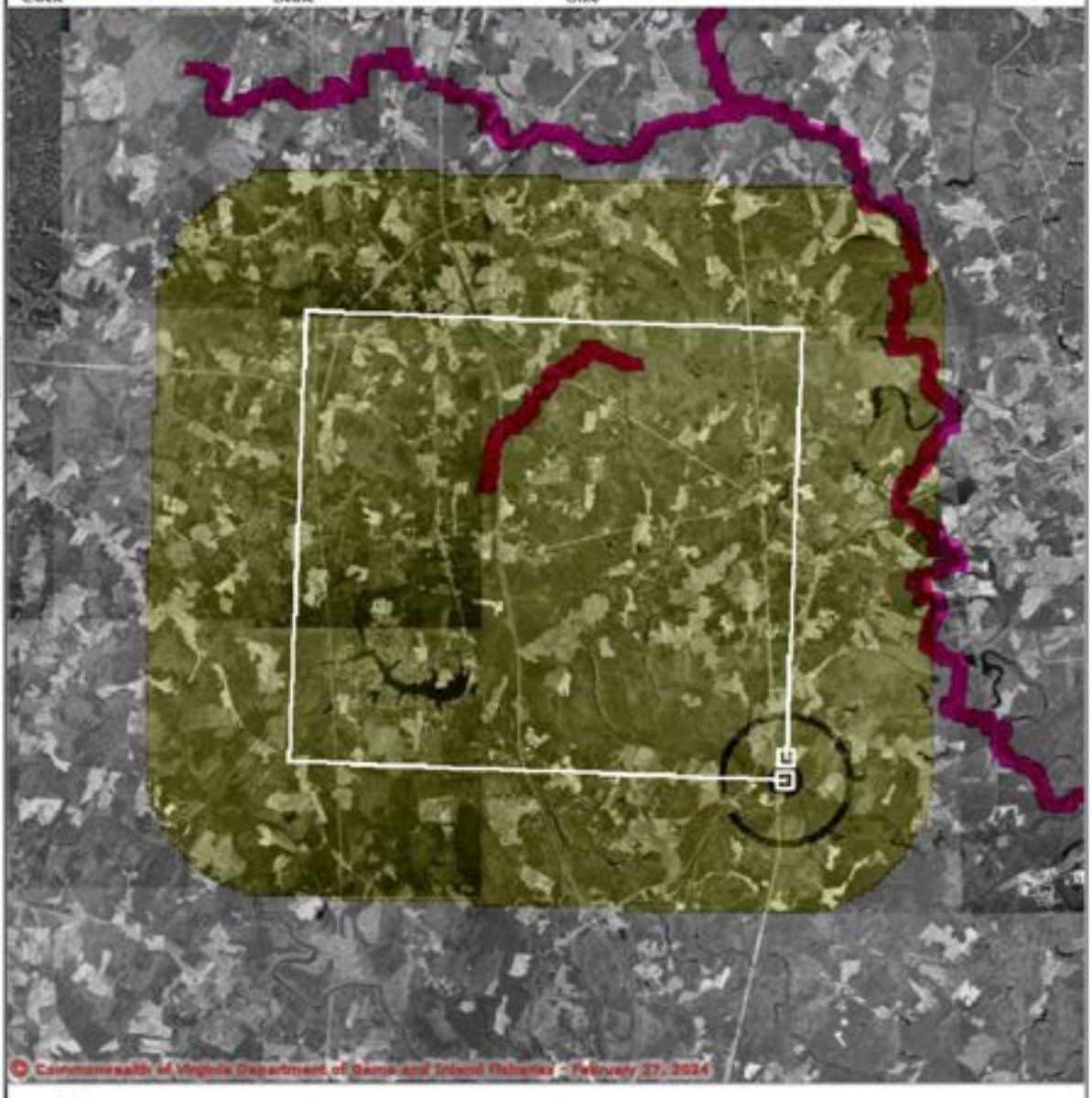
Map Overlay Legend

T & E Waters
Federal
State

Position Rings 1 mile and 1/4 mile at the Search Point

2 mile radius Search Area

back 38,07,48.3 -77,21,56.5 Refresh Browser Page
Map Click Pan
Map Scale In Zoom Out
Screen Size Small Size Big
Help



Point of Search 37,58,02.3 -77,25,08.5
Map Location 38,00,58.7 -77,29,08.2

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 269002 and top 4223341. Pixel size is 30. .
Coordinates displayed are Degrees, Minutes, Seconds North and West. Map is currently displayed as 800 columns by 800 rows for a total of 640000 pixles. The map display represents 25600 meters

east to west by 25600 meters north to south for a total of 655.3 square kilometers. The map display represents 84003 feet east to west by 84003 feet north to south for a total of 253.1 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.
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map assembled 2024-02-27 15:48:53 (qa/qc March 21, 2016 12:20 - tn=1817824.1 dist=3218 1)
$poi=37.9673200 -77.4190499

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:
Project Code: 2024-0056171
Project Name: Ruther Glen

09/23/2024 20:25:51 UTC

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: 2024-0056171
Project Name: Ruther Glen
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/@38.0155805,-77.48563429069615,14z

Counties: Caroline County, Virginia

ENDANGERED SPECIES ACT SPECIES

There is a total of 7 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.

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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
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
Small Whorled Pogonia *Isotria medeoloides* Population: No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1890	Threatened
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.

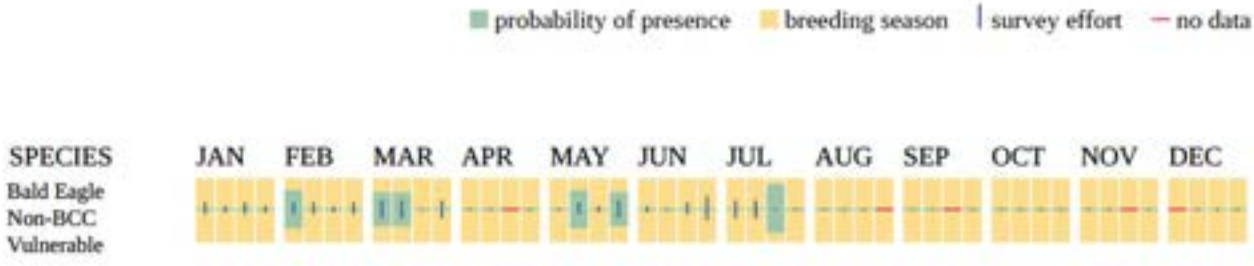
Probability of Presence (▮)

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
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
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
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

NAME	BREEDING SEASON
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:

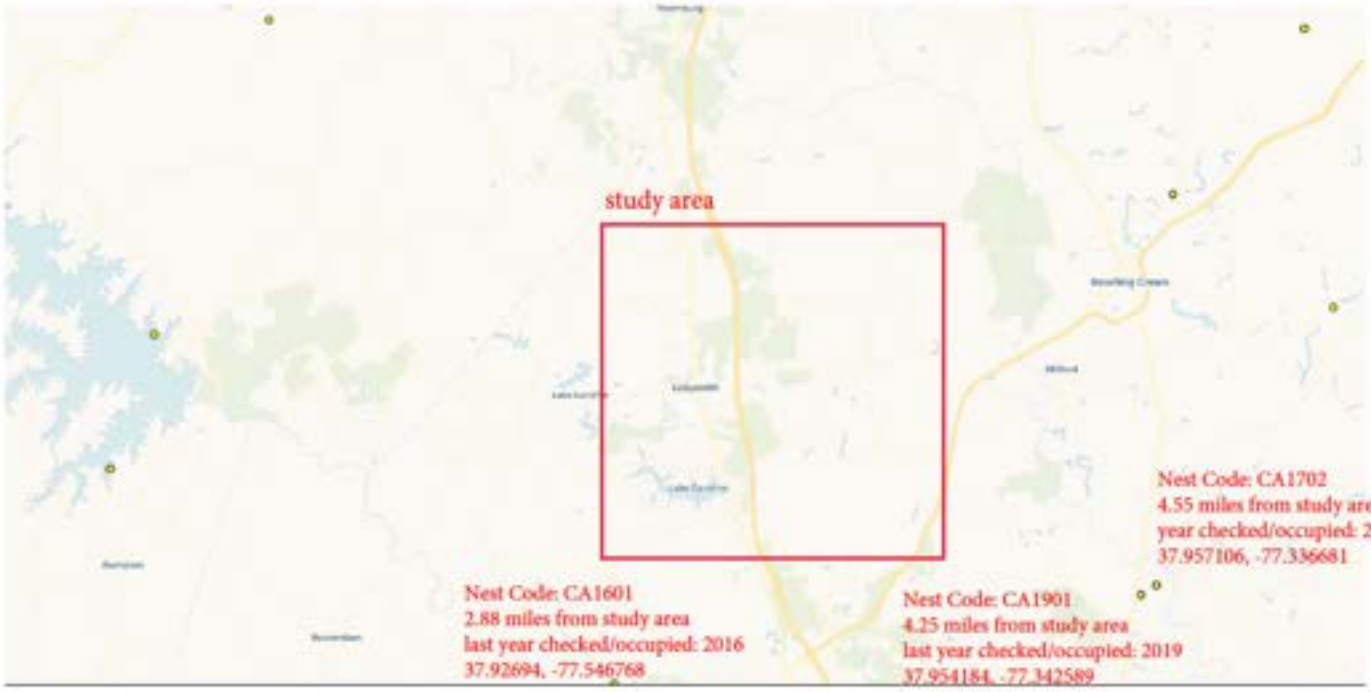
- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf

- 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:	Environmental Resources Management
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



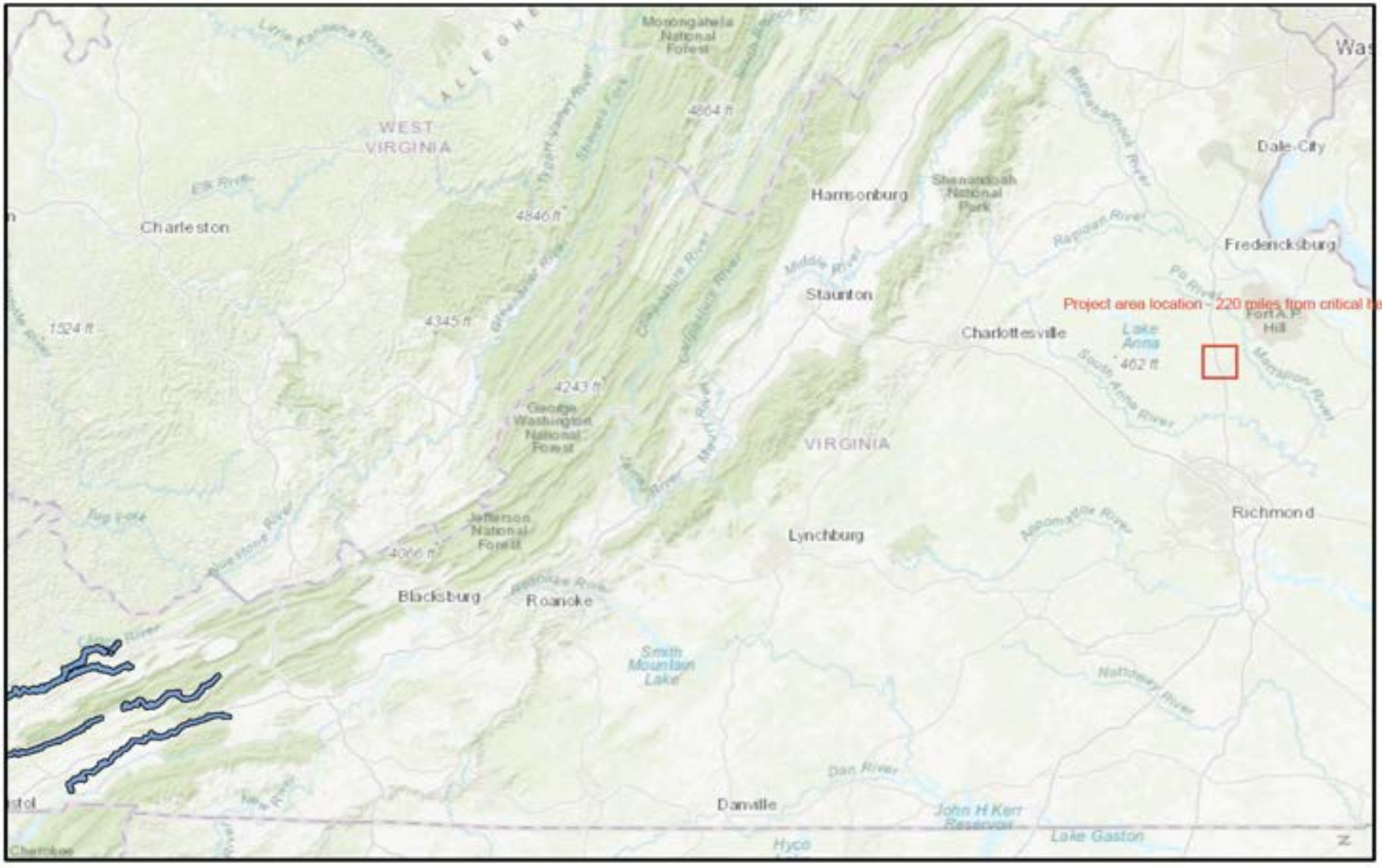
Layers: VA Eagle Nest Locator

Map Center [longitude, latitude]: [-77.51850128173828, 38.023078078670366]

Map Link:
https://ccbbirds.org/maps/#layer=VA+Eagle+Nest+Locator&zoom=12&lat=38.023078078670366&lng=-77.51850128173828&legend=legend_tab_7c321b7e-e523-11e4-aaa0-0e0c41326911&base=Street+Map+%28OSM%2FCarto%29

Report Generated On: 02/29/2024

Critical Habitat - Ruther Glen



February 29, 2024

Virginia Critical Habitat (published)

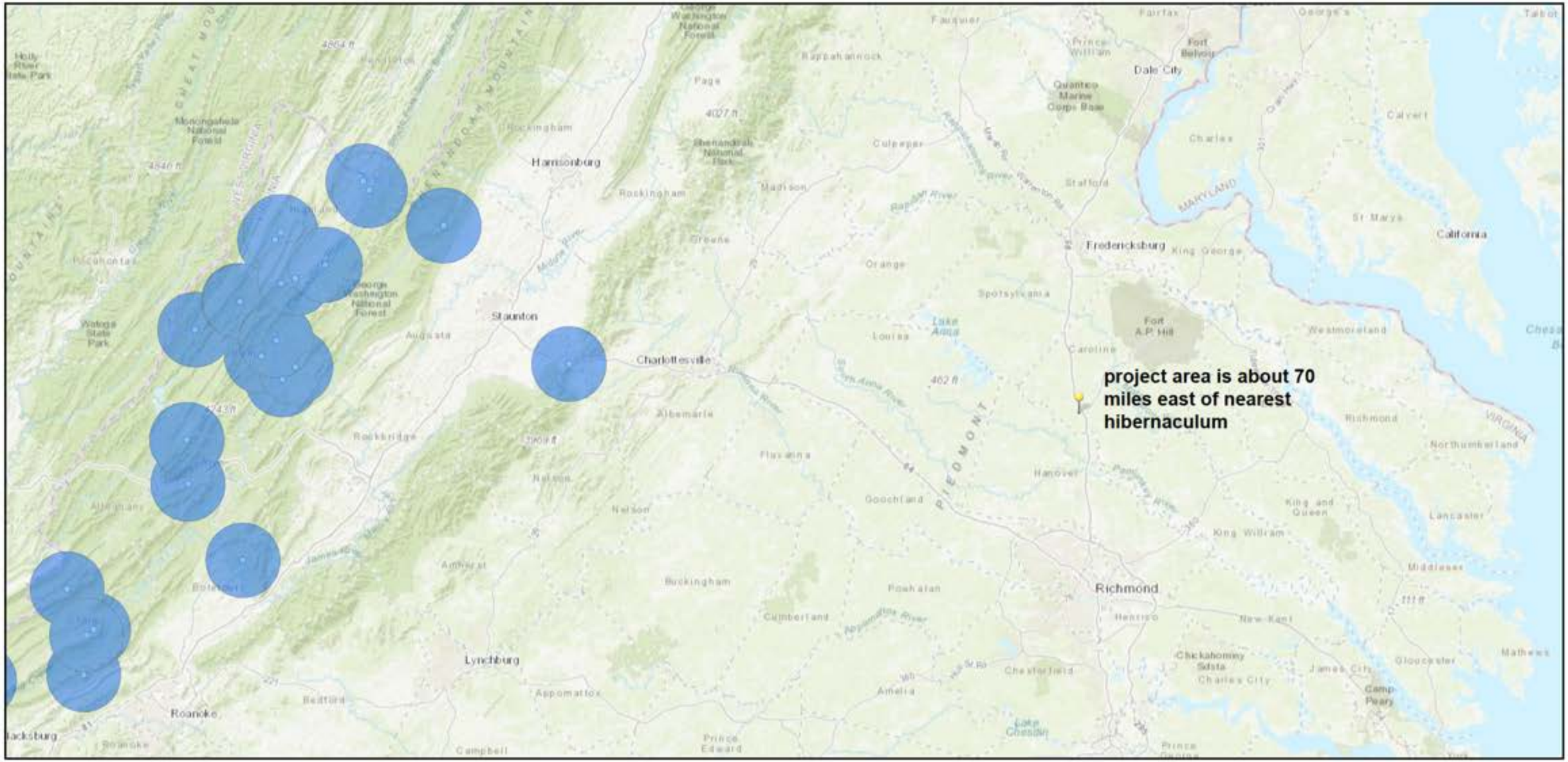
1:2,311,162

0 15 30 60 mi

0 25 50 100 km

Esri, HERE, Garmin, FAO, USGS, EPA, NPS

MYLU-PESU Locations and Roost Trees - Ruther Glen



2/29/2024

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

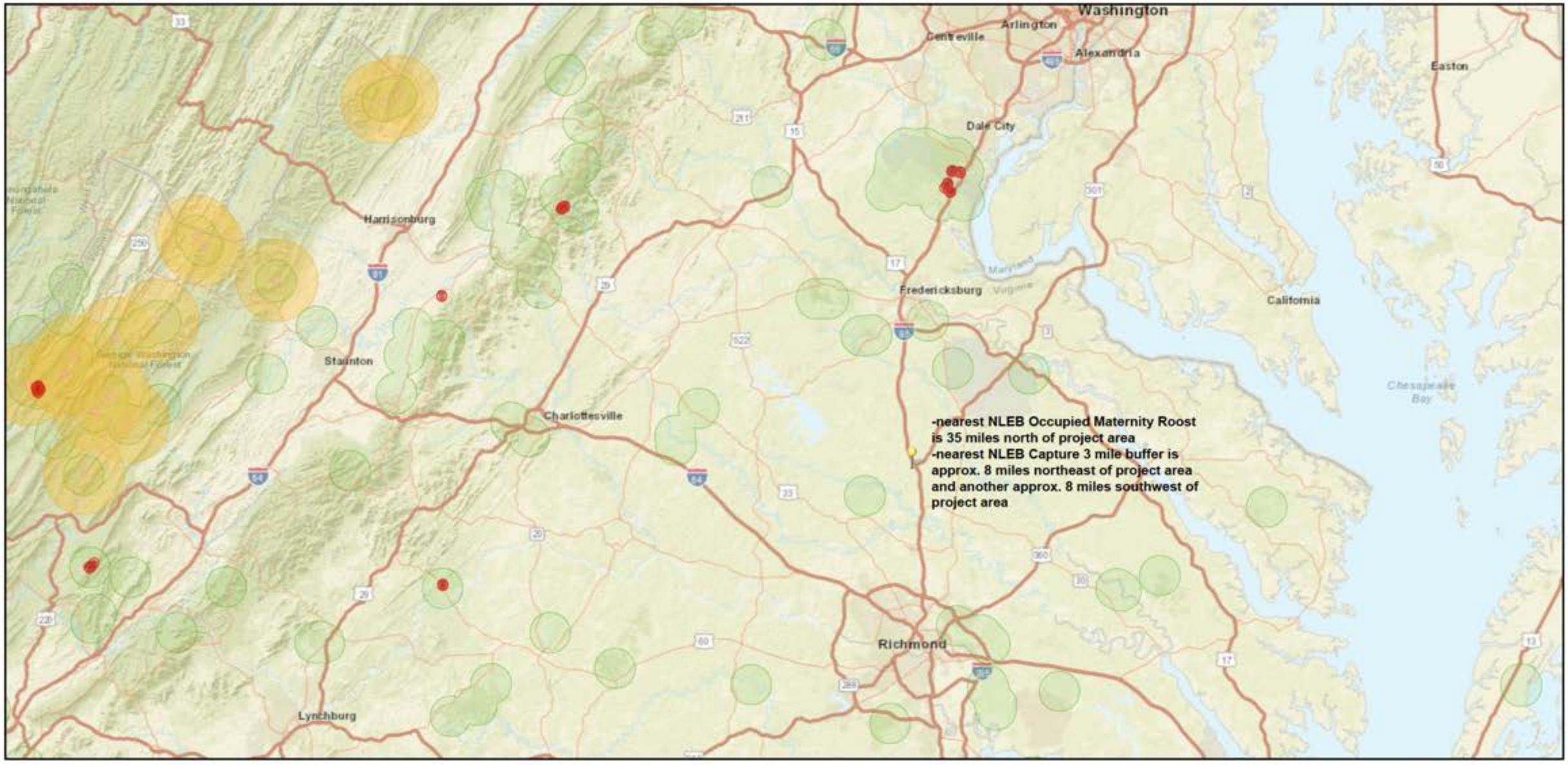
0 15 30 60 km

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 - Ruther Glen



2/29/2024

- 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!

ERM
Sustainability is our business

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

APPENDIX G VISUAL SIMULATIONS

Ruther Glen
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

KOP 009B

Ladysmith Rd and Bull Church Rd

Route: 4
Date: 7/26/24
Time: 11:17 am
Viewing Direction: South
Distance to closest feature: 386 ft

EXISTING CONDITIONS

PROPOSED CONDITIONS

Legend

- KOP View Direction
- Route 4
- 160ft 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.

Ruther Glen
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

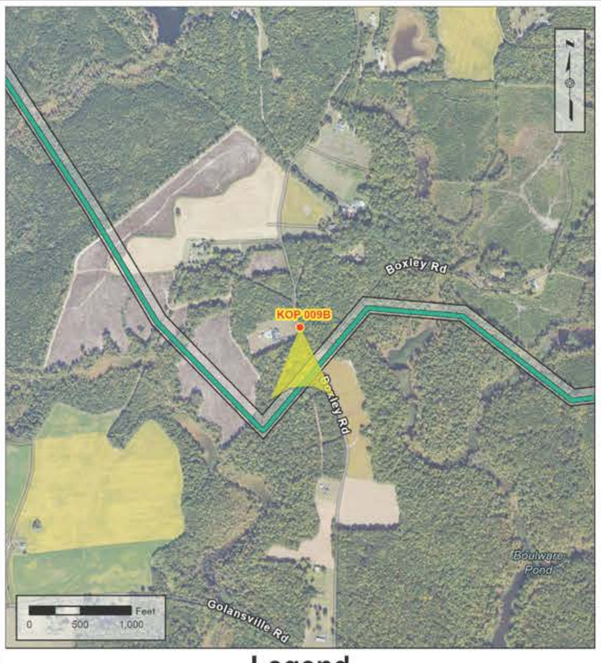
KOP 009B

Ladysmith Rd and Bull Church Rd

Route: 4
Date: 7/26/24
Time: 11:17 am
Viewing Direction: South
Distance to closest feature: 386 ft

EXISTING CONDITIONS

YELLOW: PARTIALLY OR FULLY HIDDEN PROJECT INFRASTRUCTURE



Legend

- KOP View Direction
- Route 4
- 160ft 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.

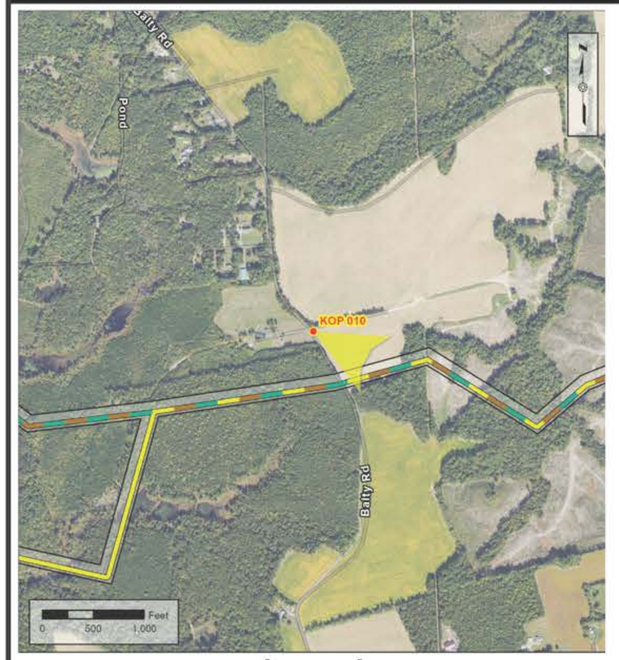
Ruther Glen
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

KOP 010

Balty Rd

Route: 4,5,6
Date: 7/24/24
Time: 2:59 pm
Viewing Direction: Southeast
Distance to closest feature: 557 ft



Legend

- KOP View Direction
- Route 4
- Route 5
- Route 6
- 160ft 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.

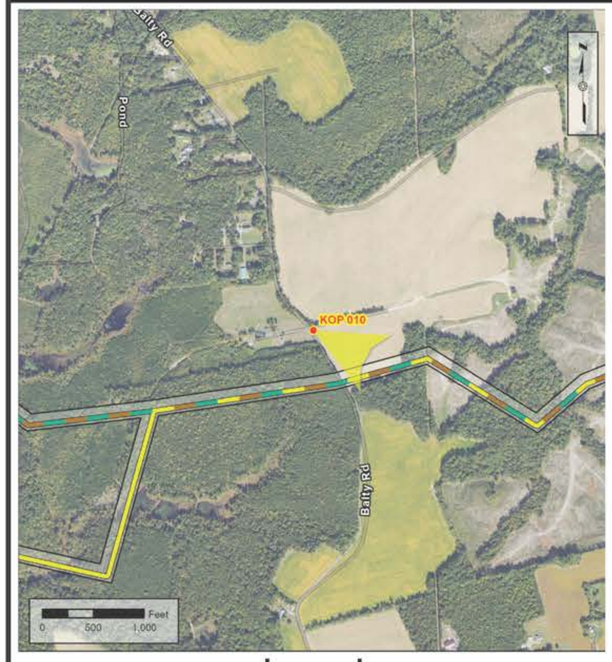
Ruther Glen
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

KOP 010

Balty Rd

Route: 4,5,6
Date: 7/24/24
Time: 2:59 pm
Viewing Direction: Southeast
Distance to closest feature: 557 ft



Legend

- KOP View Direction
- Route 4
- Route 5
- Route 6
- 160ft 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.

Ruther Glen
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

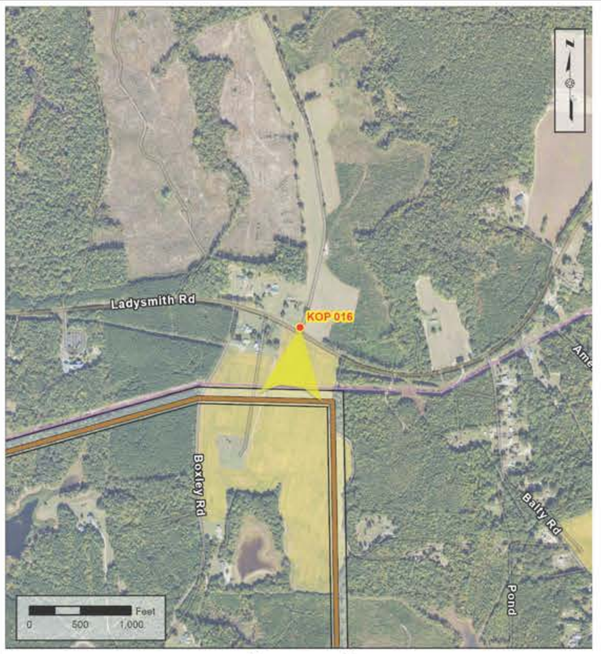
KOP 016

Ladysmith Rd

Route: 5
Date: 07/25/24
Time: 3:44 pm
Viewing Direction: South
Distance to closest feature: 724 ft

EXISTING CONDITIONS

PROPOSED CONDITIONS



Legend

- KOP View Direction
- Route 5
- 160ft 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.

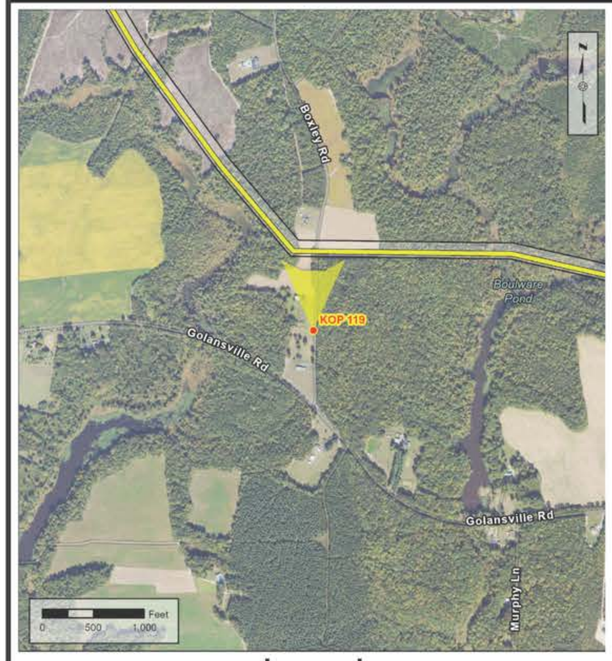
Ruther Glen
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

KOP 119

Boxley Rd

Route: 6
Date: 09/03/24
Time: 11:20 am
Viewing Direction: North
Distance to closest feature: 777 ft



Legend

- KOP View Direction
- Route 6
- 160ft 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.

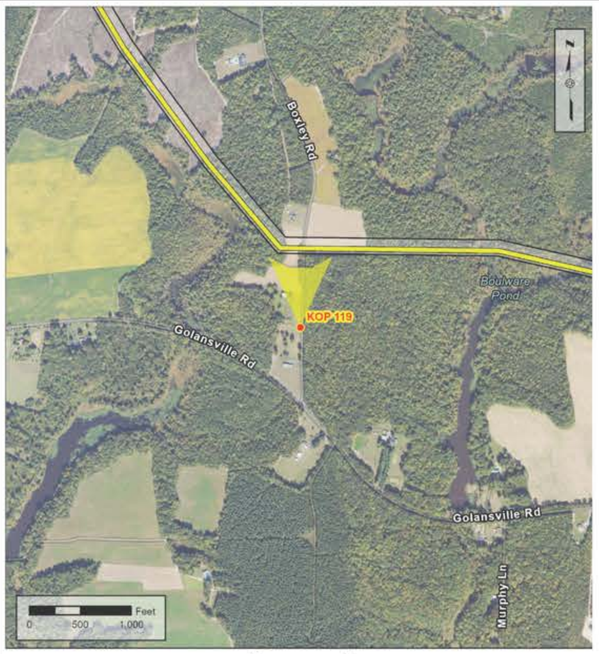
Ruther Glen
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

KOP 119

Boxley Rd

Route: 6
Date: 09/03/24
Time: 11:20 am
Viewing Direction: North
Distance to closest feature: 777 ft



Legend

- KOP View Direction
- Route 6
- 160ft 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 H STAGE 1 PRE-APPLICATION ANALYSIS OF CULTURAL RESOURCES

Ruther Glen 230 kV Electric Transmission Line Project

Pre-Application Analysis

PREPARED FOR

Dominion Energy

Dominion Energy Virginia

DATE

11 December 2024

REFERENCE

0721582

SIGNATURE PAGE

Ruther Glen 230 kV Electric Transmission Line Project

Pre-Application Analysis

0721582

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ACRONYMS AND ABBREVIATIONS

3D	three dimensional
CMOS	Complementary Metal Oxide Semiconductor
ERM	Environmental Resources Management
ESRI	Environmental Systems Research Institute
GNSS	Global Navigation Satellite System
GPR	Ground Penetrating Radar
ISO	International Organization for Standardization
JPEG	Joint Photographic Experts Group format
KOP	Key Observation Points
kV	kilovolt
MP	Milepost
NHL	National Historic Landmarks
NPS	National Park Service
NRHP	National Register of Historic Places
PBR	Physically Based Rendering
PDF	Portable Document Format
RAW	an unprocessed image
REC	Rappahannock Electric Cooperative
ROW	Right-of-Way
SCC	State Corporation Commission
USGS	U.S. Geological Survey
UTM	Universal Transverse Mercator
VCRIS	Virginia Cultural Resources Information System
VDHR	Virginia Department of Historic Resources
VDOT	Virginia Department of Transportation

EXECUTIVE SUMMARY

This report presents the findings of a pre-application analysis conducted for Dominion Energy Virginia's Ruther Glen 230 kilovolt (kV) Electric Transmission Line Project in Caroline County, Virginia. For this Project, the Company is proposing to construct and operate:

- One new, double-circuit, overhead 230 kV transmission line (Ruther Glen Line #256) in 160 feet of new rights-of-way will cut the existing Dominion Line #256 and connect to the proposed Ruther Glen Switching Station.
- One new 230 kV delivery point switching station (Ruther Glen Switching Station) in Caroline County, which will provide interconnection to REC to serve existing and planned development in the area.

Three potential routes were evaluated for the Ruther Glen Line, each of which cuts into the Ruther Glen Switching Station. This pre-application analysis assesses and compares potential impacts on previously recorded historic and archaeological resources in relation to each route. Impacts associated with construction and operation of the proposed Ruther Glen Switching Station were also considered and combined with the findings for each route. 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 are within the right-of-way for any of the proposed alternative routes.

One previously recorded historic resource meeting criteria specified in the Guidelines falls within the study tiers defined by the VDHR. The likely impacts each route would have on this resource are presented in Table 1. All three routes pass near the same resource, the Olive Cemetery. ERM recommends that Routes 4 and 6 would have No Impact on the resource, and Route 5 would have a Minimal Impact on that resource.

TABLE 1 EXECUTIVE SUMMARY OF PROJECT IMPACTS TO CONSIDERED HISTORIC RESOURCES IN THE STUDY AREA OF THE ROUTE ALTERNATIVES

Considered Resource	Route Alternatives		
	Route 4	Route 5	Route 6
016-5243	No Impact	Minimal	No Impact

Source: VCRIS (2024)

The proposed Ruther Glen Line would be constructed entirely in new right-of-way measuring 160 feet wide. Dominion Energy Virginia would use multiple structure configurations for the Project. The new structures would be double circuit weathering steel monopoles, with heights ranging from

90 to 155 feet and an average height dependent on the selected route, excluding foundation reveal, and subject to change based on final engineering. Two circuits would be supported on the same structure type at approximately 500–700-foot intervals along the right-of-way for the Project.

Routes 4 and 6 would present No Impact on cultural resources while Route 5 would present a Minimal Impact on one resource. Either Route 4 or Route 6 would have the least impact on known historic and archaeological resources.

1. INTRODUCTION

This report presents the findings of a pre-application analysis conducted for Dominion Energy Virginia's Ruther Glen 230 kilovolt (kV) Electric Transmission Line Project in Caroline County, Virginia. For this Project, the Company is proposing to construct and operate:

- One new, double-circuit, overhead 230 kV transmission line (Ruther Glen Line #256) in 160 feet of new rights-of-way will cut the existing Dominion Line #256 and connect to the proposed Ruther Glen Switching Station.
- One new 230 kV delivery point switching station (Ruther Glen Switching Station) in Caroline County, which will provide interconnection to REC to serve existing and planned development in the area.

Three potential routes were evaluated for the proposed Ruther Glen Line, each of which cuts into the proposed Ruther Glen Switching Station (Figure 1). The pre-application analysis assesses potential impacts on previously recorded historic and archaeological resources relative to each route alternative. 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

1.1.1 ROUTE 4

Route 4 taps the Company's existing Line #256 approximately 0.8 mile due north of Golansville Road and extends west for approximately 1.1 miles across agricultural fields, forested land, a Columbia Gas Natural Gas easement and Balty Road. Following property lines west of Balty Road, Route 4 passes through forested parcels and crosses Dejarnette Mill Run twice before turning southwest to cross Boxley Road approximately 0.6 mile north of Golansville Road. West of Boxley Road, Route 4 turns northwest for approximately 1.1 miles through forested land east of Reedy Swamp and west of rural residential properties before turning west to enter the proposed Ruther Glen Switching Station.

Route 4 measures approximately 3.7 miles and would require a 160-foot of right-of-way. The cumulative right-of-way for this alternative (70.7 acres) and the proposed Ruther Glen Switching Station (7.5 acres) would encompass a combined 78.2 acres.

1.1.2 ROUTE 5

Route 5 taps the Company's existing Line #256 in the same location as Route 4 and follows the same path as Route 4 for the first approximately 2.0 miles. At this point, Route 5 turns north to cross Bath Road/Pond Road and extends north for approximately 0.80 mile through forested parcels and along the eastern edge of an agricultural parcel. Route 5 then turns west to run parallel to and south of the existing REC 115 kV easement for approximately 0.8 mile through

agricultural and then forested land. Route 5 then crosses and runs parallel to the north side of the REC easement for approximately 0.4 mile through forested land before entering the Ruther Glen Switching Station.

Route 5 measures approximately 4.0 miles and would require a 160-foot of right-of-way. The cumulative right-of-way for this alternative (77.1 acres) and the proposed Ruther Glen Switching Station site (7.5 acres) would encompass a combined 84.6 acres.

1.1.3 ROUTE 6

Route 6 taps the Company's existing Line #256 in the same location as Route 4 and follows the same path as Route 4 for the first approximately 1.5 miles. At this point, Route 6 turns south for approximately 0.3 mile and then west for approximately 0.6 mile before crossing Boxley Road. This segment of Route 6 runs through forested land and crosses Dejarnette Mill Run three times, including two crossings north of Boulware Pond. After crossing BOxley Road, Route 6 turns northwest for approximately 1.2 miles through forested areas east of Reedy Swamp and west of rural residential properties along Boxley Road. Route 6 then crosses the existing REC 115 kV easement and turns west to enter the proposed Ruther Glen Switching Station.

Route 6 measures approximately 3.9 miles and would require a 160-foot of right-of-way. The cumulative right-of-way for this alternative (74.1 acres) and the proposed Ruther Glen Switching Station site (7.5 acres) would encompass a combined 81.6 acres.

1.2 MANAGEMENT RECOMMENDATIONS

No archaeological sites were identified within or adjacent to the alternative routes' rights-of-way.

One previously recorded historic resource meeting the criteria specified in the Guidelines falls within study tiers defined by the VDHR for transmission line routes (see Table 1). All three routes, Routes 4, 5, and 6, each pass near one considered architectural resources, the Olive Cemetery. Routes 4 and 6 would have No Impact on the resource, and Route 5 would have a Minimal Impact on that resource.

Routes 4 and 6 would present the least impact on cultural resources (archaeological and historic), with each assessed to have No Impact on the one resource in the study tiers. Route 5 would pose the greatest impact on cultural resources, creating a Minimal Impact on one resource. More information about the considered resource and the nature of potential impacts associated with the various route alternatives are found in the sections that follow.

FIGURE 1 OVERVIEW OF TRANSMISSION LINE ROUTES UNDER CONSIDERATION FOR THE PROJECT

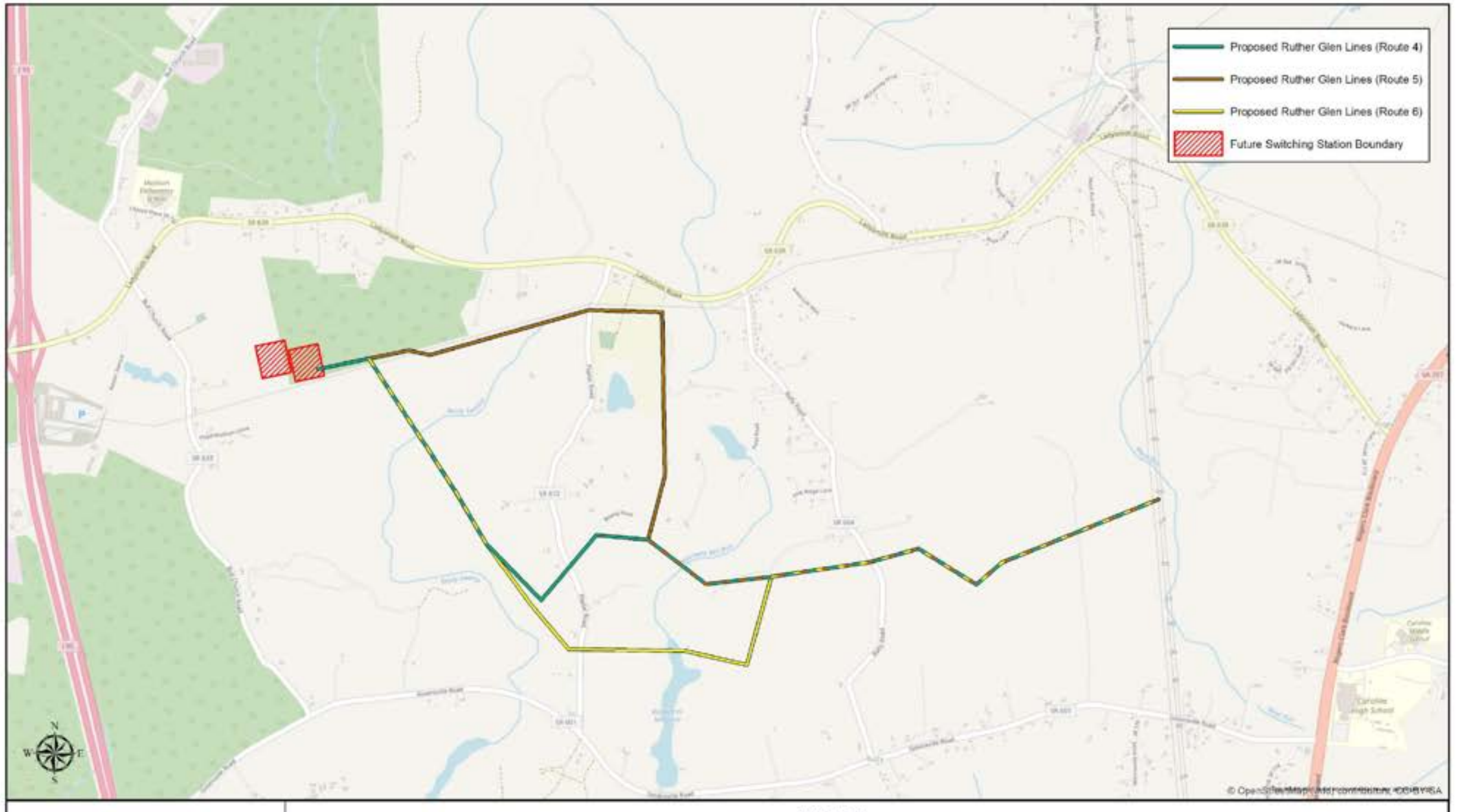

Figure 1
Overview of Transmission Line Segments under Consideration for the Project
Ruther Glen Project
Dominion Energy Virginia
Caroline County, VA

2. RECORDS REVIEW

2.1 DATA COLLECTION APPROACH

ERM conducted an analysis of potential cultural resource impacts for the route alternatives 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;
- National Register of Historic Places (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 route alternative.

Data on previously recorded cultural resources within each study tier was sought from the Virginia Cultural Resources Information System (VCRIS). However, no previously recorded resources aligned with the criteria specified in the Guidelines were identified in the study tiers in the VCRIS database. ERM also sought information on locally significant resources by contacting several possibly interested parties: Caroline Historical Society, Hanover County Historical Society, Hanover County Black Heritage Society, Virginia Department of Transportation (VDOT), VDHR, Northern Virgnia Conservation Trust, Preservation Virginia, Virginia Genealogical Society, Virginia Museum of History and Culture, Woodfork Genealogy, and American Battlefield Trust. Information was collected on 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 historic resources along each route alternative in accordance with the Guidelines. Digital photographs of each resource and views to the proposed transmission lines were taken. Photo simulations and vegetated visual analysis were prepared to assess the potential for visual impacts deriving from construction of the new transmission line.

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 any of the alternative transmission line routes.

2.3 HISTORIC RESOURCES

The following discussion summarizes the known historic resources in the vicinity of each route alternative based on the VDHR's tiered study model defined in the Guidelines. The location of the one considered historic resource relative to the various route alternatives is shown on Figure 2. Individual maps for each route alternative are provided in Attachment 1.

FIGURE 2 LOCATION OF CONSIDERED HISTORIC RESOURCE IN RELATION TO ALTERNATIVE ROUTES

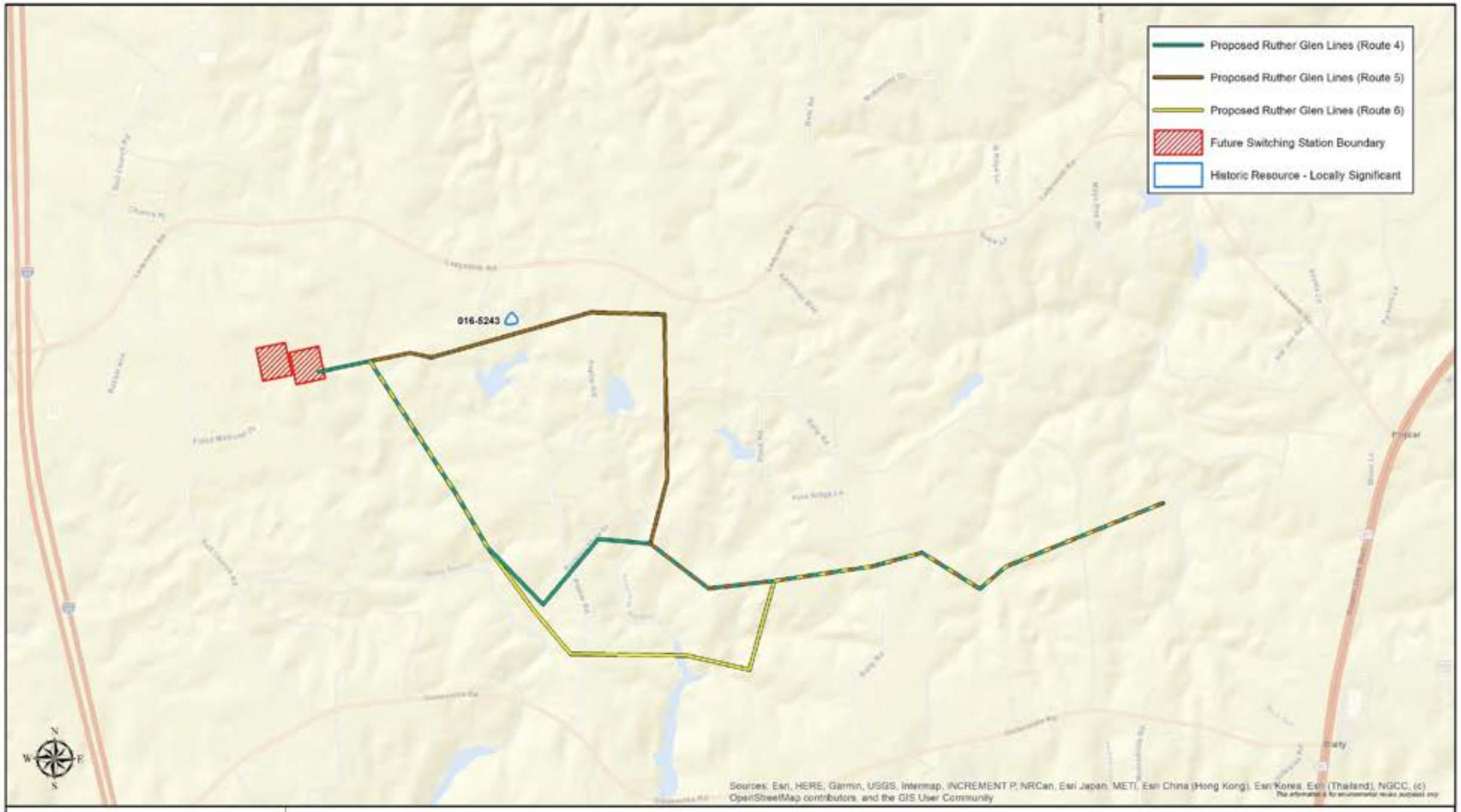

Figure 2
Location of Considered Historic Resource Along and Near Route Alternatives
Ruther Glen Project
Dominion Energy Virginia
Caroline County, VA

FILE: C:\Users\Vincent.mace\OneDrive - ERM\Dominion Cornet Church Ruther Glen\UPDATES 9-24\Ruther Glen Figure 2.mxd | REVISED: 10/21/2024 | SCALE: 1:20,000 when printed at 11x17 DRAWN BY: GIS

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.

Areas of overlap between routes mean that the impacts on some resources would likely be identical in those cases, depending on required structure placement. 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 selected 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 historic resources to the selected route.

2.3.1 ROUTE 4

The considered resource within the VDHR tiers for Route 4 is presented in Table 2 and depicted in Attachment 1, Sheet 1. This resource was 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 4

Buffer (Miles)	Resource Category	Resource Number	Description
0.0 to 0.5	Locally Significant	016-5243	Olive Cemetery

2.3.2 ROUTE 5

The considered resource within the VDHR tiers for Route 5 is presented in Table 3 and depicted in Attachment 1, Sheet 2. This resource was 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 5

Buffer (Miles)	Resource Category	Resource Number	Description
0.0 to 0.5	Locally Significant	016-5243	Olive Cemetery

2.3.3 ROUTE 6

The considered resource within the VDHR tiers for Route 6 is presented in Table 4 and depicted in Attachment 1, Sheet 3. This resource was subjected to field reconnaissance and a preliminary assessment of impacts, discussed in the next chapter.

TABLE 4 HISTORIC RESOURCES IN THE VDHR TIERS FOR ROUTE 6

Buffer (Miles)	Resource Category	Resource Number	Description
0.0 to 0.5	Locally Significant	016-5243	Olive Cemetery

3. PREVIOUS SURVEYS

There have been no previous cultural resource surveys covering portions of the alternative routes for Ruther Glen Line. Three prior surveys have been conducted within 1.5 mile of the Project routes and switching station sites, the nearest of which is approximately a mile away. 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 5 CULTURAL RESOURCE SURVEYS COVERING PORTIONS OF THE ALTERNATIVE ROUTES

VDHR Survey #	Title	Authors	Date
CE-009	Phase I Archaeological Reconnaissance Survey, Caroline County Park	Lyle E. Browning	1986
CE-172	A Cultural Resources Survey Associated with Route 639 Ladysmith Road Widening, Caroline County, Virginia	Nicholas Arnhold, Laura Purvis	2017
CE-198	A Phase I Cultural Resources Survey of Approximately 2.5 Acres Associated with the Proposed Development of Sheetz #37, in Ruther Glen, Virginia	Donald Sadler, Ellen Brady	2020

4. STAGE 1 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 April 24–26, 2024. The fieldwork involved photographing resources requiring visual assessment according to the Guidelines and examining potential line-of-sight views from each resource toward the route alternativesPhotographs were taken from the public right-of-way nearest to the resource facing toward the applicable route(s).

Panoramic photographs were taken from the one considered resource, with an effort to capture the direction with the clearest, most unobstructed view toward the applicable route or routes. 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 Key Observation Points (KOP). Site visits to the KOPs 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 was 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 f1.4D 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.

Additional viewshed renderings were conducted to assess the visibility of the three proposed route alternatives from Olive Cemetery (016-5243). Digital Surface Model viewshed analyses were prepared using a Digital Elevation Model derived from National Elevation Dataset 1/3 arc second Elevation Dataset. Focal points were placed along the centerline at locations preliminarily assigned by engineering. Structure heights ranged from 90 feet to 155 feet above the ground, as noted in the structures' attributes. Vegetation data was derived by combining the Virginia Landcover data with the tree heights (in meters) from the USDA LANDFIRE dataset. The resulting visual analyses are presented in Attachment 6.

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.
- **Minimal**–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

4.3.1 016-5243, OLIVE CEMETERY

Olive Cemetery, a circa 1850 African American community cemetery, is located approximately 0.16 miles to the south of Ladysmith Road nestled deep in a wooded area just south of the St. Mary of the Annunciation Catholic Church (Attachment 4, Figure 1). According to previous surveyors the cemetery is partially delineated by barbed wire.

First surveyed in August of 2022 by Joanna Wilson-Green, the cemetery was noted as not being associated with the neighboring church located several hundred feet away. In November 2022, Wilson-Green resurveyed the resource, which was accompanied by the caretakers from the neighboring church. The resource was then surveyed again in December of 2023 by Sarah Lowry of New South Associates, who conducted ground penetrating radar (GPR). The GPR survey identified 225 potential cemetery features. Among those, it was noted that there were 81 probable and 135 possible graves totaling 216. Of the 216 possible graves, 36 had associated markers and mounds, 93 were identified by mounding only, while the remaining 87 were neither marked nor mounded. Of the remaining 9 cemetery features, all had GPR anomalies with no definitive information to it representing an interment. The earliest marked grave is from 1902, and the most recent marked grave dates to 1982. In March of 2024, Wilson-Green recorded the name change by the caretakers to Olive Cemetery as to not confuse it with a neighboring cemetery with a similar name.

016-5243 has not been formally evaluated for NRHP eligibility by VDHR, but ERM has categorized it as locally significant for the purposes of the Ruther Glen Project due to its ties to the local African American community. 016-5243 lies within the half-mile study tier for all three routes.

4.4 HISTORIC RESOURCE FINDINGS FOR ROUTE 4

The impacts to resource in Route 4 study tiers are discussed below. Photo simulations are provided in Attachment 5.

4.4.1 016-5234, OLIVE CEMETERY

Olive Cemetery is approximately 0.47 mile to the east-northeast of Route 4 and approximately 0.65 mile to the east-northeast of the proposed switching station (Attachment 5, Figure 1). The area between the resource and the route is densely wooded, except for an area of cleared land around a dwelling and along the existing transmission line running roughly east to west to the south of the cemetery. Due to the secluded location, one simulation was prepared for this resource from a vantage point located 0.11 miles to the north-northeast of the resource's boundary in the parking lot of a nearby church (KOP 007; Attachment 5, Figure 2). As shown by the simulation, there will be no view to the route or proposed switching station due to the existing vegetation and distance. Therefore, ERM recommends there would be **No Impact** on this resource from Route 4.

4.5 HISTORIC RESOURCE FINDINGS FOR ROUTE 5

The impacts to the historic resource in the Route 5 study tiers are discussed below. Photo simulations are provided in Attachment 5.

4.5.1 016-5243, OLIVE CEMETERY

Olive Cemetery is located approximately 183 feet to the north of Route 5, which follows along an existing transmission line right-of-way near this resource (Attachment 5, Figure 3). The area between the resource and the route consists of a thin strip of trees followed by a clearing for the existing transmission line running northeast to southwest.

Due to the secluded location, one simulation was prepared for this resource from a vantage point located 0.11 miles to the north-northeast of the resource's boundary in the parking lot of a nearby church (KOP 007; Attachment 5, Figure 4). From this location, the proposed Route 5 would not be visible due to the dense vegetation, although the bulk of the screening vegetation in the simulation is north of the resource, not between the resource and Route 5.

Because ERM was unable to take a simulation from the resource boundary that would capture actual sight lines to the route, ERM conducted additional modeling using the vegetated viewshed analysis, which analyzes vantage points across the resource and in the surrounding area looking towards Route 5. The model depicts where there is potential for transmission structures to be visible and quantifies the number of structures likely to be visible. According to the analysis, there will be no view of structures from the resource (Attachment 6, Figure 1). However, this analysis used available aerial imagery, which may differ from current conditions.

While the vicinity of the Olive Cemetery has been impacted by recent construction that might increase the visibility of Route 5 from vantage points within the resource, the viewshed has also been altered previously by the existing transmission line, which parallels the north side of Route 5's alignment and which has already introduced comparable modern infrastructure into the resource's viewshed. Even so, Route 5 would introduce additional modern elements that would be more prominent within the resource's viewshed, albeit partially obscured by dense vegetation during most of the year. Therefore, ERM recommends that Route 5 would have a **Minimal Impact** on 016-5243.

4.6 HISTORIC RESOURCE FINDINGS FOR ROUTE 6

The impacts to the resource in Route 6 study tiers are discussed below. Photo simulations are provided in Attachment 5.

4.6.1 016-5234, OLIVE CEMETERY

Olive Cemetery is approximately 0.47 mile to the east-northeast of Route 6 (Attachment 5, Figure 5). The area between the resource and the route is densely wooded, except for an area of cleared land around a dwelling and along the existing transmission line running roughly east to west to the south of the cemetery. Due to the secluded location, one simulation was prepared for this resource from a vantage point located 0.11 miles to the north-northeast of the resource's boundary in the parking lot of a nearby church (KOP 007; Attachment 5, Figure 6). As shown by the simulation, there will be no view to the route due to the existing vegetation and distance. Therefore, ERM recommends there would be **No Impact** on this resource from Route 6.

4.7 ARCHAEOLOGICAL RESOURCES WITHIN THE RIGHT-OF-WAY FOR THE ROUTE ALTERNATIVES

There are no known archaeological sites within the right-of-way for any of the alternative transmission line routes or switching station sites.

5. CONCLUSIONS AND RECOMMENDATIONS

As part of the effort to evaluate potential impacts from route alternatives 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.

One historic resource falls within the VDHR study tiers for the route alternatives under consideration. A comparison of the resource impacts from each route is presented in Table 6. Specifics on the impacts posed by each alternative are covered in the subsections that follow.

TABLE 6 COMPARISON OF PROJECT IMPACTS ON HISTORIC RESOURCES IN THE STUDY AREAS OF THE ROUTE ALTERNATIVES

	Number of Considered Resources in Each Impact Category				
Route Alternative	**None**	**Minimal**	**Moderate**	**Severe**	**Total**
Route 4	1	-	-	-	1
Route 5	-	1	-	-	1
Route 6	1	-	-	-	1

Final assessments of Project impacts will be dependent on the completion of identification-phase archaeological and historic architectural 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 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 4

One previously recorded historic resource meeting the criteria specified in the Guidelines is within the VDHR study tiers for Route 4 (Table 7). The route would have No Impact on this historic resource.

TABLE 7 IMPACTS ON HISTORIC RESOURCES IN THE VDHR STUDY TIERS FOR ROUTE 4

Buffer (miles)	Resource Category	Resource Number	Description	Impact
1.0 to 1.5	National Historic Landmarks	-	-	-
0.5 to 1.0	National Register Properties (Listed)	-	-	-
	National Register – eligible (Battlefields/Historic Landscape)	-	-	-
	Locally Significant	-	-	-
0.0 to 0.5	National Register Properties (Listed)	-	-	-
	National Register – Eligible	-	-	-
	Locally Significant	016-5243	Olive Cemetery	None
0.0 (within ROW)	National Register Properties (Listed)	-	-	-
	National Register – Eligible	-	-	-

ROW = right-of-way

5.2 ROUTE 5

One previously recorded historic resource meeting the criteria specified in the Guidelines is within the VDHR study tiers for Route 5 (Table 8). The route would have a Minimal Impact on this historic resource.

TABLE 8 IMPACTS ON HISTORIC RESOURCES IN THE VDHR STUDY TIERS FOR ROUTE 5

Buffer (miles)	Resource Category	Resource Number	Description	Impact
1.0 to 1.5	National Historic Landmarks	-	-	-
0.5 to 1.0	National Register Properties (Listed)	-	-	-
	National Register – eligible (Battlefields/Historic Landscape)	-	-	-
	Locally Significant	-	-	-
0.0 to 0.5	National Register Properties (Listed)	-	-	-
	National Register – Eligible	-	-	-
	Locally Significant	016-5243	Olive Cemetery	Minimal
0.0 (within ROW)	National Register Properties (Listed)	-	-	-
	National Register – Eligible	-	-	-

ROW = right-of-way

5.3 ROUTE 6

One previously recorded historic resource meeting the criteria specified in the Guidelines is within the VDHR study tiers for Route 6 (Table 9). The route would have No Impact on this historic resource.

TABLE 9 IMPACTS ON HISTORIC RESOURCES IN THE VDHR STUDY TIERS FOR ROUTE 6

Buffer (miles)	Resource Category	Resource Number	Description	Impact
1.0 to 1.5	National Historic Landmarks	-	-	-
0.5 to 1.0	National Register Properties (Listed)	-	-	-
	National Register – eligible (Battlefields/Historic Landscape)	-	-	-
	Locally Significant	-	-	-
0.0 to 0.5	National Register Properties (Listed)	-	-	-
	National Register – Eligible	-	-	-
	Locally Significant	016-5243	Olive Cemetery	None
0.0 (within ROW)	National Register Properties (Listed)	-	-	-
	National Register – Eligible	-	-	-

ROW = right-of-way

5.4 FUTURE INVESTIGATIONS

The next stage of assessing impacts on historic 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 archaeological and historic architectural 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 VCRIS 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 architectural resource regarding eligibility for listing on the NRHP and to assess Project impacts.

6. REFERENCES

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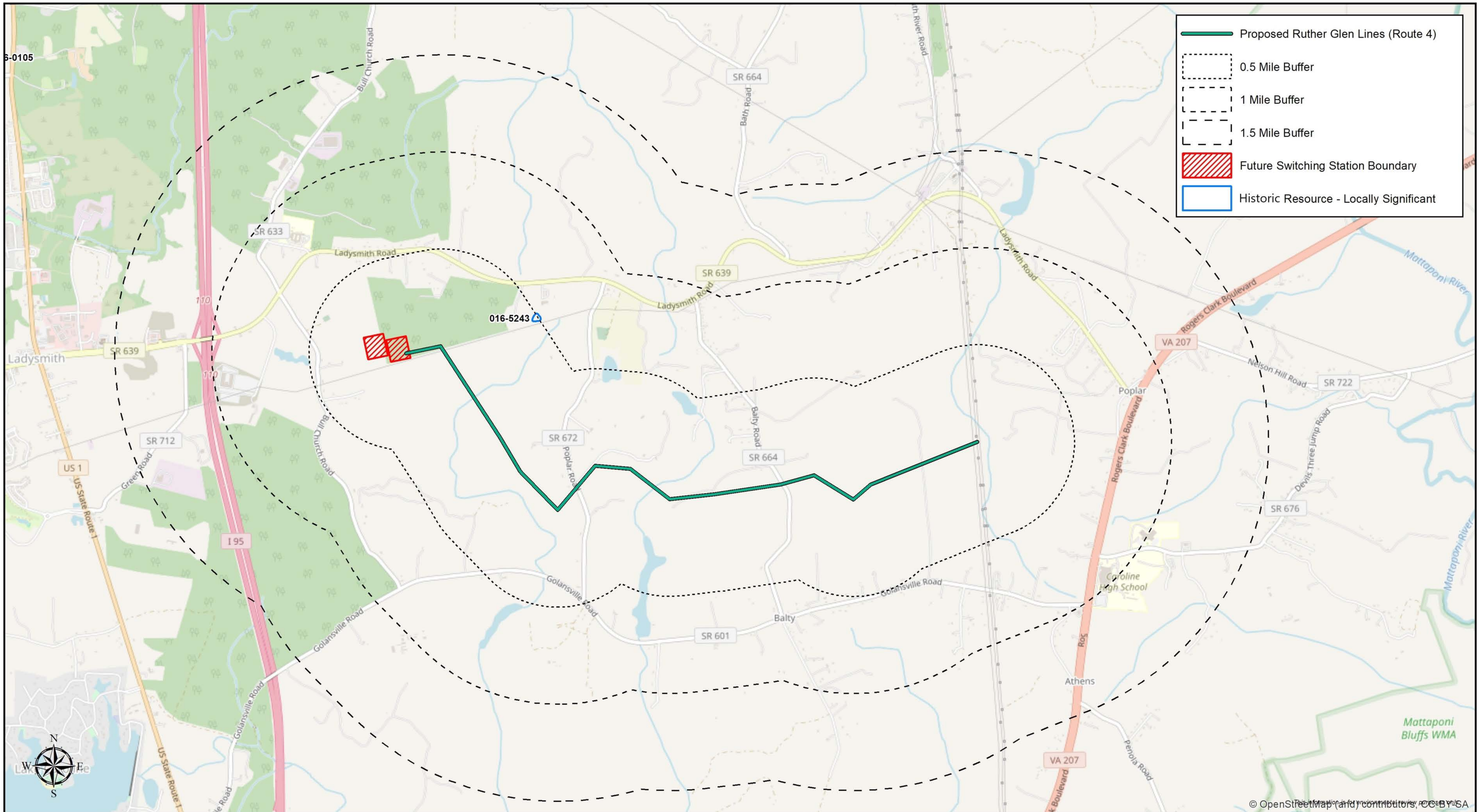
2017 Guidelines for Conducting Historic Resources Survey in Virginia. Accessed February 2024. Retrieved from: https://www.dhr.virginia.gov/wp-content/uploads/2023/05/SurveyManual_2017.pdfeyManual_2017.pdf (virginia.gov).

ATTACHMENT 1 LOCATIONS OF CONSIDERED HISTORIC RESOURCES ASSOCIATED WITH PROPOSED PROJECT



Attachment 1, Sheet 1
Locations of Considered Resources Associated with Proposed Project Alternatives - Proposed Ruther Glen Lines (Route 4)
Ruther Glen Project
Dominion Energy Virginia
Caroline County, VA

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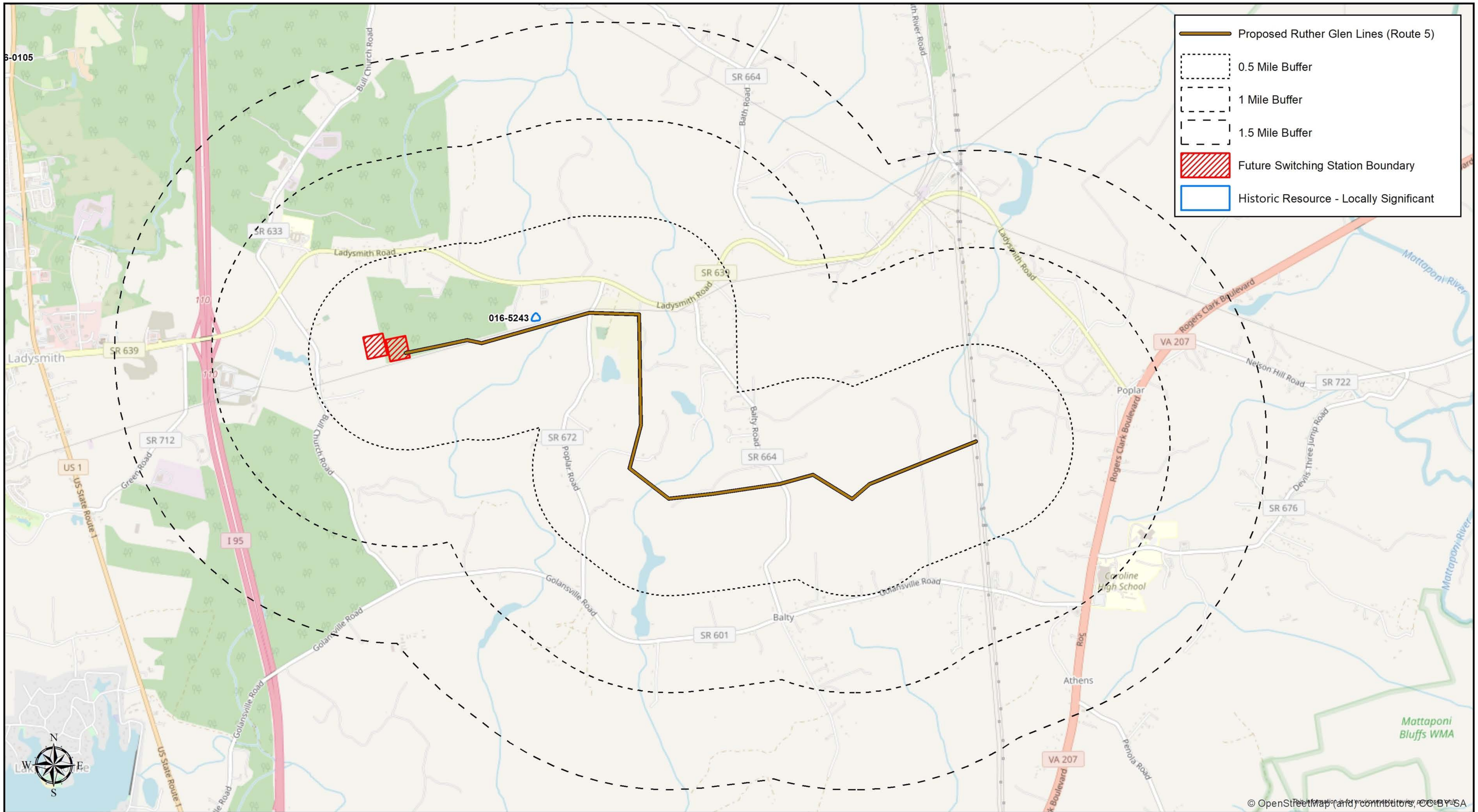
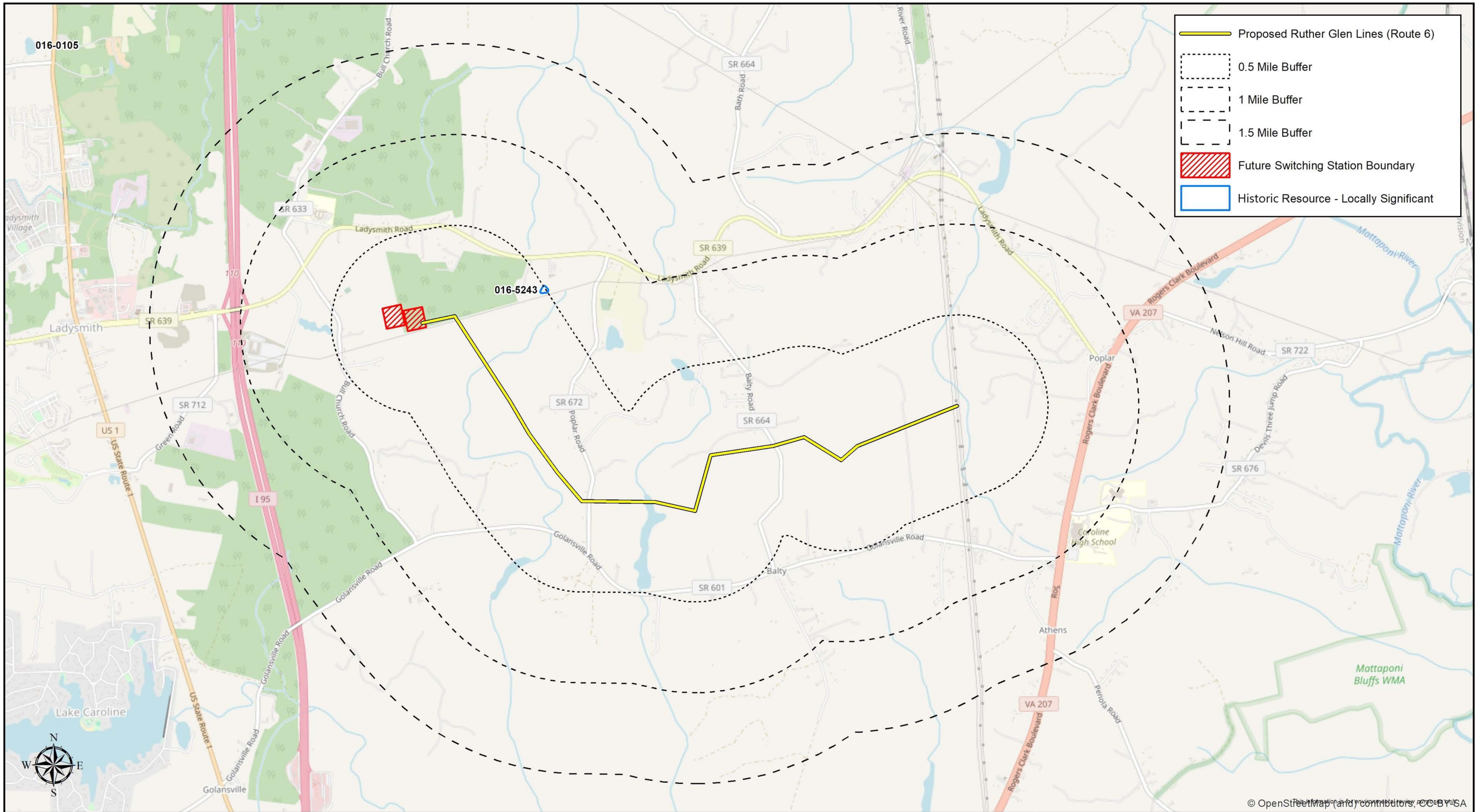


Attachment 1, Sheet 2
Locations of Considered Resources Associated with Proposed Project Alternatives - Proposed Ruther Glen Lines (Route 5)
Ruther Glen Project
Dominion Energy Virginia
Caroline County, VA

FILE: C:\Users\Vincent.macek\OneDrive - ERM\Dominion Carmel Church Ruther Glen\UPDATES 9-24\Ruther Glen Atatchment 1 Sheet 2.mxd | REVISED: 10/11/2024 | SCALE: 1:30,000 when printed at 11x17 DRAWN BY: GIS



Attachment 1, Sheet 3
Locations of Considered Resources Associated with Proposed Project Alternatives - Proposed Ruther Glen Lines (Route 6)
Ruther Glen Project
Dominion Energy Virginia
Caroline County, VA

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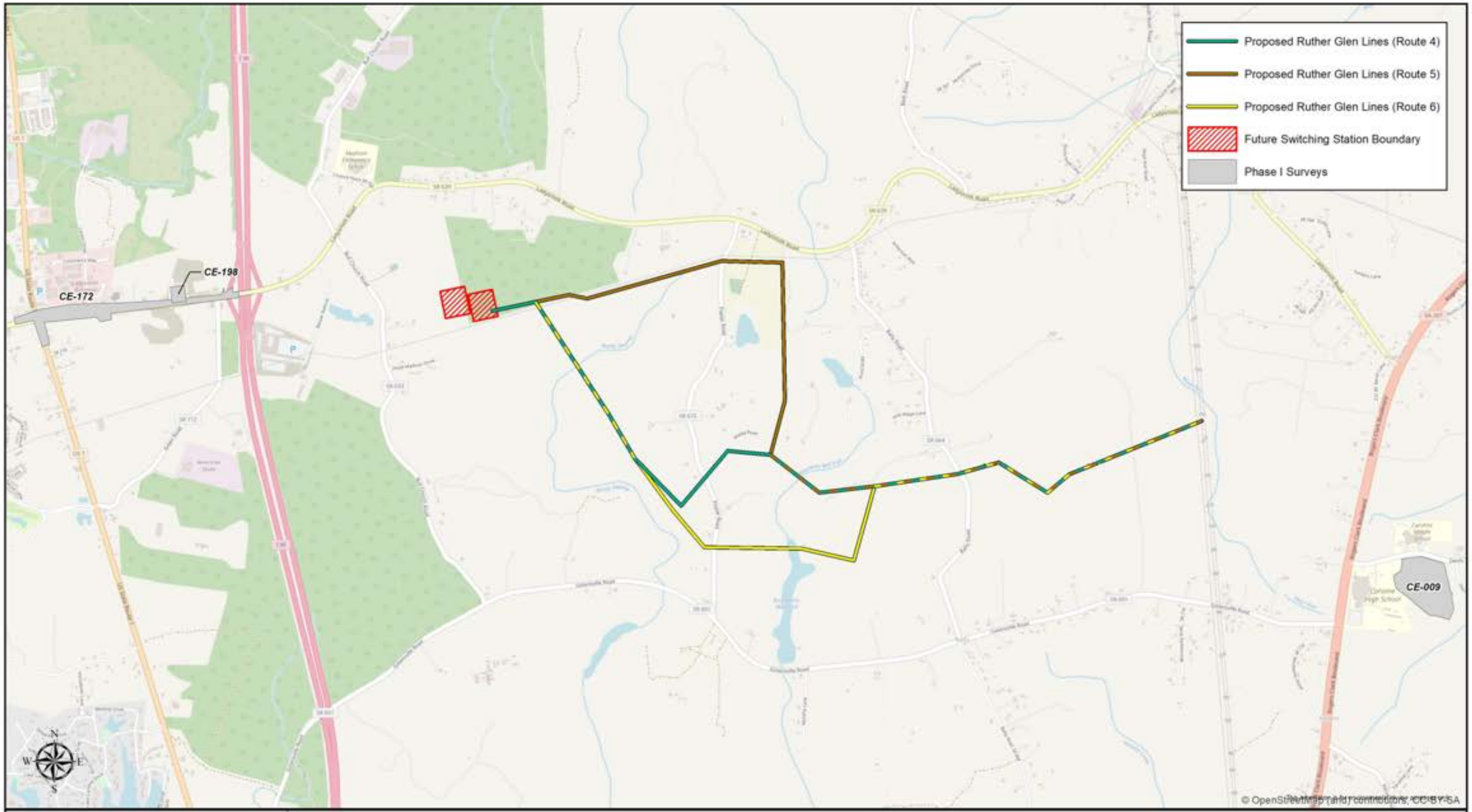
ATTACHMENT 2 CULTURAL RESOURCES SURVEYS COVERING PORTIONS OF ROUTES



0 0.25 0.5 0.75 1 Miles

1:24,000

Attachment 2
Location of Phase I Surveys Associated with Proposed Project Alternatives
Ruther Glen Project
Dominion Energy Virginia
Caroline County, VA

Dominion Energy

ERM

FILE: C:\Users\Vincent.macek\OneDrive - ERM\Dominion Carmel Church Ruther Glen\UPDATES 9-24\Ruther Glen Attachment 2.mxd | REVISED: 10/11/2024 | SCALE: 1:24,000 when printed at 11x17

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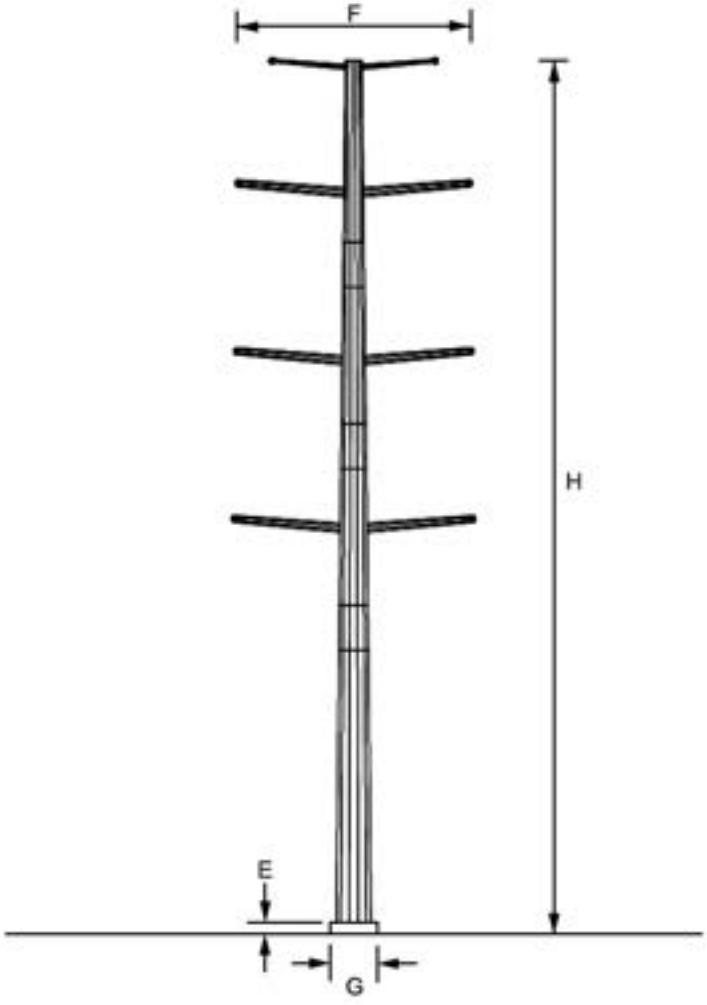
ATTACHMENT 3 TYPICAL DESIGN AND LAYOUT



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):	4.0 MILES (13 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):	110' 155' 120'
I. AVERAGE SPAN LENGTH (RANGE):	571' - 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

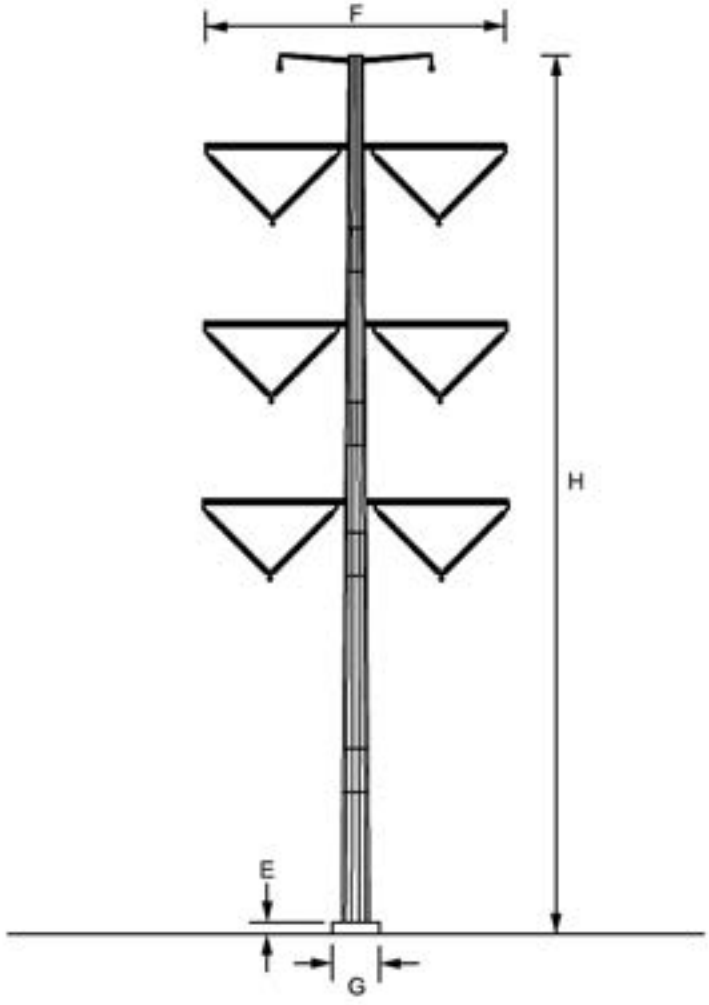
LINES 256, 2410 (ROUTE 5)

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):	4.0 MILES (20 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):	105' 135' 115'
I. AVERAGE SPAN LENGTH (RANGE):	571' - 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 256, 2410 (ROUTE 5)

TYPICAL DC ENGINEERED MONOPOLE SUSPENSION STRUCTURE (V-STRING)

ATTACHMENT NO.

II.B.3.b

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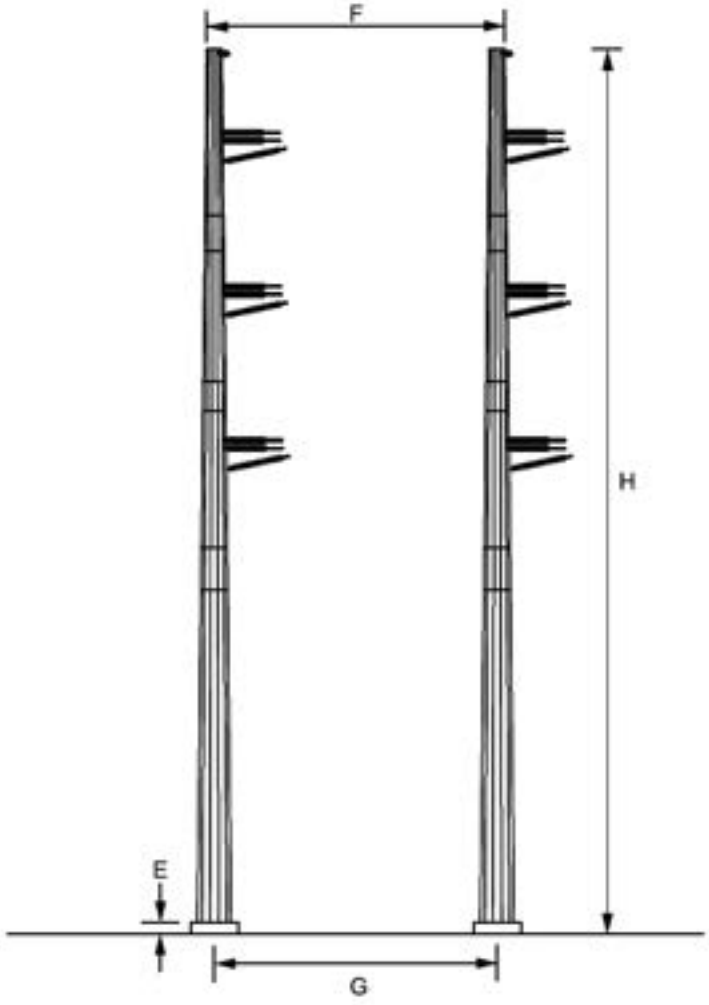

TYPICAL DC ENGINEERED 2-POLE DOUBLE DEADEND STRUCTURE

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):	4.0 MILES (2 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:	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' 105' 103'
I. AVERAGE SPAN LENGTH (RANGE):	571' - 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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Dominion Energy
5000 Dominion Blvd.
Glen Allen, VA 23060

LINES 256, 2410 (ROUTE 5)

TYPICAL DC ENGINEERED 2-POLE DOUBLE DEADEND STRUCTURE

ATTACHMENT NO.

II.B.3.c

DRAWN BY: SDH

ATTACHMENT 4 HISTORIC RESOURCE PHOTOS

Figure 1. 016-5243, Olive Cemetery, No View from the Public ROW, View to the South.

ATTACHMENT 5 PHOTO SIMULATIONS

Figure 1. Aerial photograph depicting land use and photo view for 016-5243.

EXISTING CONDITIONS

PROPOSED CONDITIONS

RUTHER GLEN

230 kV Electric Transmission Project

Dominion Energy Virginia

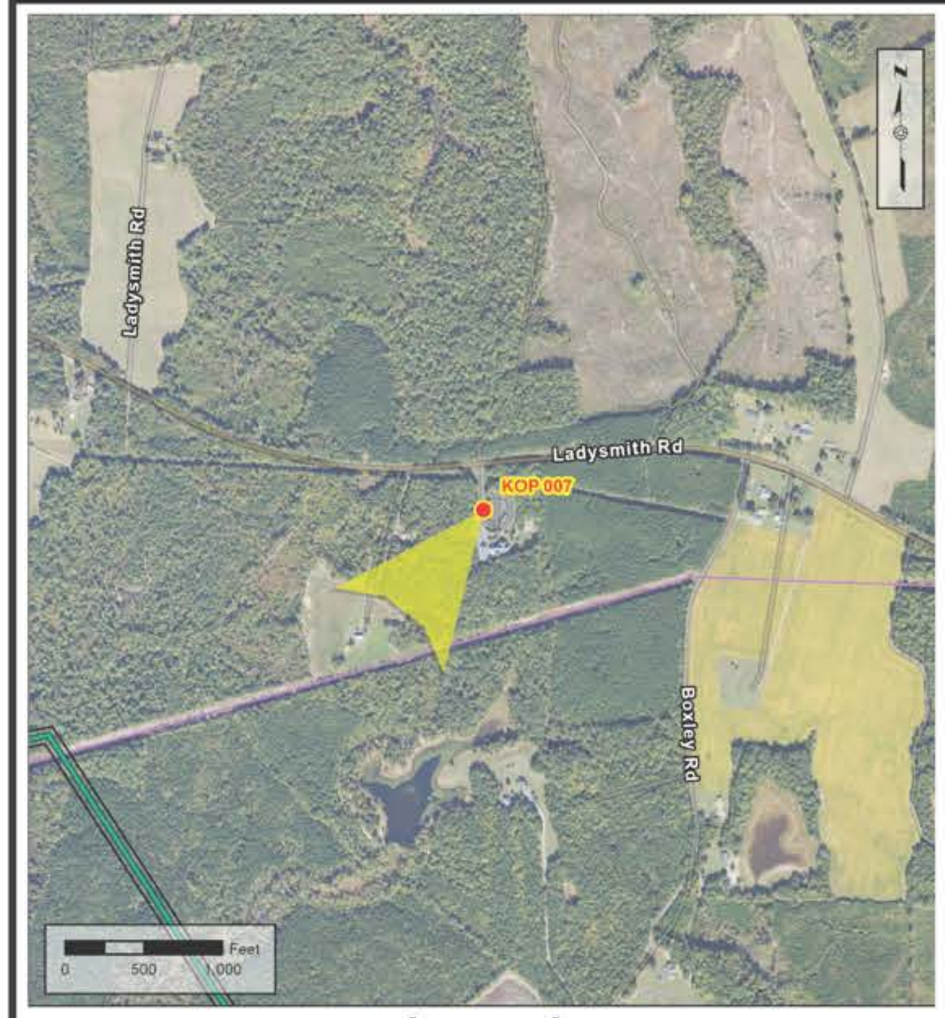
Caroline County, Virginia

Dominion Energy℠

KOP 007

Ladysmith Rd

Figure 2
Route: 4
Date:07/25/2024
Time: 03:53 pm
Viewing Direction: Southwest
Distance to closest feature: 0.6 miles



Legend

- KOP View Direction
- Existing REC Line
- Route 4
- 100ft 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.

Figure 3. Aerial photograph depicting land use and photo view for 016-5243.

EXISTING CONDITIONS

PROPOSED CONDITIONS

RUTHER GLEN

230 kV Electric Transmission Project

Dominion Energy Virginia

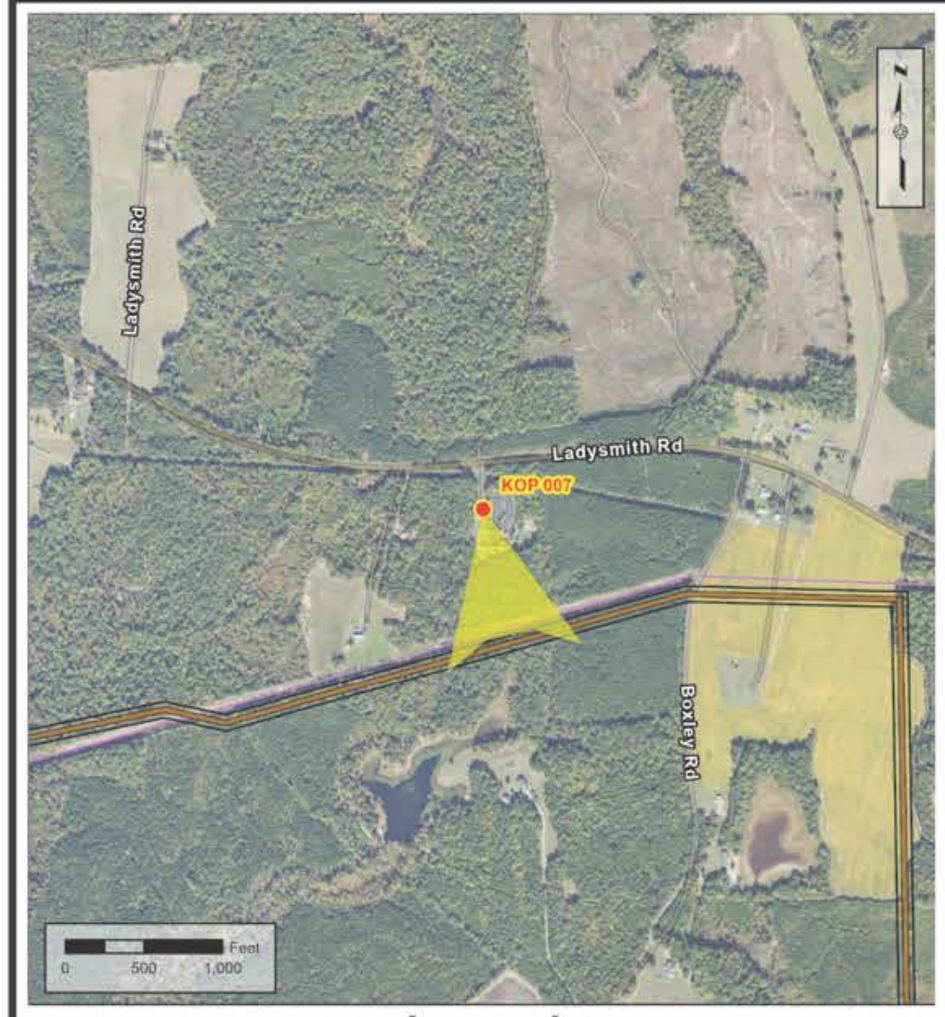
Caroline County, Virginia

Dominion Energy℠

KOP 007

Ladysmith Rd

Figure 4
Route: 5
Date:07/25/2024
Time: 03:53 pm
Viewing Direction: South
Distance to closest feature: 0.2 miles



Legend

- KOP View Direction
- Existing REC Line
- Route 5
- 100ft 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.

Figure 5. Aerial photograph depicting land use and photo view for 016-5243.

RUTHER GLEN
230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia

Dominion Energy℠

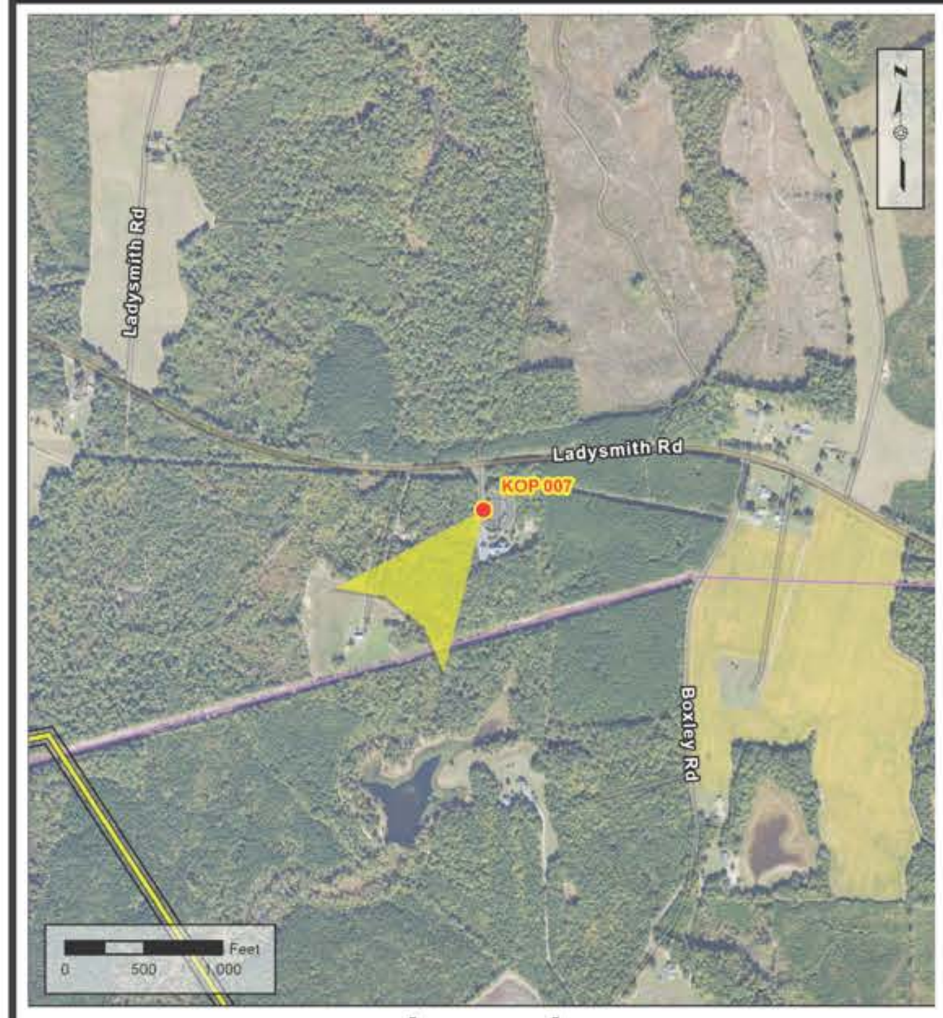
KOP 007

Ladysmith Rd

Figure 6
Route: 6
Date:07/25/2024
Time: 03:53 pm
Viewing Direction: Southwest
Distance to closest feature: 0.6 miles

EXISTING CONDITIONS

PROPOSED CONDITIONS

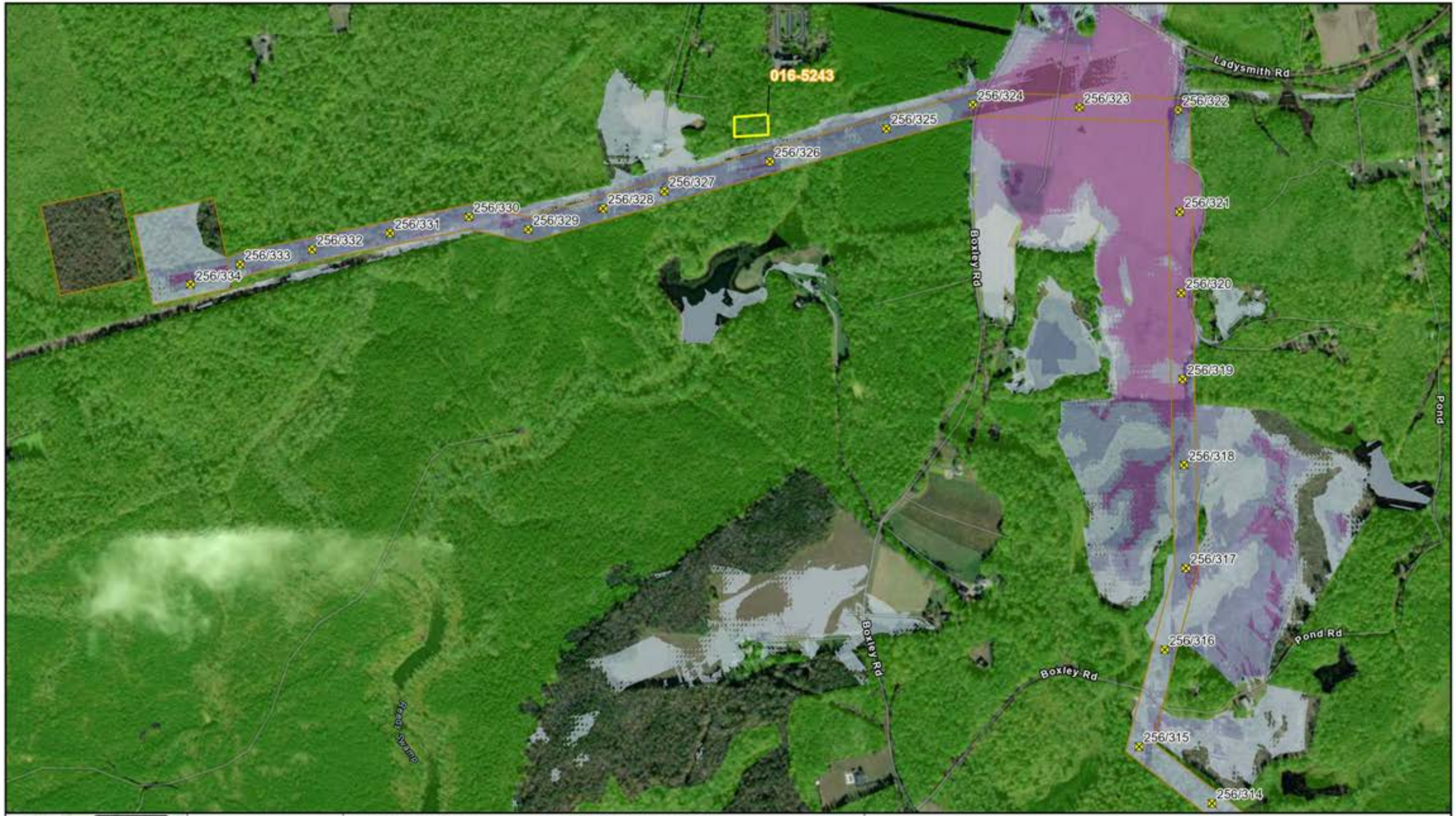


Legend

- KOP View Direction
- Existing REC Line
- Route 6
- 100ft 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.

ATTACHMENT 6 VEGETATED VIEWSHED ANALYSIS


016-5243
256/324
256/323
256/322
256/325
256/326
256/327
256/328
256/329
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256/334
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256/316
256/315
256/314
Ladysmith Rd
Boxley Rd
Boxley Rd
Boxley Rd
Pond Rd
Pond
Reed Swamp
Project Location
OH
WV
KY
Virginia
TN
0
300
600
Feet
1:7,200
Locally Significant Architecture Resource
Structure Locations
160' Right-of-Way
Modeled Vegetation
18 - 22 Structures Visible
9 - 18 Structures Visible
5 - 9 Structures Visible
1 - 5 Structures Visible
Route 5 Vegetated Viewshed Analysis - DSM
Ruther Glen 230 kV Electric Transmission Project
Dominion Energy Virginia
Caroline County, Virginia
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Dominion Energy
MPLS M:\US\Projects\D-F\Dominion\Carmel_Church_ArcGIS\2024\09\Cultural_VSA\Cultural_VSA.aprx\DOM_CRCH_RG_VSA_Rte5 | REVISED: 10/15/2024 | SCALE: 1:7,200 when printed at 11x17
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