

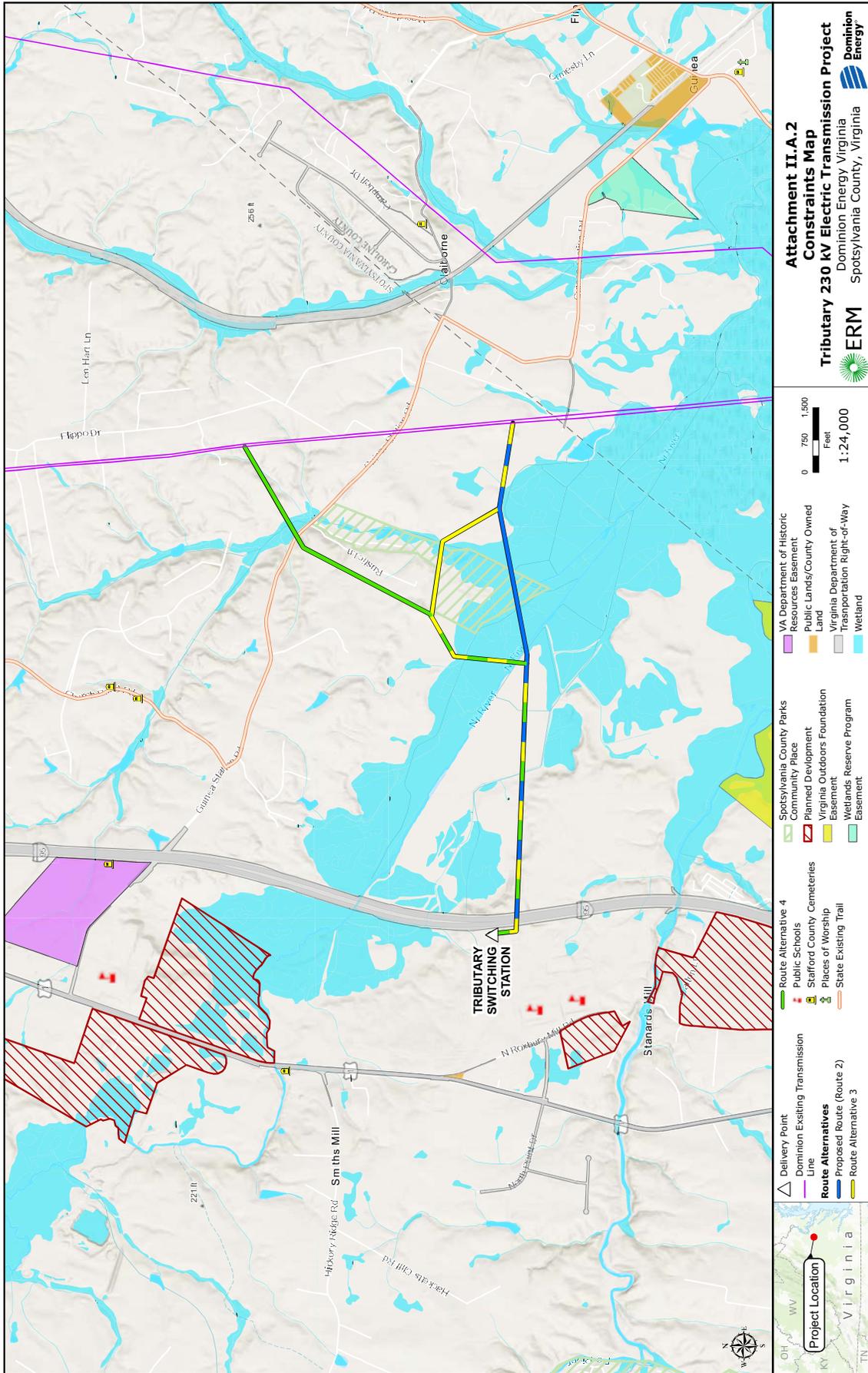
II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way ("ROW")

2. **Provide color maps of suitable scale (including both general location mapping and more detailed GIS-based constraints mapping) showing the route of the proposed line and its relation to: the facilities of other public utilities that could influence the route selection, highways, streets, parks and recreational areas, scenic and historic areas, open space and conservation easements, schools, convalescent centers, churches, hospitals, burial grounds/cemeteries, airports and other notable structures close to the proposed project. Indicate the existing linear utility facilities that the line is proposed to parallel, such as electric transmission lines, natural gas transmission lines, pipelines, highways, and railroads. Indicate any existing transmission ROW sections that are to be quitclaimed or otherwise relinquished. Additionally, identify the manner in which the Applicant will make available to interested persons, including state and local governmental entities, the digital GIS shape file for the route of the proposed line.**

Response: See Attachment II.A.2. There is no existing electric transmission right-of-way that serves the proposed Tributary Station or Proposed or Alternative Routes.

Dominion Energy Virginia will make the digital Geographic Information Systems ("GIS") shape file available to interested persons upon request to the Company's legal counsel as listed in the Project Application.



**Attachment II.A.2
Constraints Map
Tributary 230 kV Electric Transmission Project**
 Dominion Energy Virginia
 Spotsylvania County, Virginia

ERM
 Dominion Energy

- VA Department of Historic Resources Easement
- Public Lands/County Owned Land
- Virginia Department of Transportation Right-of-Way
- Wetland

- Spotsylvania County Parks Community Place
- Planned Development
- Virginia Outdoors Foundation Easement
- Wetlands Reserve Program Easement

- Route Alternative 4
- Public Schools
- Stafford County Cemeteries
- Places of Worship
- State Existing Trail

- Delivery Point
- Dominion Existing Transmission Line
- Route Alternatives
- Proposed Route (Route 2)
- Route Alternative 3



Scale: 0, 750, 1,500 Feet
 1:24,000

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way ("ROW")

- 3. Provide a separate color map of a suitable scale showing all the Applicant's transmission line ROWs, either existing or proposed, in the vicinity of the proposed project.**

Response: See Attachment I.G.1.

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way ("ROW")

4. **To the extent the proposed route is not entirely within existing ROW, explain why existing ROW cannot adequately service the needs of the Applicant.**

Response: There is no existing right-of-way that connects proposed Tributary Station to the Company's 230 kV network (Line #2090).

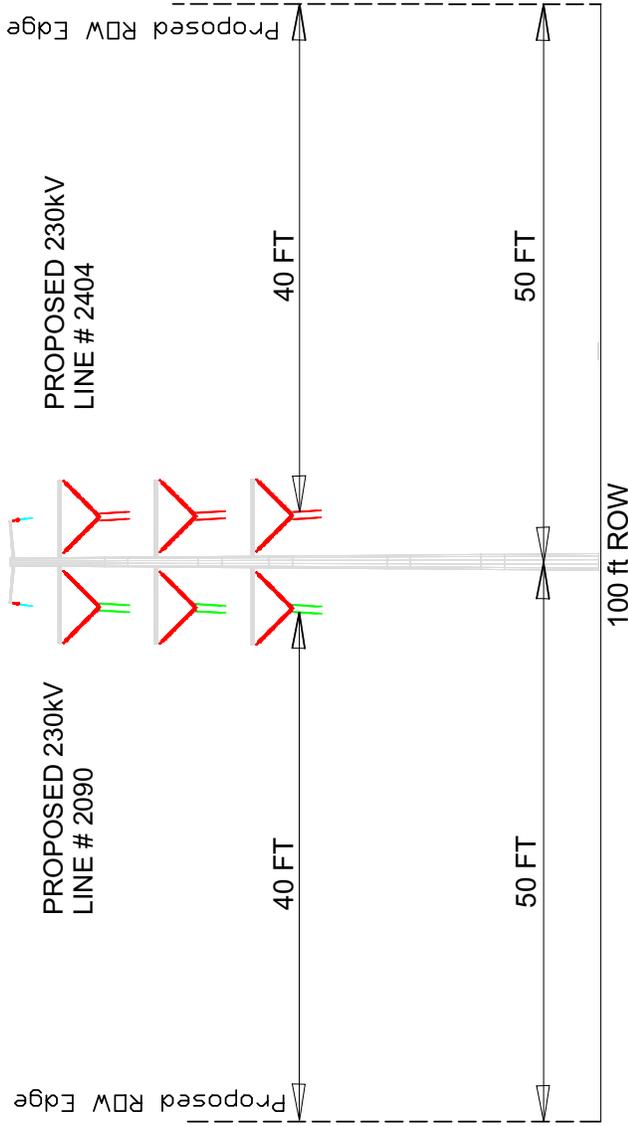
See Section II.A.9 and the Routing Study for an explanation of the Company's route selection process.

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way ("ROW")

- 5. Provide drawings of the ROW cross section showing typical transmission line structure placements referenced to the edge of the ROW. These drawings should include:**
 - a. ROW width for each cross section drawing;**
 - b. Lateral distance between the conductors and edge of ROW;**
 - c. Existing utility facilities on the ROW; and**
 - d. For lines being rebuilt in existing ROW, provide all of the above (i) as it currently exists, and (ii) as it will exist at the conclusion of the proposed project.**

Response: See Attachment II.A.5.



PROPOSED ROW CONFIGURATION

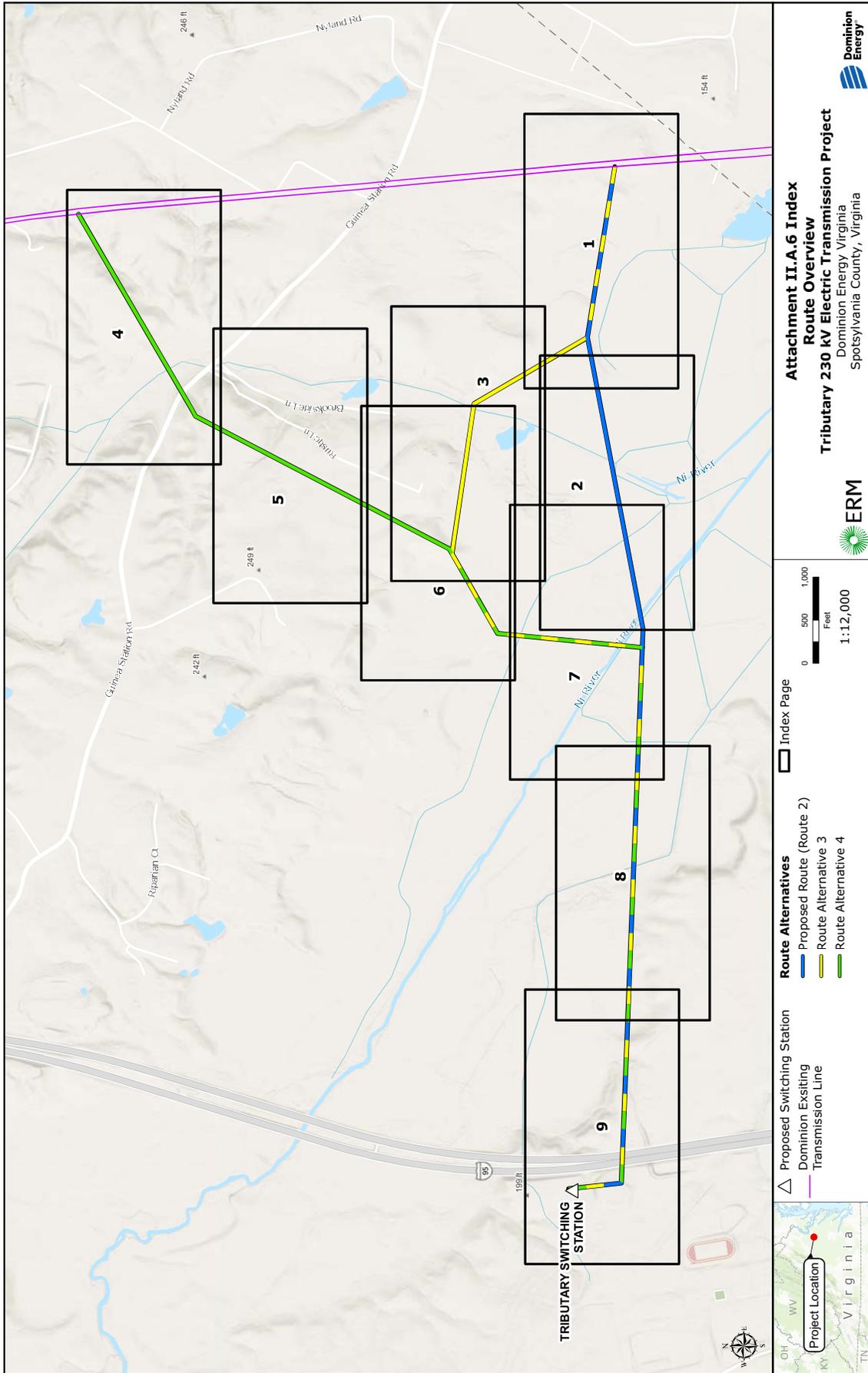
DISCLAIMER	DESCRIPTION & VIEW	ATTACHMENT NO.
<p>THE INFORMATION CONTAINED ON THIS DRAWING IS CONSIDERED PRELIMINARY IN NATURE AND IS SUBJECT TO CHANGE BASED ON FINAL DESIGN</p>	<p>STR. 2404/200-2404/218 (2090/200-2090/218) TYPICAL RIGHT OF WAY LOOKING TOWARDS TRIBUTARY SUBSTATION</p>	<p>II.A.5.a</p>
 <p>Dominion Energy 5000 Dominion Blvd. Glen Allen, VA 23060</p>		<p>DRAWN BY SDH</p>

II. DESCRIPTION OF THE PROPOSED PROJECT

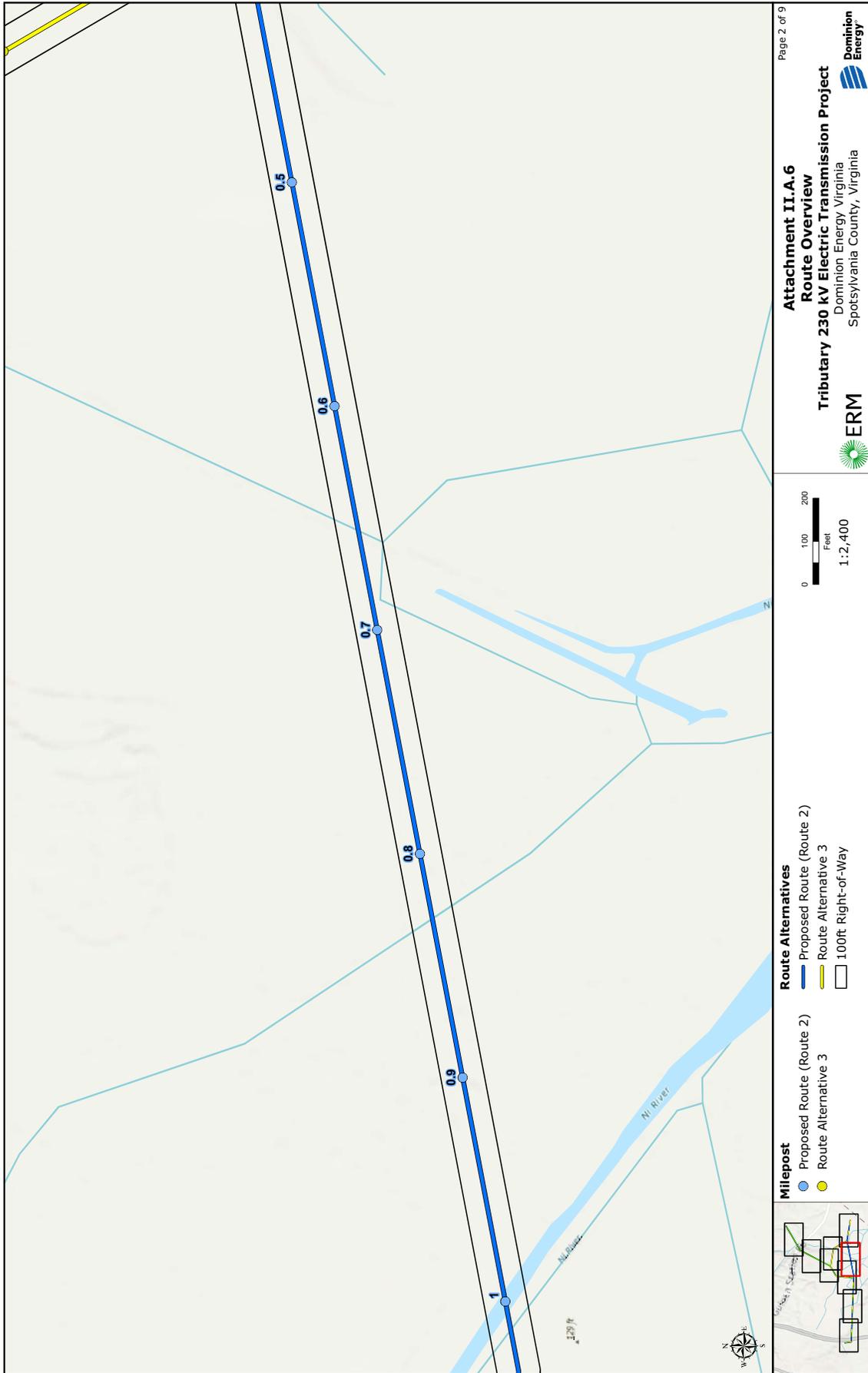
A. Right-of-way ("ROW")

6. Detail what portions of the ROW are subject to existing easements and over what portions new easements will be needed.

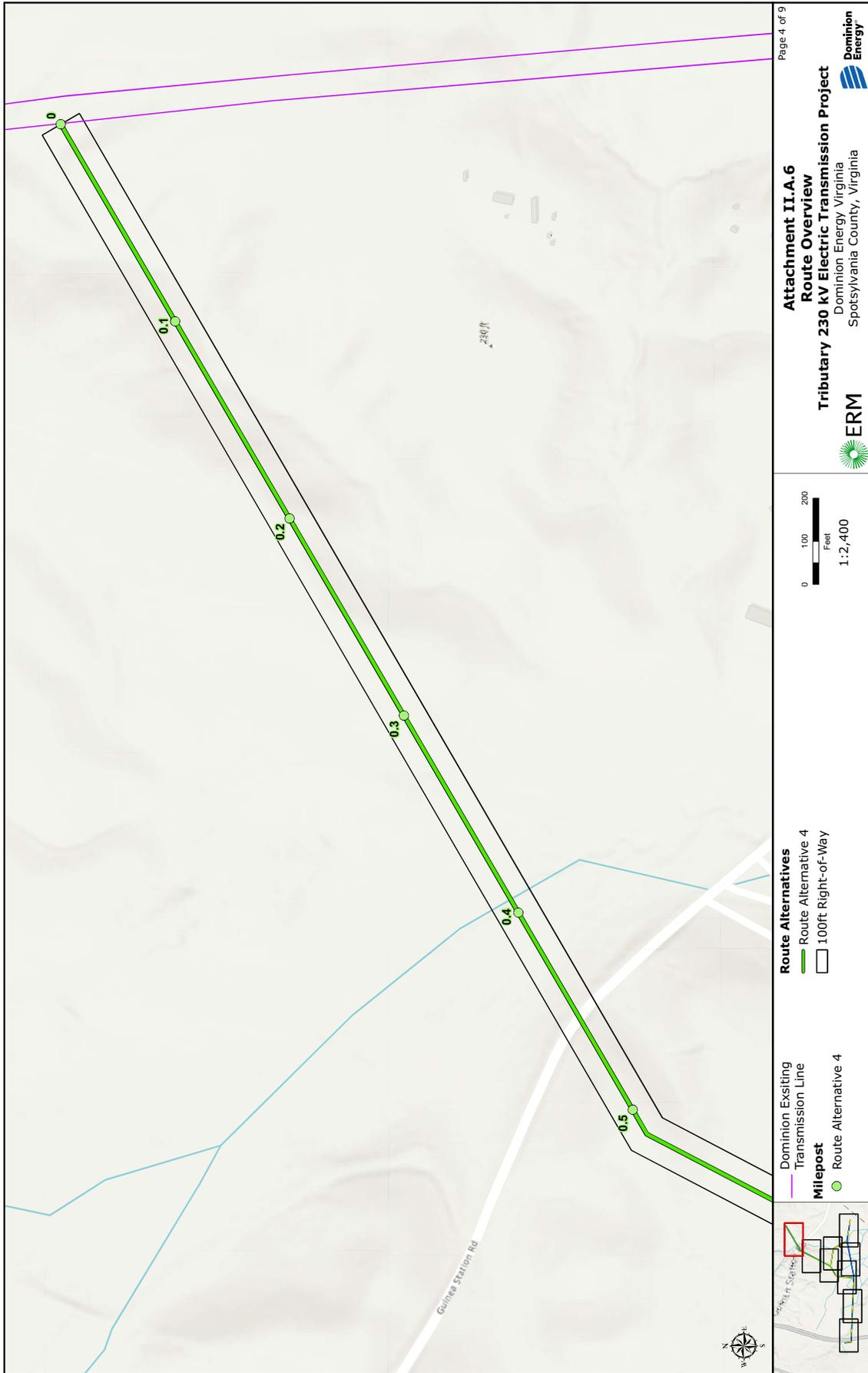
Response: As discussed in Section II.A.4, there is no existing electric transmission right-of-way that can be used to serve the proposed Tributary Station. Therefore, the entire right-of-way for the Project will require new property rights for a new-build transmission line. No overlap between existing easements and the proposed easements for the Project will occur. See Attachment II.A.6.







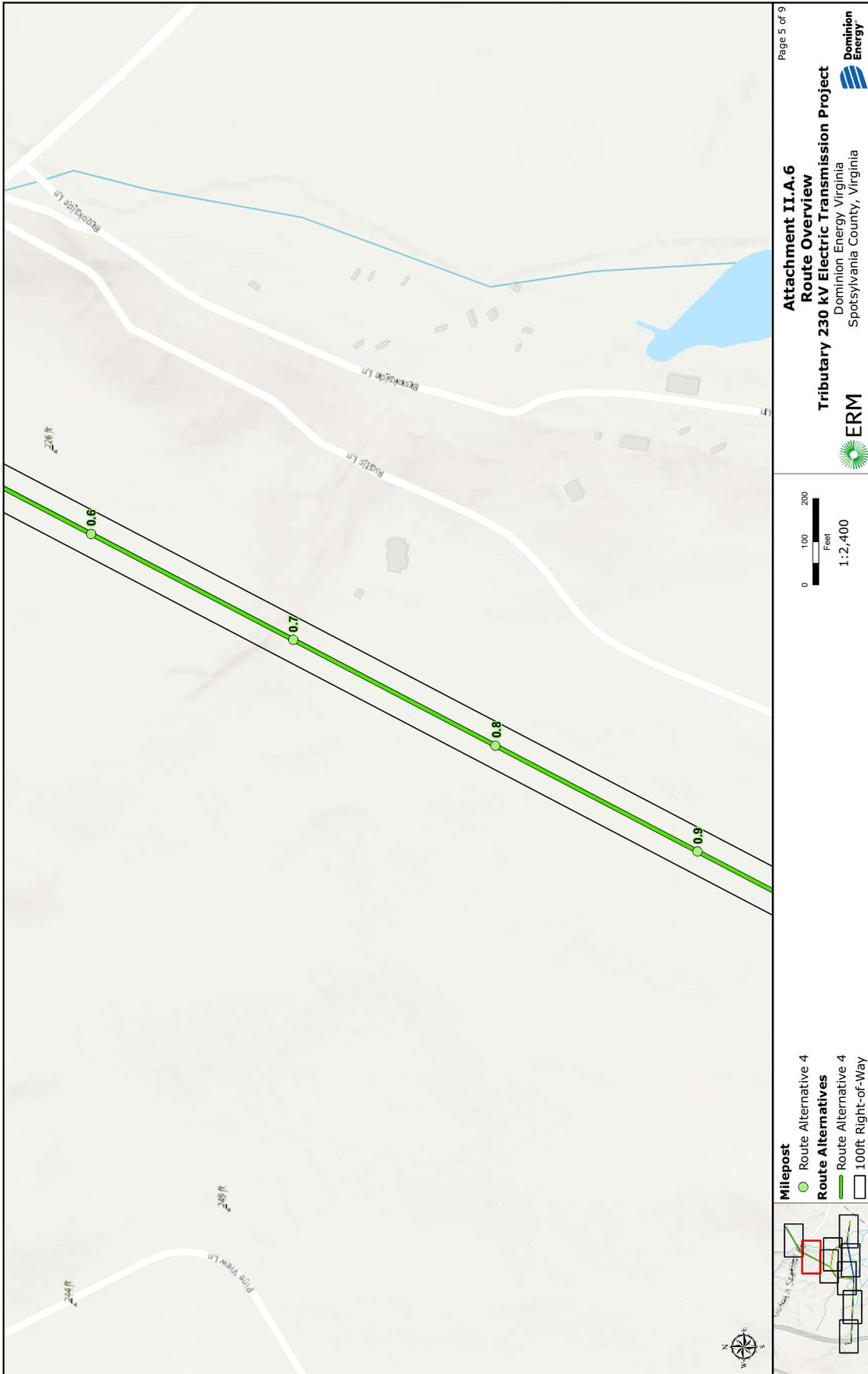


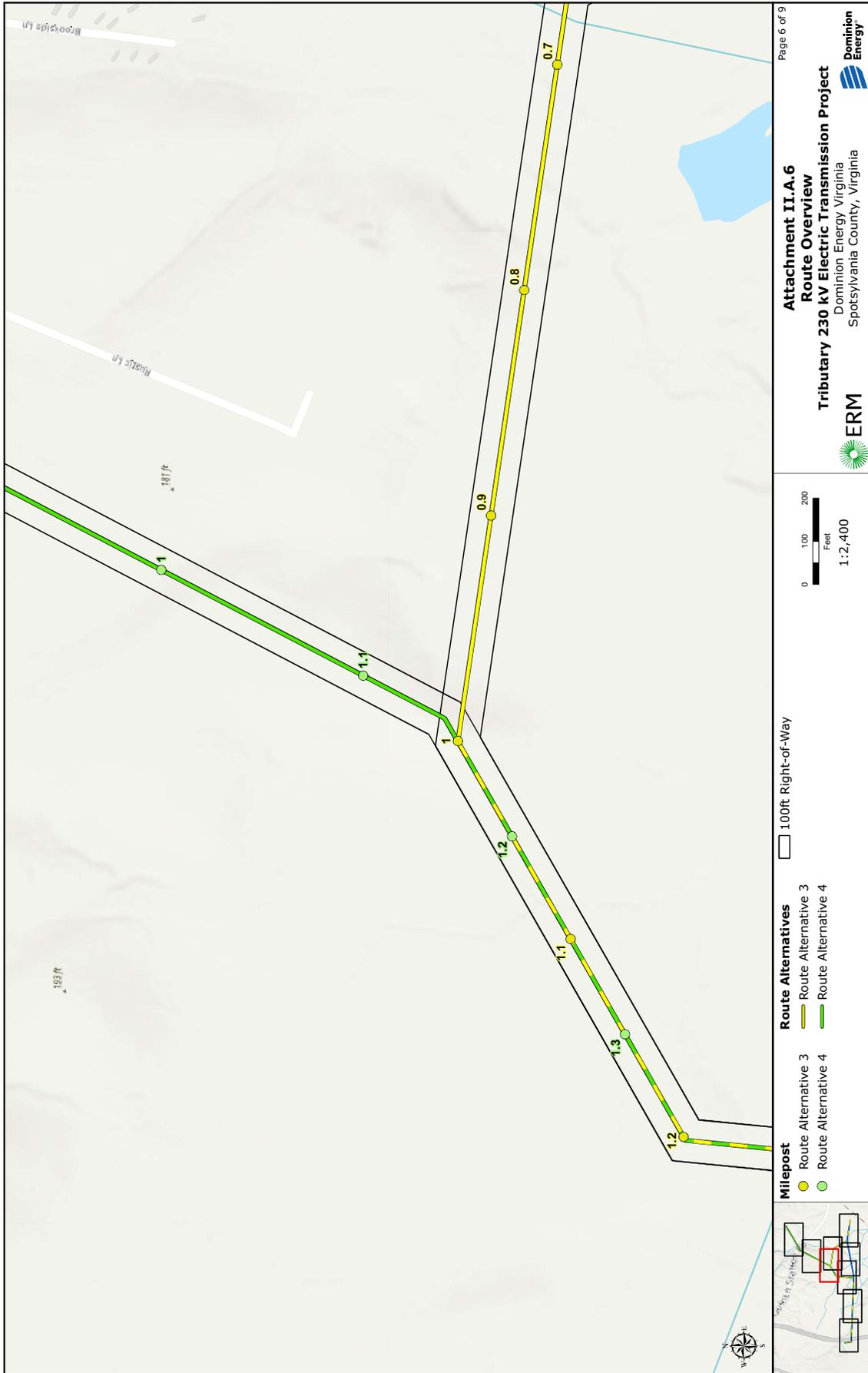


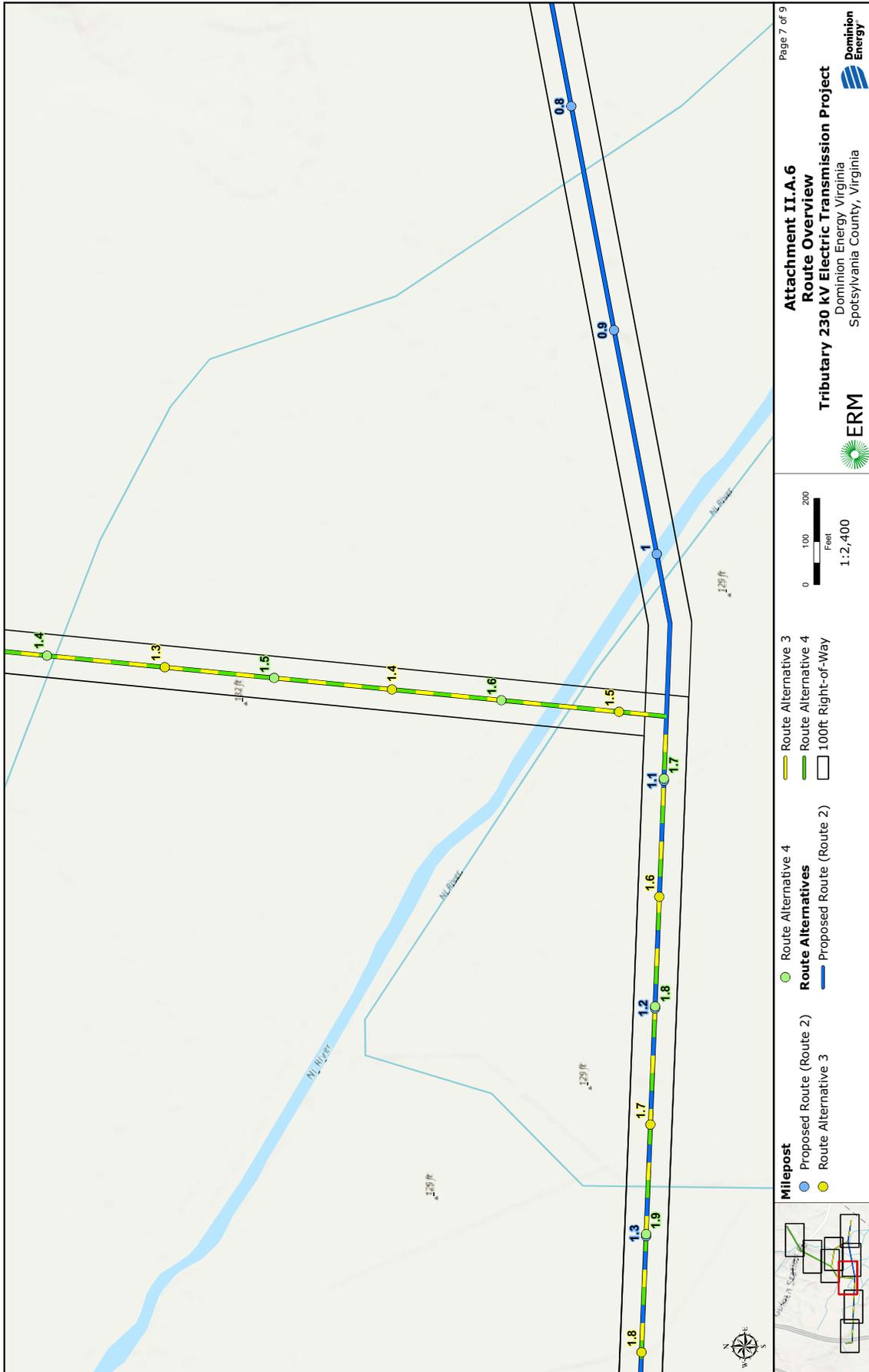
Attachment II.A.6
Route Overview

Tributary 230 kV Electric Transmission Project
Dominion Energy Virginia
Spotsylvania County, Virginia











II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way ("ROW")

7. **Detail the proposed ROW clearing methods to be used and the ROW restoration and maintenance practices planned for the proposed project.**

Response: The permanent right-of-way width for the Proposed Route is 100 feet. In general, the entire 100-foot-wide right-of-way will require clearing.

The trees within newly cleared right-of-way will be cut to be no more than three inches above ground level and no grubbing of roots or stumps will occur, except as needed to install structure foundations. Tree removal within wetland areas and within 100 feet of streams will be accomplished by hand or from equipment placed upon mats. Cut trees from the cleared right-of-way will be limbed and either removed from the right-of-way or mulched and chipped into upland areas. Care will be taken not to leave debris in streams or wetland areas that may cause an impediment to the flow of water. No mulching will occur in wetlands. Erosion control devices will be used where applicable on an ongoing basis, as appropriate, during all clearing and construction activities.

Trimming of tree limbs along the edge of the right-of-way may be conducted to support construction activities for the Project. Trees located outside of the right-of-way that are tall enough to potentially impact the transmission facilities, commonly referred to as "danger trees," may also need to be cut. Danger trees will also be cut to be no more than three inches above ground level, limbed, and will remain where felled. No grubbing of roots or stumps will occur. Debris that is adjacent to homes will be disposed of by chipping or removal. In other areas, debris may be mulched or chipped as practicable. Danger tree removal will be accomplished by hand or from equipment placed on mats in wetland areas and within 100 feet of streams, if applicable. Care will be taken not to leave debris in streams or wetland areas that may cause an impediment to the flow of water. No mulching will occur in wetlands.

Erosion control will be maintained and temporary stabilization for all soil-disturbing activities will be used until the right-of-way has been restored. Upon completion of the Project, the Company will restore the right-of-way utilizing site rehabilitation procedures outlined in the Company's General Erosion and Sedimentation Control Specifications for the Construction and Maintenance of Electric Transmission Lines that is approved yearly by the Virginia Department of Environmental Quality ("DEQ"). Time of year and weather conditions may affect when permanent stabilization takes place.

In addition to the clearing required within new right-of-way, limited clearing or limbing may be required to accommodate construction access. Clearing will be done in accordance with the Company's Integrated Vegetation Management Plan

("IVMP") practice with no grabbing of roots or stump materials. The remainder of the existing right-of-way is currently cleared and maintained.

The right-of-way will continue to be maintained on a regular cycle to prevent interruptions to electric service and provide ready access to the right-of-way in order to patrol and make emergency repairs. Periodic maintenance to control woody growth will consist of hand cutting, machine mowing and/or herbicide application.

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way ("ROW")

8. Indicate the permitted uses of the proposed ROW by the easement landowner and the Applicant.

Response: Any non-transmission use will be permitted that:

- Is in accordance with the terms of the easement agreement for the right-of-way;
- Is consistent with the safe maintenance and operation of the transmission lines;
- Will not restrict future line design flexibility; and
- Will not permanently interfere with future construction.

Subject to the terms of the easement, examples of typical permitted uses include but are not limited to:

- Agriculture;
- Hiking Trails;
- Fences;
- Perpendicular Road Crossings;
- Perpendicular Utility Crossings;
- Residential Driveways; and
- Wildlife / Pollinator Habitat.

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way ("ROW")

9. **Describe the Applicant's route selection procedures. Detail the feasible alternative routes considered. For each such route, provide the estimated cost and identify and describe the cost classification (e.g., "conceptual cost," "detailed cost," etc.). Describe the Applicant's efforts in considering these feasible alternatives. Detail why the proposed route was selected and other feasible alternatives were rejected. In the event that the proposed route crosses, or one of the feasible routes was rejected in part due to the need to cross, land managed by federal, state, or local agencies or conservation easements or open space easements qualifying under §§ 10.1-1009 – 1016 or §§ 10.1-1700 – 1705 of the Code (or a comparable prior or subsequent provision of the Code), describe the Applicant's efforts to secure the necessary ROW.**

Response: The Company's route selection for a new transmission line typically begins with identification of the project "origin" and "termination" points provided by the Company's Transmission Planning group. This is followed by the development of a study area for the project. The study area represents a circumscribed geographic area from which potential routes that may be suitable for a transmission line can be identified.

For this Project, the Company retained the services of Environmental Resources Management ("ERM") to help collect information within the study area, identify potential routes, perform a routing analysis comparing the route alternatives, and document the routing efforts in a Routing Study.

The study area encompasses an approximately 9.5 square mile area containing the Project origin and termination points (the Company's existing Line #2090 and the proposed Tributary Station) in eastern Spotsylvania County and a small section of Caroline County, generally bounded by the following features:

- Patriot Highway and North Roxbury Mill Road to the west;
- The Po River to the south;
- Massaponax High School and Heartland Way to the north; and
- Existing Line #2090 to the east.

The Company considered the infrastructure for the Project, the amount of existing development in the area, the potential for environmental impacts and impacts on communities, and cost. After developing the Project study area, the Company identified a single electrical solution, the Project, located entirely within

Spotsylvania County, Virginia, to meet the Project need. The route development process for the Project is described in more detail in the Routing Study.

As discussed in more detail below and in the Routing Study, ERM ultimately identified three viable routes for the proposed Project. Ultimately, the Company selected the Proposed Route, with Alternative Routes 3 and 4 serving as viable alternatives. All three route alternatives are located entirely within Spotsylvania County.

PROPOSED AND ALTERNATIVE ROUTES

Proposed Route

The Proposed Route would consist of a new overhead 230 kV transmission line on double circuit monopoles in a new 100-foot-wide right-of-way from the #2090 Tap and extending approximately 2.4 miles west to the proposed Tributary Station. The estimated conceptual cost of the Proposed Route is approximately \$20.6 million for transmission-related work (2024 dollars).

The Proposed Route extends from the #2090 Tap to the proposed Tributary Station. The #2090 Tap is approximately 0.5 mile south of where the existing line crosses Guinea Station Road along the southern boundary of the study area. From there, the Proposed Route heads west/northwest for about 0.4 mile, passing through forested land before angling southwest through forest for about 0.7 mile, passing through a portion of the Fredericksburg/Washington DC South Kampgrounds of America Holiday campground (“KOA Campground”) and crossing the Ni River. On the south side of the Ni River, the route turns west, crossing agricultural and forested land for about 1.2 miles and crossing Interstate 95. On the west side of Interstate 95, the route turns north for about 0.1 mile and enters the Tributary Station.

The Proposed Route is approximately 2.4 miles long. The right-of-way associated with this alignment (28.1 acres) and the proposed Tributary Station site (2.2 acres) would encompass a combined 30.3 acres.

All nine parcels crossed by the Proposed Route are privately owned. Land use along the Proposed Route right-of-way (inclusive of the proposed Tributary Station) consists of 23.6 acres of forested land, 6.4 acres of agricultural land, 0.2 acres of developed land, and 0.1 acre of open space.

Based on ERM’s desktop wetland and waterbody analysis, the footprint of the Proposed Route right-of-way and Tributary Station will traverse approximately 46.5% (14.1 acres) of land with a medium or higher probability of containing wetlands and waterbodies. Of these, the majority consists of forested and scrub-shrub type wetlands (7.3 and 6.4 acres, respectively). The Proposed Route crosses 12 waterbodies, including seven perennial waterbodies and five intermittent

streams.

Alternative Route 3

Alternative Route 3 extends from the #2090 Tap to the proposed Tributary Station. From here, Alternative Route 3 heads west/northwest for about 0.4 mile before turning north/northwest for about 0.3 mile. At this point the route turns west and crosses the KOA Campground. On the west edge of the campground, the route turns southwest/south for about 0.5 mile, paralleling an undeveloped, forested parcel boundary and crossing the Ni River. On the south side of the river, the route turns west, intersecting and following the same alignment as the Proposed Route for the remaining 1.3 miles to the Tributary Station.

Alternative Route 3 measures approximately 2.8 miles long. The right-of-way for this alternative (33.5 acres) and the proposed Tributary Station site (2.2 acres) would encompass a combined 35.7 acres.

All 10 parcels crossed by Alternative Route 3 are privately owned. Land use along the Alternative Route 3 right-of-way (inclusive of the proposed Tributary Station) consists of 29.3 acres of forested land, 6.2 acres of agricultural land, 0.2 acres of developed land, and 0.1 acre of open space.

Based on ERM's desktop wetland and waterbody analysis, the right-of-way of Alternative Route 3 and Tributary Station will traverse approximately 40.3% (14.4 acres) of land with a medium or higher probability of containing wetlands and waterbodies. Of these, the majority consists of forested and scrub-shrub type wetlands (7.9 and 6.1 acres, respectively). Alternative Route 3 crosses 11 waterbodies, including six perennial waterbodies and five intermittent streams.

The estimated conceptual cost of Alternative Route 3 is approximately \$23.99 million for transmission-related work (2024 dollars).

Alternative Route 4

Alternative Route 4 extends from a cut-in at Structure #2090/82 along the Company's existing Line #2090 to the proposed Tributary Station. The cut-in is approximately 0.7 mile north of the intersection of the existing transmission line and Guinea Station Road along the southern boundary of the study area. From here, Alternative Route 4 heads southwest/south for about 1.1 mile, passing through forested land and crossing Guinea Station Road. Just west of the KOA Campground, the route intersects with and shares an alignment with the Proposed Route and Alternative Route 3, turning west/southwest for about 0.5 mile and then west for about 1.2 mile, crossing Interstate 95 and turning north into the Tributary Station.

Alternative Route 4 measures approximately 3.0 miles long. The right-of-way for this alternative (35.4 acres) and the proposed Tributary Station site (2.2 acres)

would encompass a combined 37.6 acres.

All 11 parcels crossed by Alternative Route 4 are privately owned. Land use along the Alternative Route 4 right-of-way (inclusive of the proposed Tributary Station) consists of 31.0 acres of forested land, 6.2 acres of agricultural land, 0.3 acres of developed land, and 0.1 acre of open space.

Based on ERM's desktop wetland and waterbody analysis, the right-of-way of Alternative Route 4 and Tributary Station will traverse approximately 36.8% (13.8 acres) of land with a medium or higher probability of containing wetlands and waterbodies. Of these, the majority consists of forested and scrub-shrub type wetlands (7.4 and 6.1 acres, respectively). Alternative Route 4 crosses 11 waterbodies, including five perennial waterbodies and six intermittent streams.

The estimated conceptual cost of Alternative Route 4 is approximately \$24.8 million for transmission-related work (2024 dollars).

Proposed Route Analysis

Of the route alternatives, the Proposed Route is the shortest, would cross the fewest parcels, avoids proximity to residences, avoids crossing the U.S. Route 1 Bike Trail, requires the least amount of tree and forested wetland clearing, and crosses the fewest acres of forested land. Based on this analysis, the Company selected the Proposed Route for the Project.

Specifically, there are no residences within 100 feet of any of the route alternatives, and no homes within 250 or 500 feet of the proposed centerlines of the Proposed Route or Alternative Route 3. Alternative Route 4 would have one residence within 250 feet and two residences within 500 feet of the proposed centerline. All routes would cross the KOA Campground, but the Proposed Route would have the shortest crossing and would be farthest from the established camping areas. Alternative Route 4 would cross the U.S. Bike Route 1 trail.

The Proposed Route also crosses the fewest acres of forested land. While Alternative Route 4 would cross the fewest acres of wetlands, all routes would cross similar amounts of wetland, and the Proposed Route would cross slightly fewer acres of forested wetlands than the other routes. All route alignments would have similar waterbody crossing counts, with the Proposed Route crossing one more perennial stream than Alternative Routes 3 and 4.

See Table 6-1 of the Routing Study for a summary of the impacts for each route considered and Sections 5 and 6 of the Routing Study for additional discussion and route comparison analysis.

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way ("ROW")

10. **Describe the Applicant's construction plans for the project, including how the Applicant will minimize service disruption to the affected load area. Include requested and approved line outage schedules for affected lines as appropriate.**

Response: The Company plans to construct the 230 kV Line #2090 extension in a manner that minimizes outage time on existing substation and transmission lines. The #2090 Tap will require a PJM outage eDart ticket on Line #2090. The cut-in should only require a 30-day outage. Assuming a final order from the Commission by July 1, 2025, as requested in Section I.H of this Appendix, the Company estimates that construction of the Project will commence in Spring of 2026. The cut-in of the lines to serve the Company's proposed Tributary Station should start early in 2027, and be completed by April 1, 2027.

The Company will request this outage from PJM prior to the date of such outages. It is customary for PJM not to grant approval of outages until shortly before the outages are expected to occur (up until one week prior) and, therefore, it may be subject to change. Outages for this Project have been submitted to the Company's System Operating Center.

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way ("ROW")

11. Indicate how the construction of this transmission line follows the provisions discussed in Attachment 1 of these Guidelines.

Response: Attachment 1 to these Guidelines provides a tool routinely used by the Company in routing its transmission line projects.

The Company utilized Guideline #1 by minimizing conflict between the rights-of-way and present and prospective uses of the land on which the proposed Project is to be located (to the extent permitted by the property interests involved, rights-of-way should be selected with the purpose of minimizing conflict between the rights-of-way and present and prospective uses of the land on which they are to be located. To this end, existing rights-of-way should be given priority as the locations for additions to existing transmission facilities, and the joint use of existing rights-of-way by different kinds of utility services should be considered).

Collocating the proposed Project with existing rights-of-way was limited, restricting the potential for collocation. Based on the Project start (Existing Line #2090) and end point (Tributary Station west of Interstate 95), the transmission line is required to route westward, with the potential to collocate with existing roads limited to Guinea Station Road. Due to residential developments around and along Guinea Station Road, collocation with the road was not possible. See Section III.D.

The Proposed Route will avoid or minimize impacts to the maximum extent practicable on national historic places listed in the National Register of Historic Places ("NRHP"). Thus, it is consistent with Guideline #2 (where practical, rights of-way should avoid sites listed on the NRHP). A Stage I Pre-Application Analysis prepared by ERM on behalf of the Company is included with the Routing Study as Appendix G, which was submitted to the Virginia Department of Historic Resources ("VDHR") on September 30, 2024.

The Company utilized Guideline #3 (rights-of-ways should avoid prime or scenic timbered areas, steep slopes and proximity to main highways where practical) by siting the Proposed Route away from main highways. One crossing of Interstate 95 is required for the Project. The Company is coordinating with VDOT and will follow standard practices such as designing the crossings at nearly perpendicular angles to reduce visual impacts.

The Company has communicated with local, state, and federal agencies and relevant private organizations prior to filing this Application, consistent with Guideline #4 (where government land is involved the applicant should contact the agencies early in the planning process). In particular, the Company has consulted with Spotsylvania County and VDOT. The Company consulted with Spotsylvania County staff regarding the Project and route alternatives to solicit feedback on

existing and future land use, planned developments, and resource protection areas (“RPA”). The Company also solicited feedback from VDOT regarding route alternatives crossing VDOT rights-of-way and confirmed any impacts to existing and future roadways, structure locations, and construction and operations. Initial consultations with VDOT warranted no significant comments. See Section III.B of this Appendix.

The Company follows recommended construction methods in the Guidelines on a site-specific basis for typical construction projects (Guidelines #8, #10, #11, #15, #16, #18, and #22).

The Company also utilizes recommended guidelines in clearing right-of-way, constructing facilities, and maintaining rights-of-way after construction. Secondary uses of right-of-way that are consistent with the safe maintenance and operation of facilities are permitted.

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way ("ROW")

12. a. **Detail counties and localities through which the line will pass. If any portion of the line will be located outside of the Applicant's certificated service area: (1) identify each electric utility affected; (2) state whether any affected electric utility objects to such construction; and (3) identify the length of line(s) proposed to be located in the service area of an electric utility other than the Applicant; and**
- b. **Provide three (3) color copies of the Virginia Department of Transportation "General Highway Map" for each county and city through which the line will pass. On the maps show the proposed line and all previously approved and certificated facilities of the Applicant. Also, where the line will be located outside of the Applicant's certificated service area, show the boundaries between the Applicant and each affected electric utility. On each map where the proposed line would be outside of the Applicant's certificated service area, the map must include a signature of an appropriate representative of the affected electric utility indicating that the affected utility is not opposed to the proposed construction within its service area.**

- Response:
- a. The proposed Project traverses Spotsylvania County for approximately 2.4 miles and is located within the REC territory. The Company has confirmed that REC does not object to the Project.
 - b. An electronic copy of the VDOT "General Highway Map" for Spotsylvania County has been marked as required and submitted with the Application. A reduced copy of the map is provided as Attachment II.A.12.b.

Spotsylvania County Road Map

MAP DATE: 8/26/2024



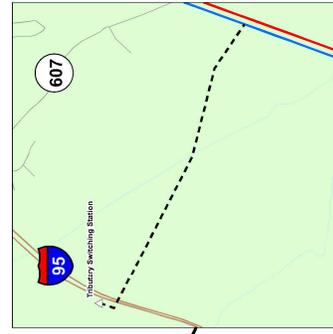
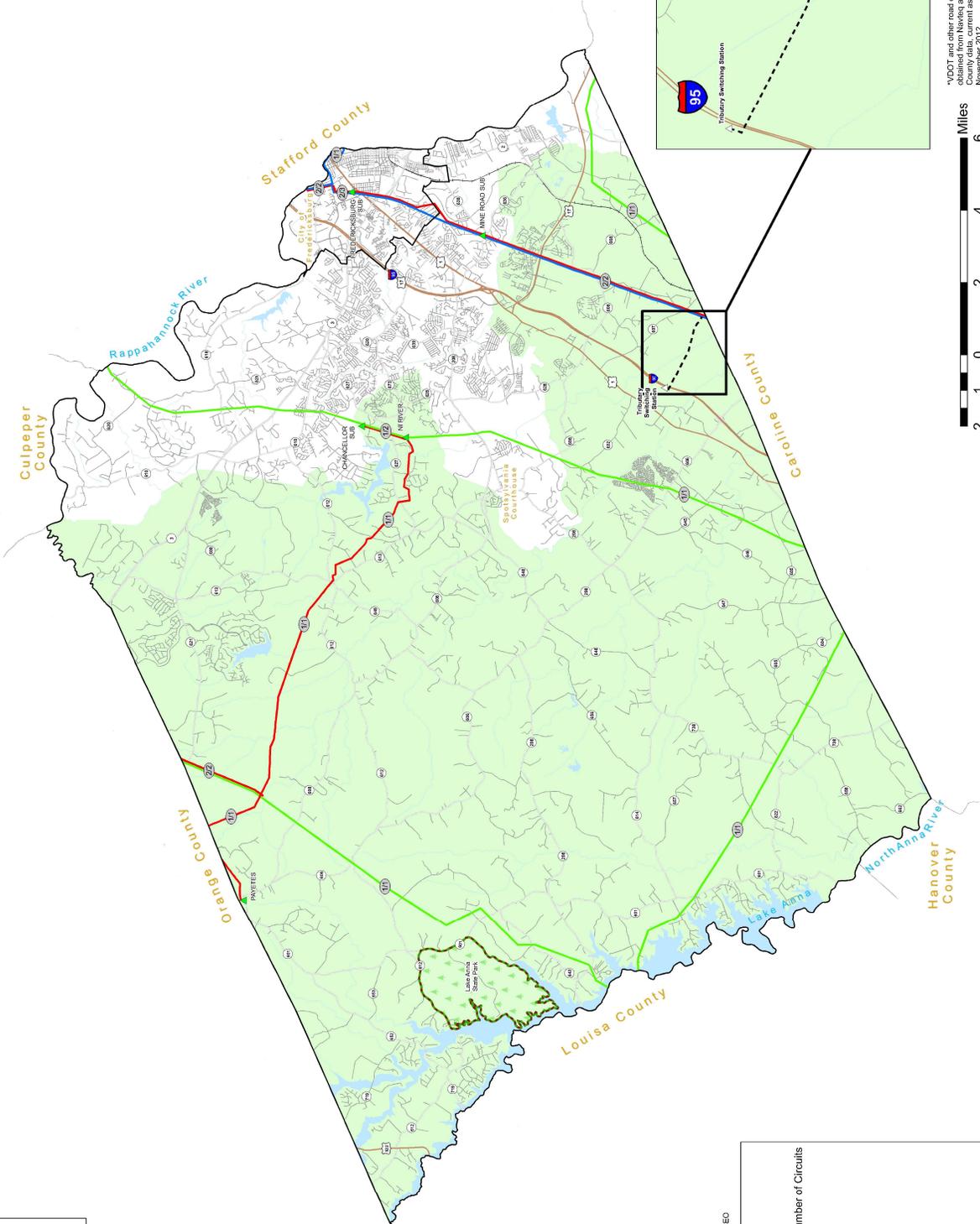
This letter, in which the Virginia Electric and Power Company ("Company") transmission facilities in this county as approved by the Virginia State Corporation Commission, is hereby proposed for construction in this county, as of _____ proposed transmission facilities previously authorized by the Virginia State Corporation Commission are depicted on prior SCC approved county maps.

VIRGINIA ELECTRIC AND POWER COMPANY
 TRANSMISSION FACILITIES TO BE CONSTRUCTED
 SUBSTATIONS AS SHOWN IN BLACK DASHES
 ON THIS MAP.
 RAPPANNOCK ELECTRIC COOPERATIVE
 IS NOT OPPOSED TO SUCH CONSTRUCTION
 LOCATED IN THE SPECIFIC SERVICE
 TERRITORY LOCATED IN THIS MAP.

SIGNATURE _____ TITLE President & CEO
 DATE 9/19/24

Legend

- Proposed 230 kV Line
- ⑥ Number of Lines of Structures/Number of Circuits
- △ Proposed Substation
- ▲ Existing Substation
- 115 kV
- 230 kV
- 500 kV
- ▭ Lake Anna State Park
- ▭ Provider Service Territory
- REC
- VEPCO



*DOT and other road data obtained from Niles and County data, current as of November 2012.

Miles
 2 1 0 2 4 6

Spotsylvania

II. DESCRIPTION OF THE PROPOSED PROJECT

B. Line Design and Operational Features

- 1. Detail the number of circuits and their design voltage, initial operational voltage, any anticipated voltage upgrade, and transfer capabilities.**

Response: The 230 kV Line #2090 extension will be designed and operated at 230 kV with no anticipated voltage upgrade and will have a transfer capability of 1573 MW.

II. DESCRIPTION OF THE PROPOSED PROJECT

B. Line Design and Operational Features

- 2. Detail the number, size(s), type(s), coating and typical configurations of conductors. Provide the rationale for the type(s) of conductor(s) to be used.**

Response: The proposed double circuit 230 kV Line #2090 extension will use six phases (3 phases per circuit) of 2-768.2kcmil ACSS/TW/HS conductors, which are the Company's standard for new 230 kV construction.

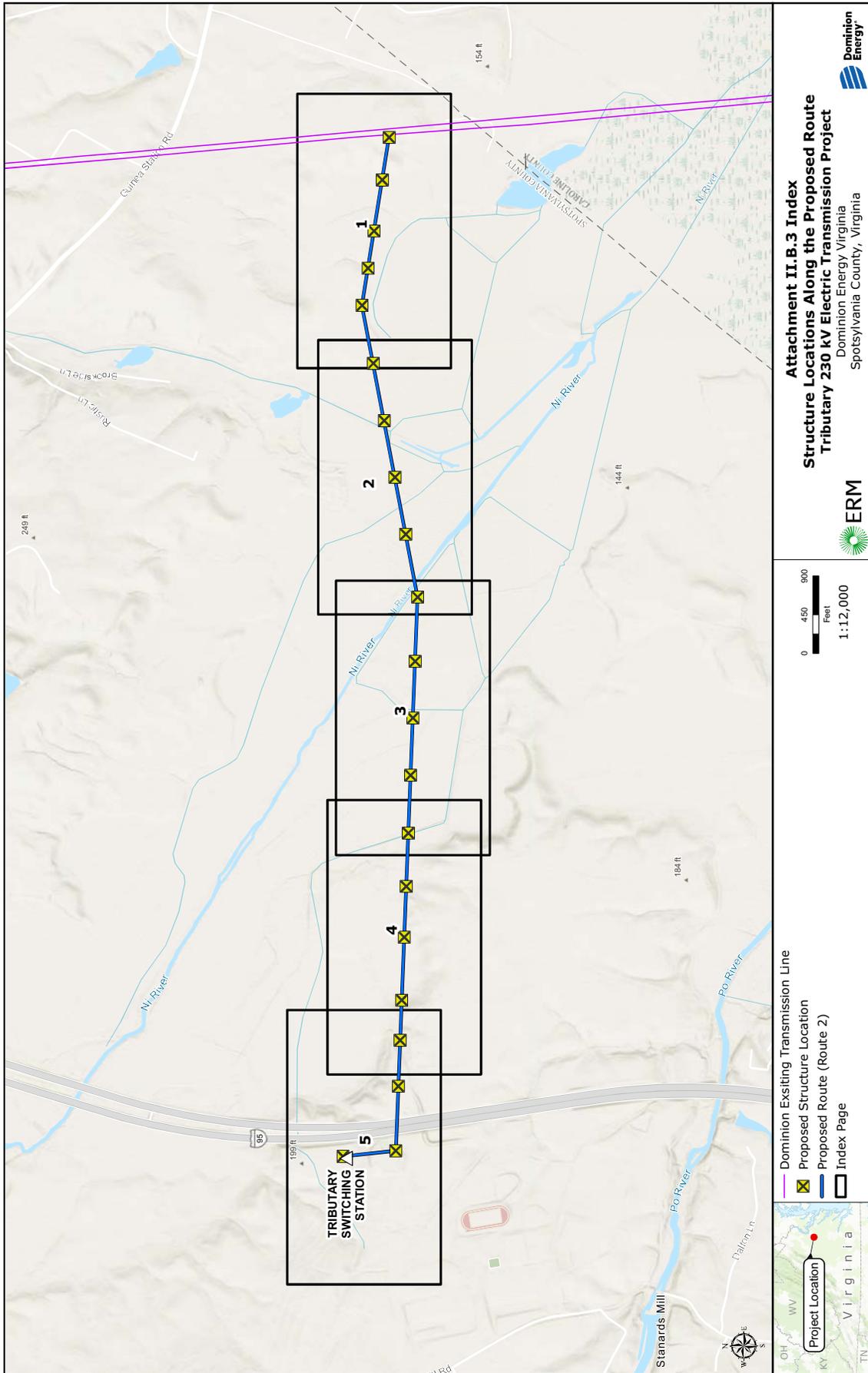
II. DESCRIPTION OF THE PROPOSED PROJECT

B. Line Design and Operational Features

3. With regard to the proposed supporting structures over each portion of the ROW for the preferred route, provide diagrams (including foundation reveal) and descriptions of all the structure types, to include:
 - a. mapping that identifies each portion of the preferred route;
 - b. the rationale for the selection of the structure type;
 - c. the number of each type of structure and the length of each portion of the ROW;
 - d. the structure material and rationale for the selection of such material;
 - e. the foundation material;
 - f. the average width at cross arms;
 - g. the average width at the base;
 - h. the maximum, minimum and average structure heights;
 - i. the average span length; and
 - j. the minimum conductor-to-ground clearances under maximum operating conditions.

Response: For subpart (a), see Attachment II.B.3 for approximate mapping of the proposed structures along the Proposed Route, which is subject to change during final engineering design.

See Attachments II.B.3.a-c for subparts (b)-(j).





The proposed approximate structure heights and locations are from the conceptual design created to estimate the cost of the proposed Project along this section and are subject to change based on final engineering design.

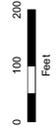
Structure #	Height (ft)	Elevation (ft)
2090/91A (cut-in)	100	164.2
2090/200	110	135
2090/201	110	136.2
2090/202	110	128.7
2090/203	110	132
2090/204	110	131.2

Page 1 of 5



Attachment II.B.3
Structure Locations Along the Proposed Route
Tributary 230 kV Electric Transmission Project
 Dominion Energy Virginia
 Spotsylvania County, Virginia





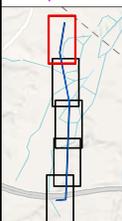
1:2,400

Proposed Structure Location

-  Proposed Route (Route 2)
-  100ft Right-of-Way

Proposed Switching Station

-  Dominion Existing Transmission Line

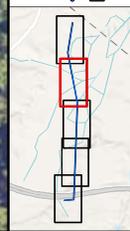


The proposed approximate structure heights and locations are from the conceptual design created to estimate the cost of the proposed Project along this section and are subject to change based on final engineering design.



Structure #	Height (ft)	Elevation (ft)
2090/204	110	131.2
2090/205	110	128.1
2090/206	110	129.5
2090/207	110	130.6
2090/208	110	130.6

- Proposed Switching Station
- Proposed Structure Location
- Proposed Route (Route 2)
- 100ft Right-of-Way



Attachment II.B.3
Structure Locations Along the Proposed Route
Tributary 230 kV Electric Transmission Project
 Dominion Energy Virginia
 Spotsylvania County, Virginia

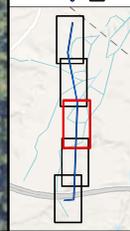




The proposed approximate structure heights and locations are from the conceptual design created to estimate the cost of the proposed Project along this section and are subject to change based on final engineering design.

Structure #	Height (ft)	Elevation (ft)
2090/208	110	130.6
2090/208A	110	130.7
2090/209	110	130.9
2090/210	110	131.8
2090/211	110	132.3

- Proposed Switching Station
- Proposed Structure Location
- Proposed Route (Route 2)
- 100ft Right-of-Way



Attachment II.B.3
Structure Locations Along the Proposed Route
Tributary 230 kV Electric Transmission Project
 Dominion Energy Virginia
 Spotsylvania County, Virginia

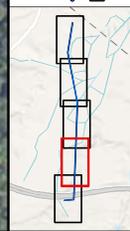


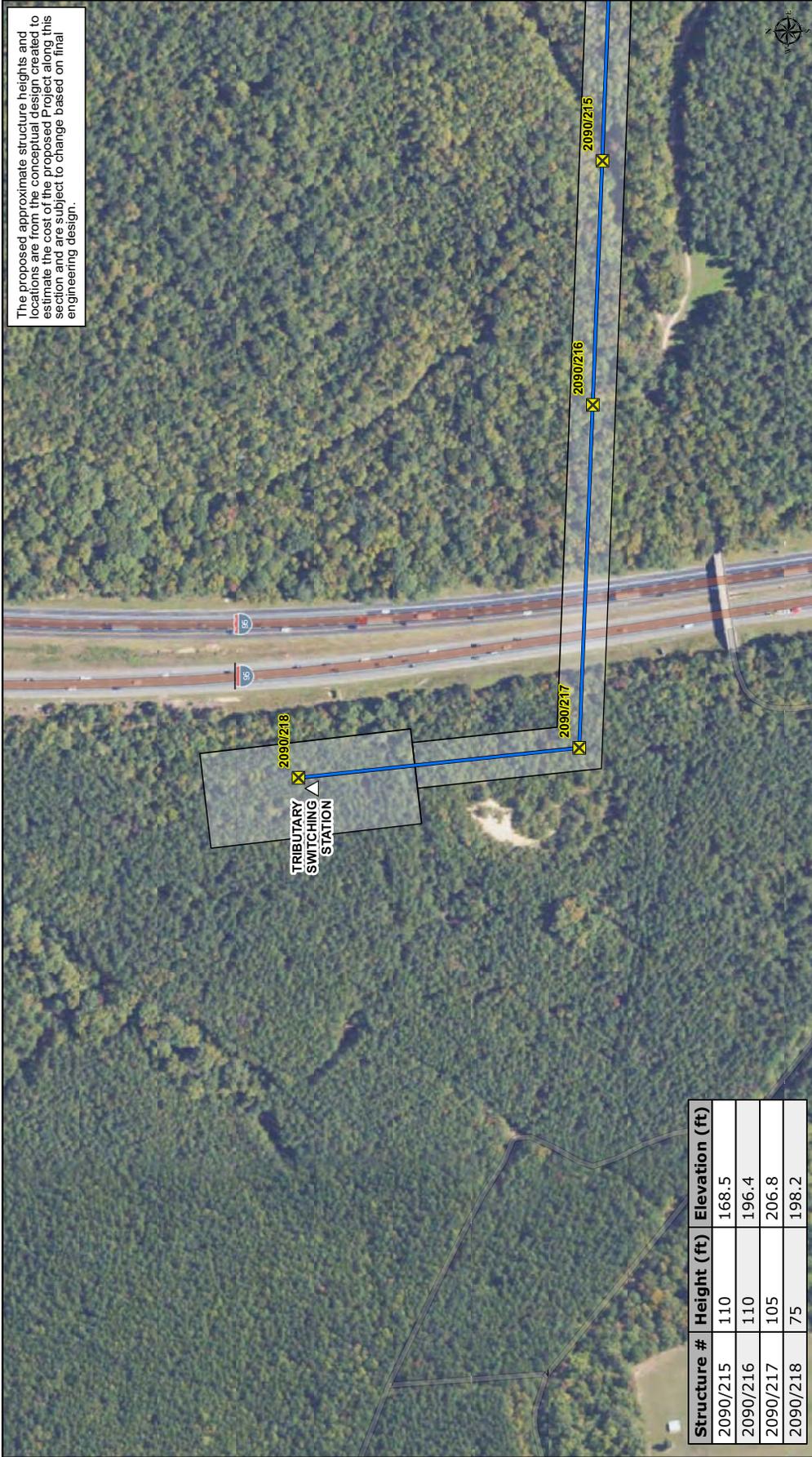
The proposed approximate structure heights and locations are from the conceptual design created to estimate the cost of the proposed Project along this section and are subject to change based on final engineering design.



Structure #	Height (ft)	Elevation (ft)
2090/211	110	132.3
2090/212	110	146.6
2090/213	110	143.5
2090/214	110	148.4
2090/215	110	168.5

- Proposed Switching Station
- Proposed Structure Location
- Proposed Route (Route 2)
- 100ft Right-of-Way





The proposed approximate structure heights and locations are from the conceptual design created to estimate the cost of the proposed Project along this section and are subject to change based on final engineering design.

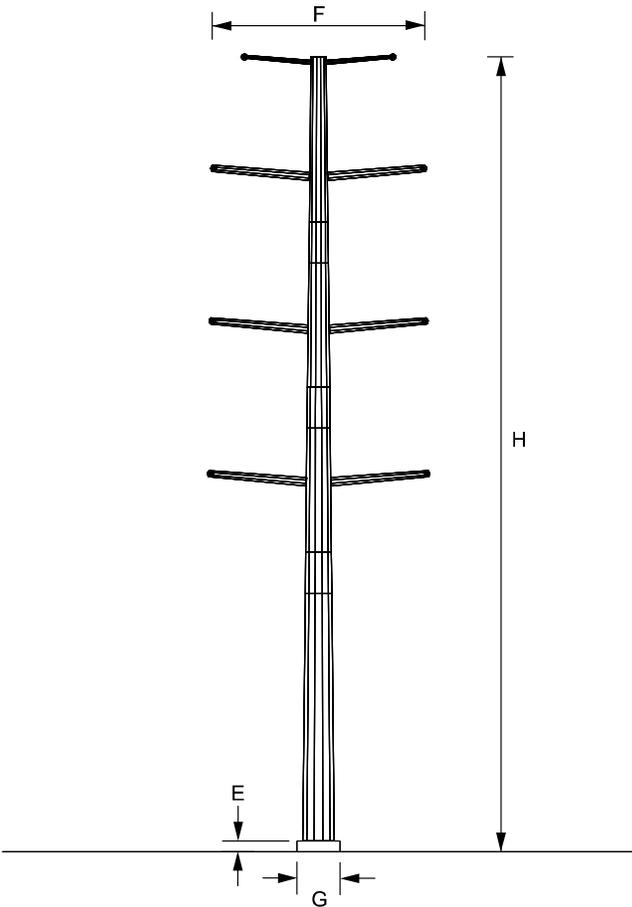
Structure #	Height (ft)	Elevation (ft)
2090/215	110	168.5
2090/216	110	196.4
2090/217	105	206.8
2090/218	75	198.2

- △ Proposed Switching Station
- ⊗ Proposed Structure Location
- Proposed Route (Route 2)
- 100ft Right-of-Way



Attachment II.B.3
Structure Locations Along the Proposed Route
Tributary 230 kV Electric Transmission Project
 Dominion Energy Virginia
 Spotsylvania County, Virginia



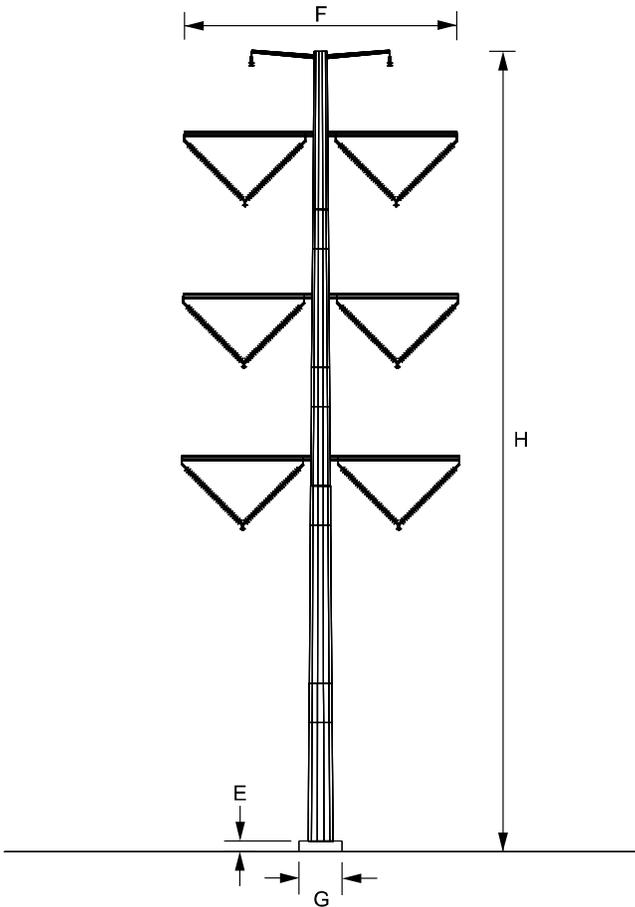


TYPICAL DC ENGINEERED MONOPOLE DOUBLE DEADEND STRUCTURE

A. STRUCTURE MAPPING	N/A
B. RATIONALE FOR STRUCTURE TYPE:	MINIMIZES RIGHT OF WAY ACQUISITION
C. LENGTH OF R/W (STRUCTURE QTY):	2.3 MILES (3 STRUCTURES) - SEE NOTE 1
D. STRUCTURE MATERIAL:	WEATHERING STEEL
RATIONALE FOR STRUCTURE MATERIAL:	MATCH CURRENT STANDARDS ⁸ AND EXISTING STRUCTURES IN THE AREA
E. FOUNDATION MATERIAL:	CONCRETE
AVERAGE FOUNDATION REVEAL:	SEE NOTE 2
F. AVERAGE WIDTH AT CROSSARM:	26'
G. AVERAGE WIDTH AT BASE:	SEE NOTE 3
H. MINIMUM STRUCTURE HEIGHT (SEE NOTE 4):	110'
MAXIMUM STRUCTURE HEIGHT (SEE NOTE 4):	110'
AVERAGE STRUCTURE HEIGHT (SEE NOTE 4):	110'
I. AVERAGE SPAN LENGTH (RANGE):	676' - SEE NOTE 5
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

<p>THE INFORMATION CONTAINED ON THIS DRAWING IS CONSIDERED PRELIMINARY IN NATURE AND IS SUBJECT TO CHANGE BASED ON FINAL DESIGN</p>	<p>LINES 2404, 2090</p> <p>TYPICAL DC ENGINEERED MONOPOLE DOUBLE DEADEND STRUCTURE</p>	ATTACHMENT NO.
		II.B.3.a
 <p>Dominion Energy 5000 Dominion Blvd. Glen Allen, VA 23060</p>		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 OPTIMIZES EXISTING ROW USAGE
C. LENGTH OF R/W (STRUCTURE QTY):	2.3 MILES (15 STRUCTURES) - SEE NOTE 1
D. STRUCTURE MATERIAL:	WEATHERING STEEL
RATIONALE FOR STRUCTURE MATERIAL:	MATCH CURRENT STANDARDS ⁸ AND EXISTING STRUCTURES IN THE AREA
E. FOUNDATION MATERIAL:	CONCRETE
AVERAGE FOUNDATION REVEAL:	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):	110'
MAXIMUM STRUCTURE HEIGHT (SEE NOTE 4):	110'
AVERAGE STRUCTURE HEIGHT (SEE NOTE 4):	110'
I. AVERAGE SPAN LENGTH (RANGE):	620' - SEE NOTE 5
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 STRUCTURE 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
5000 Dominion Blvd.
Glen Allen, VA 23060

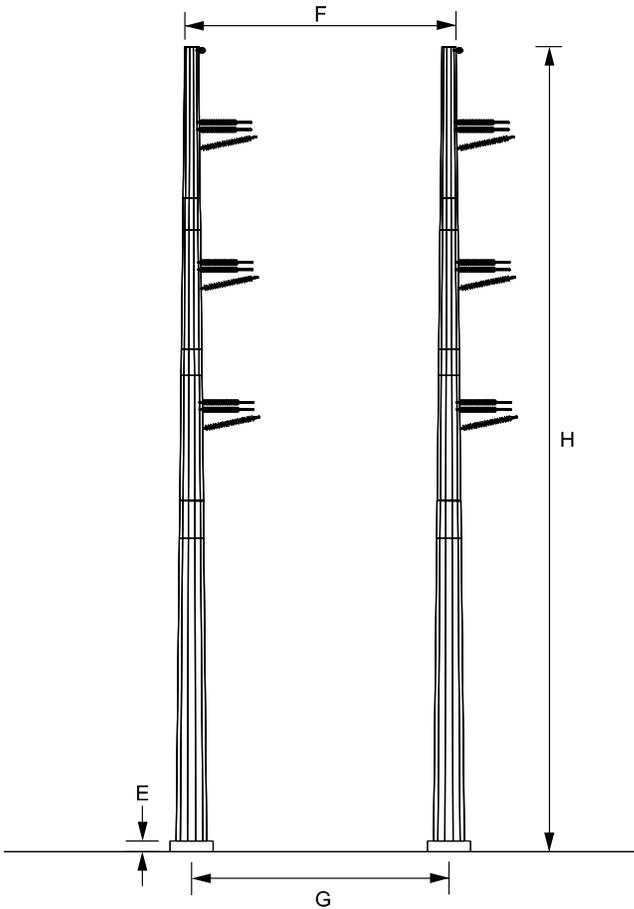
LINES 2404, 2090

TYPICAL DC ENGINEERED MONOPOLE SUSPENSION STRUCTURE (V-STRING)

ATTACHMENT NO.

II.B.3.b

DRAWN BY: SDH



TYPICAL DC ENGINEERED 2-POLE DOUBLE DEADEND STRUCTURE

A. STRUCTURE MAPPING	N/A
B. RATIONALE FOR STRUCTURE TYPE:	MINIMIZES RIGHT OF WAY ACQUISITION; 2-POLES USED FOR HEAVY ANGLES TO OPTIMIZE POLE/FOUNDATION SIZE AND COST
C. LENGTH OF R/W (STRUCTURE QTY):	2.45 MILES (5) - SEE NOTE 1
D. STRUCTURE MATERIAL:	WEATHERING STEEL
RATIONALE FOR STRUCTURE MATERIAL:	MATCH CURRENT STANDARDS AND EXISTING STRUCTURES IN THE AREA
E. FOUNDATION MATERIAL:	CONCRETE
AVERAGE FOUNDATION REVEAL:	SEE NOTE 2
F. AVERAGE WIDTH AT CROSSARM:	36'
G. AVERAGE WIDTH AT BASE:	SEE NOTE 3
H. MINIMUM STRUCTURE HEIGHT (SEE NOTE 4):	105'
MAXIMUM STRUCTURE HEIGHT (SEE NOTE 4):	105'
AVERAGE STRUCTURE HEIGHT (SEE NOTE 4):	105'
I. AVERAGE SPAN LENGTH (RANGE):	615' - SEE NOTE 5
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 STRUCTURE 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
5000 Dominion Blvd.
Glen Allen, VA 23060

LINES 2404, 2090

TYPICAL DC ENGINEERED 2-POLE
DOUBLE DEADEND STRUCTURE

ATTACHMENT NO.

II.B.3.c

DRAWN BY: SDH

II. DESCRIPTION OF THE PROPOSED PROJECT

B. Line Design and Operational Features

4. With regard to the proposed supporting structures for all feasible alternate routes, provide the maximum, minimum and average structure heights with respect to the whole route.

Response: The approximate structure heights along the Proposed and Alternative Routes are provided in the table below, based on preliminary conceptual design, not including foundation reveal and subject to change based on final engineering design.

Route	Minimum (ft.)	Maximum (ft.)	Average (ft.)
Proposed Route	100	110	109
Alternative Route 3	100	115	109
Alternative Route 4	100	140	110

II. DESCRIPTION OF THE PROPOSED PROJECT

B. Line Design and Operational Features

- 5. For lines being rebuilt, provide mapping showing existing and proposed structure heights for each individual structure within the ROW, as proposed in the application.**

Response: Not applicable.

II. DESCRIPTION OF THE PROPOSED PROJECT

B. Line Design and Operational Features

6. Provide photographs for [a] typical existing facilities to be removed, [b] comparable photographs or representations for proposed structures, and [c] visual simulations showing the appearance of all planned transmission structures at identified historic locations within one mile of the proposed centerline and in key locations identified by the Applicant.

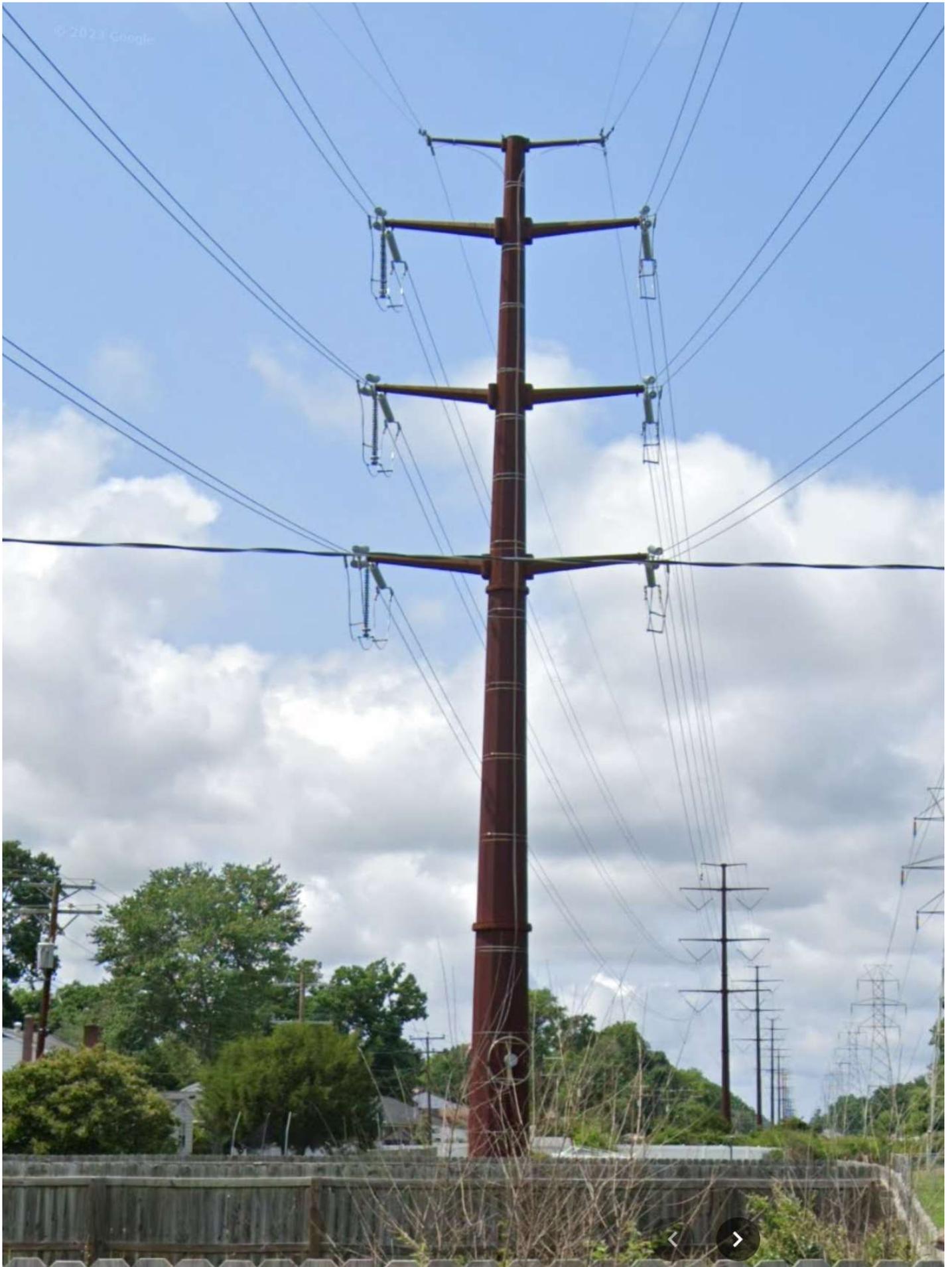
Response: [a] Not applicable.

[b] See [Attachment II.B.6.b.i](#) through [Attachment II.B.6.b.iv](#) for representative photographs of the proposed structures.

[c] Visual simulations showing the appearance of the proposed transmission structures at identified historic locations within 1.0 mile of the proposed Project centerline of the Proposed Route are provided. See [Attachment II.B.6.c](#) for maps depicting each of the simulation locations, the existing views at the historic properties, and simulated proposed views. These simulations were created using GIS modeling to depict whether the proposed structures will be visible from the identified historic property. The historic properties evaluated are described below. See also the Stage I Pre-Application Analysis Report contained in Appendix G of the Environmental Routing Study.

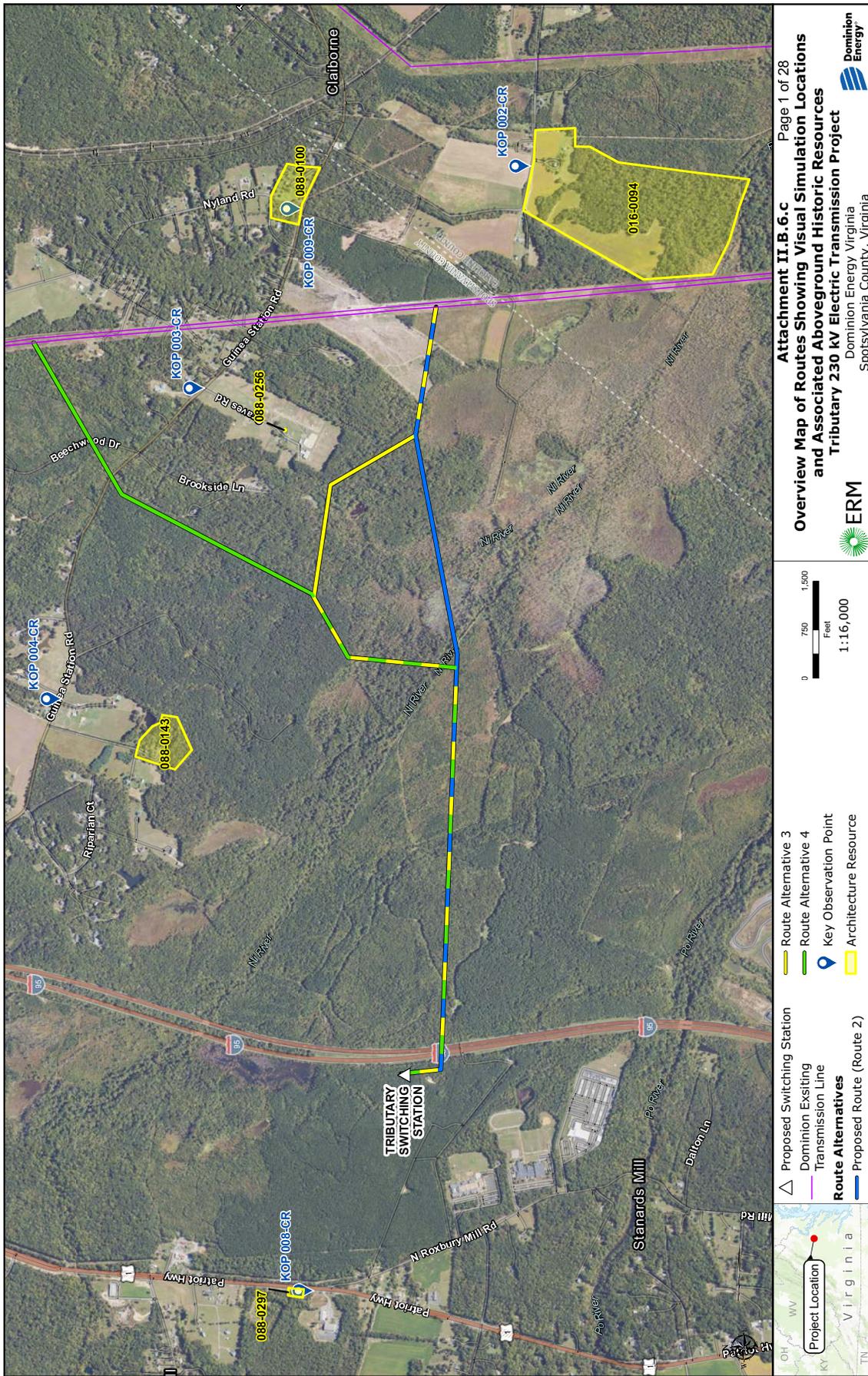
Historic Property	Viewpoint	Comments
Spring Grove (VDHR ID# 016-0094)	KOP 002- CR	The Proposed Route and Alternative Route 3 will have no impact on 016-0094.
Nyland (VDHR ID# 088-0100)	KOP 009- CR	The Proposed Route and Alternative Route 3 will have no impact on 088-0100.
La Vista (VDHR ID# 088-0143)	KOP 004- CR	The Proposed Route and Alternative Route 3 will have no impact on 088-0143.
Westwood (VDHR ID# 088-0256)	KOP 003- CR	The Proposed Route, Alternative Route 3, and Alternative Route 4 will have no impact on 088-0256.
Coates House (VDHR ID# 088-0297)	KOP 008- CR	The Proposed Route, Alternative Route 3, and Alternative Route 4 will have no more than a moderate impact on 088-0297.

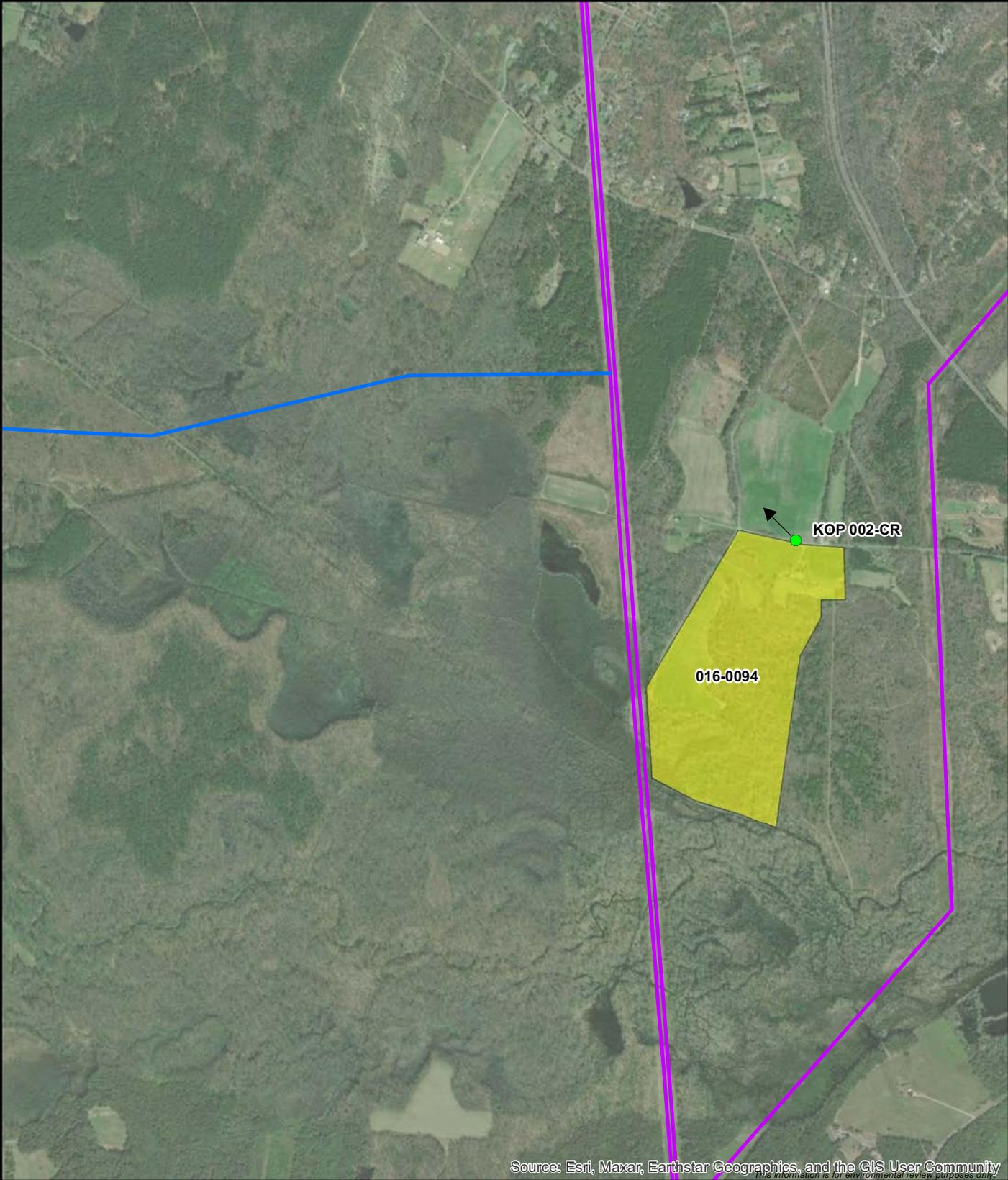




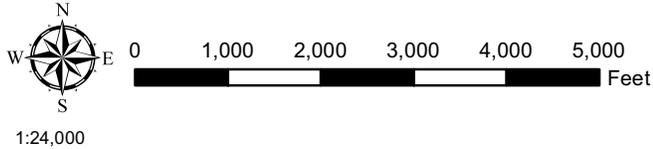








Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



- Proposed Tributary Lines (Route 2)
- Existing Dominion Lines
- Architecture Resource
- Photo Point



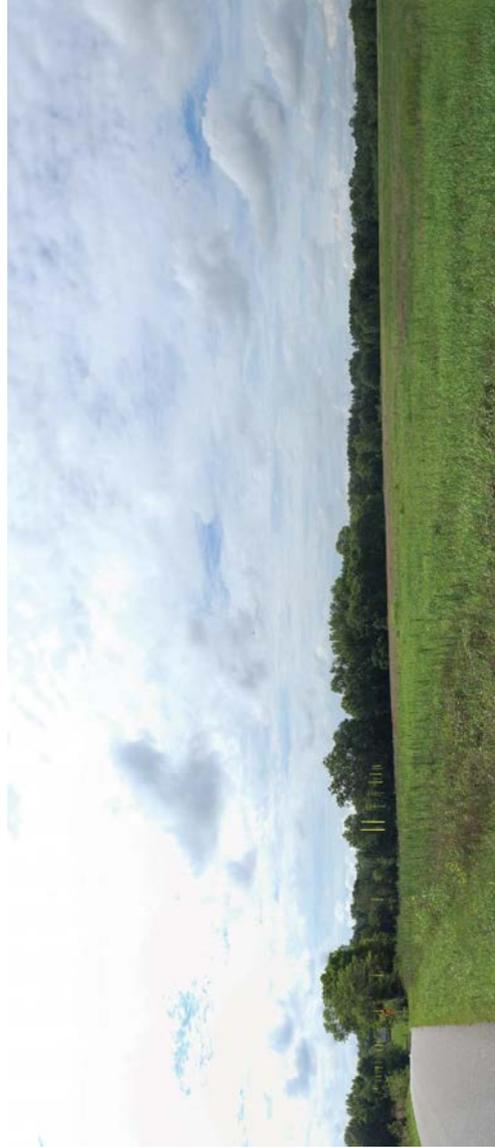
Figure 1. Aerial photograph depicting land use and photo view for 016-0094.

Figure 2
Viewpoint KOP 002-CR
 Guinea Station Rd NW of Flippo Dr
 016-0094

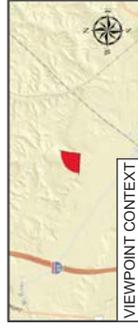
Pre-Application Analysis
Tributary



Existing View



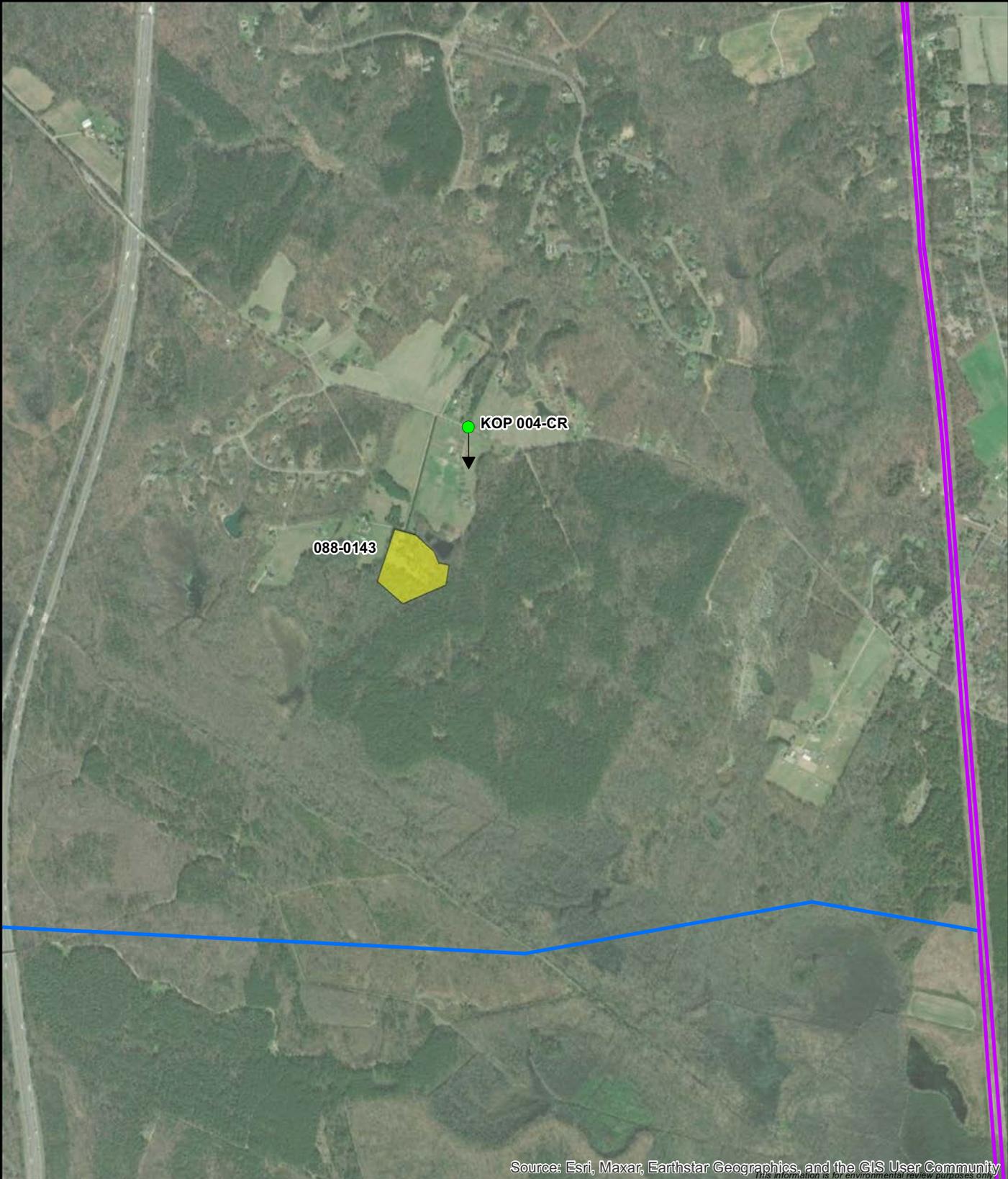
Proposed view showing hidden transmission line structures



Date of Photography: 24th July 2024 16:19
Camera: Nikon D800
Lens: Nikkor 50mm 1.4
Camera Height: 64 inches

Viewpoint Location UTM Zone 18N: 284477E 4225548N
View Direction: 321 degrees
Viewpoint Elevation: 140 feet
Distance to Development: 1396 feet
Horizontal Field of View: 95 degrees





Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



1:24,000

- Proposed Tributary Lines (Route 2)
- Existing Dominion Lines
- Architecture Resource
- Photo Point



Figure 3. Aerial photograph depicting land use and photo view for 088-0100.

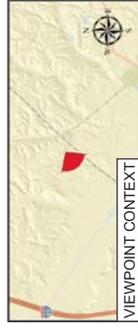
Figure 4
Viewpoint KOP 009-CR
 Guinea Station Rd E. of Nyland Rd
 086-0100
Pre-Application Analysis
Tributary



Existing View

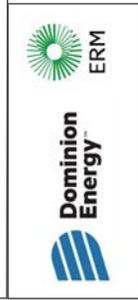


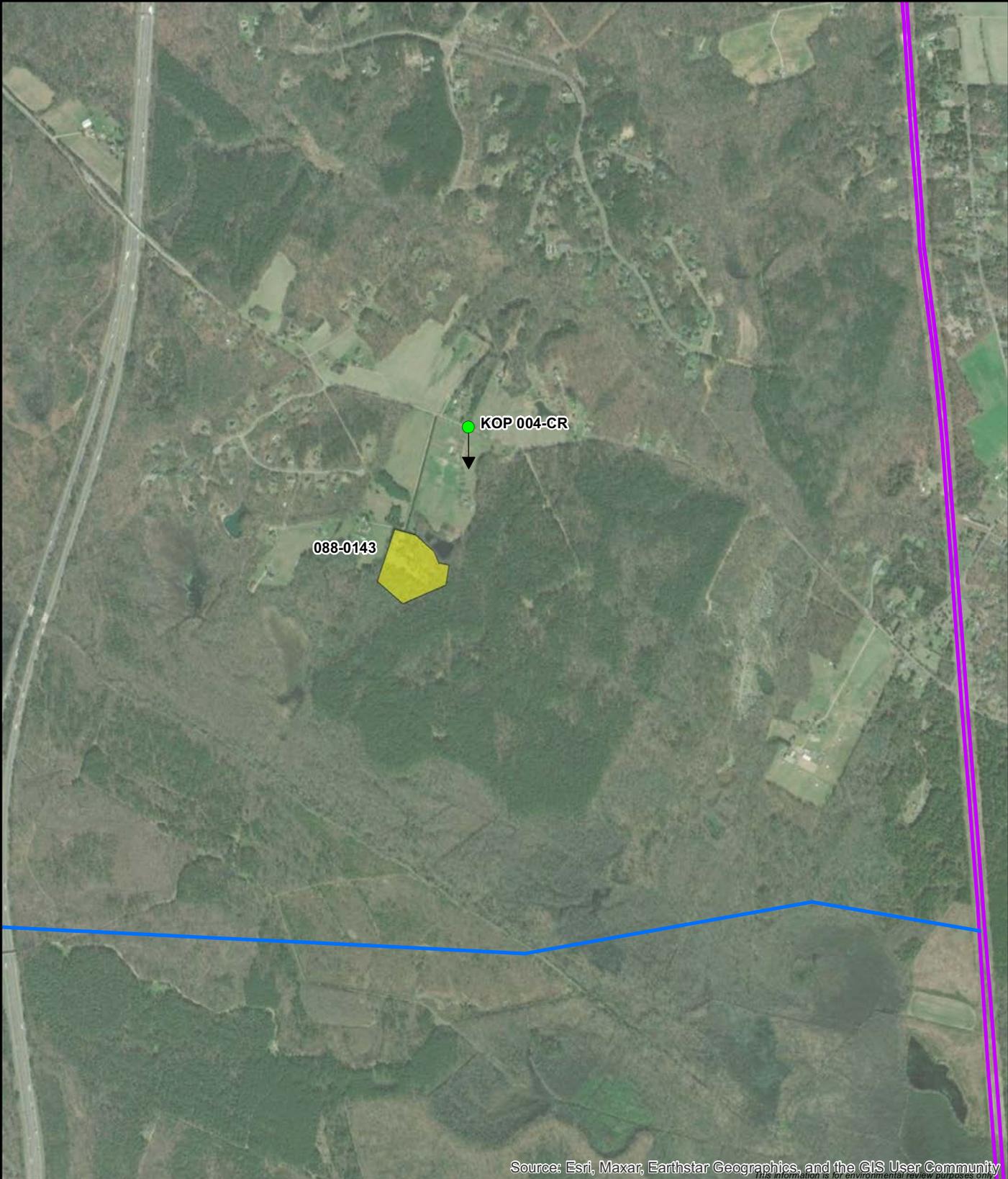
Proposed view showing hidden transmission line structures



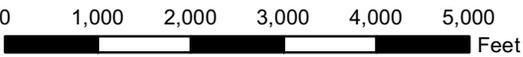
Date of Photography: 21st May 2024 14:07
Camera: Nikon D800
Lens: Nikkor 50mm 1.4
Camera Height: 64 inches

Viewpoint Location UTM Zone 18N: 284295E 4226634N
View Direction: 235 degrees
Viewpoint Elevation: 196 feet
Distance to Development: 2319 feet
Horizontal Field of View: 95 degrees





Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



1:24,000

- Proposed Tributary Lines (Route 2)
- Architecture Resource
- Existing Dominion Lines
- Photo Point



Figure 5. Aerial photograph depicting land use and photo view for 088-0143.

<p>Figure 6 Viewpoint KOP 004-CR Guinea Station Rd SE of Station Nye 088-0143</p>	<p>Pre-Application Analysis Tributary</p>
--	---



Existing View



Proposed view showing hidden transmission line structures



<p>Date of Photography: 21st May 2024 13:18 Camera: Nikon D800 Lens: Nikkor 50mm 1.4 Camera Height: 64 inches</p>
--

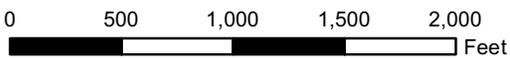
<p>Viewpoint Location UTM Zone 18N: 282043E 4227872N View Direction: 190 degrees Viewpoint Elevation: 268 feet Distance to Development: 6016 feet Horizontal Field of View: 95 degrees</p>



Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



1:10,000



- Proposed Tributary Lines (Route 2)
- Architecture Resource
- Existing Dominion Lines
- Photo Point



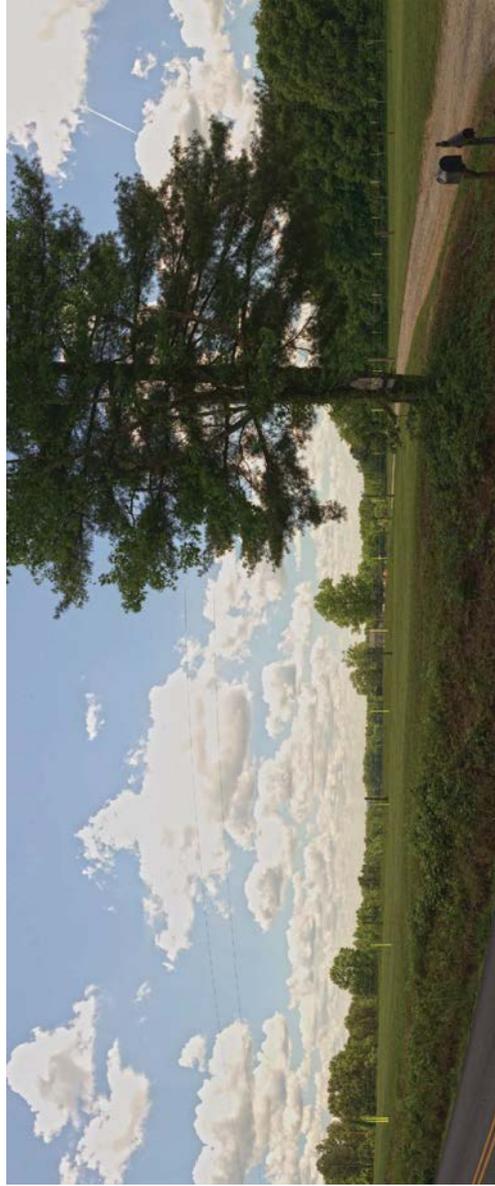
Figure 7. Aerial photograph depicting land use and photo view for 088-0256.

Figure 8
Viewpoint KOP 003-CR
 Guinea Station Rd at Graves Rd
 088-0296

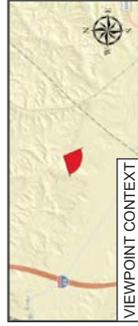
Pre-Application Analysis
Tributary



Existing View

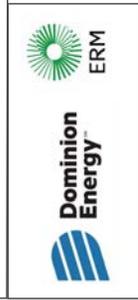


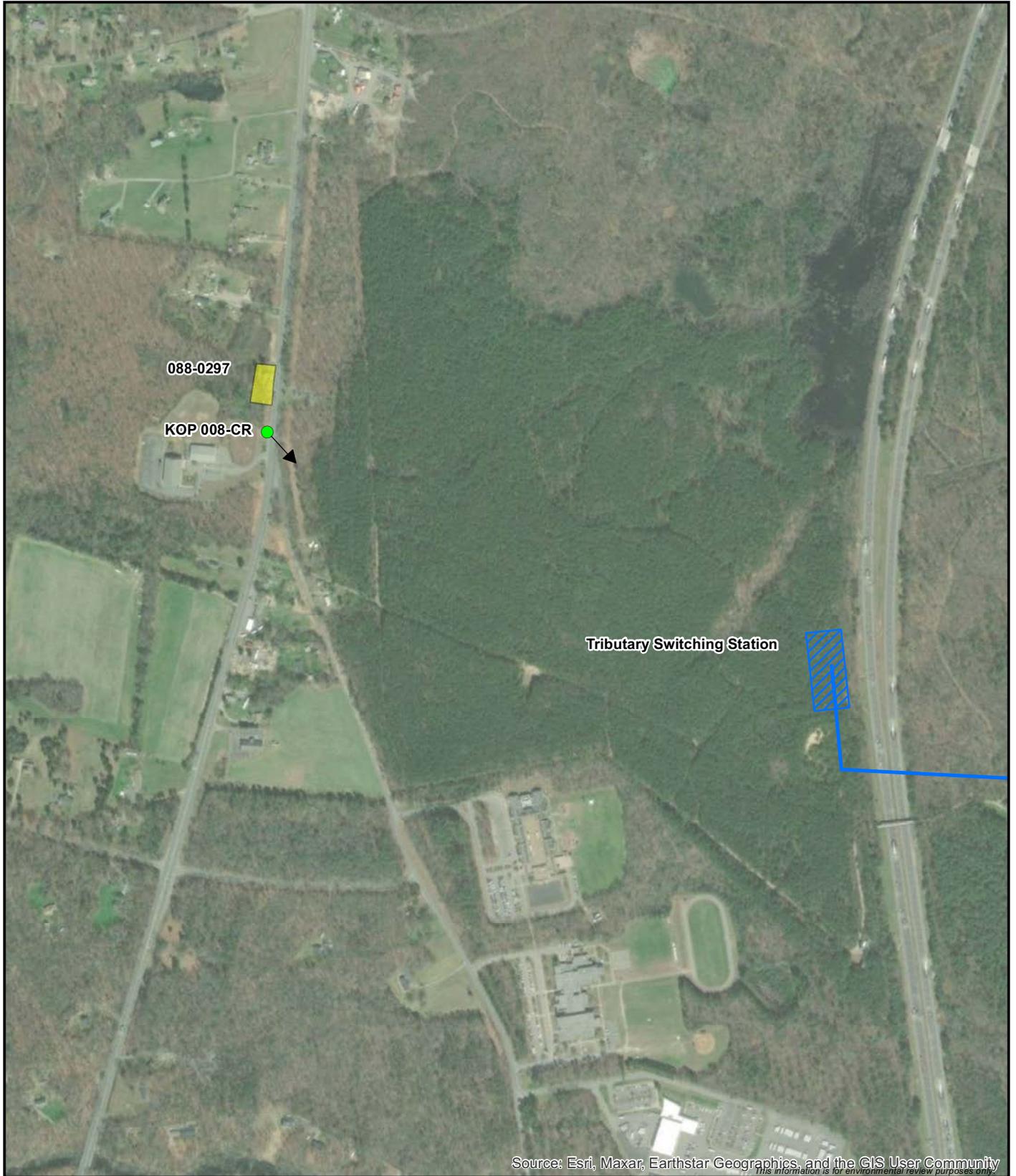
Proposed view showing hidden transmission line structures



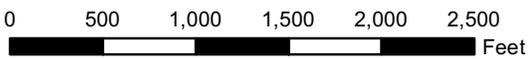
Date of Photography: 21st May 2024 13:41
Camera: Nikon D800
Lens: Nikkor 50mm 1.4
Camera Height: 65 inches

Viewpoint Location UTM Zone 18N: 283504E 4227125N
View Direction: 204 degrees
Viewpoint Elevation: 229 feet
Distance to Development: 3273 feet
Horizontal Field of View: 95 degrees





Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



1:12,000

-  Proposed Tributary Lines (Route 2)
-  Tributary Switching Station
-  Architecture Resource
-  Photo Point



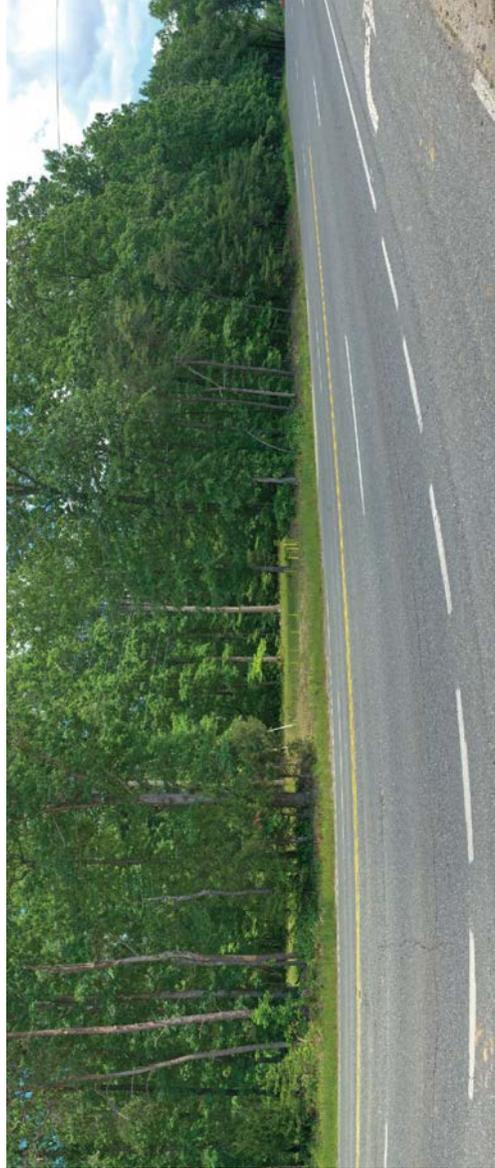
Figure 9. Aerial photograph depicting land use and photo view for 088-0297.

Figure 10
Viewpoint KOP 008-CR
 Patriot Hwy N of Hickory Ridge Rd
 088-0287

Pre-Application Analysis
Tributary



Existing View



Proposed view showing hidden transmission line structures

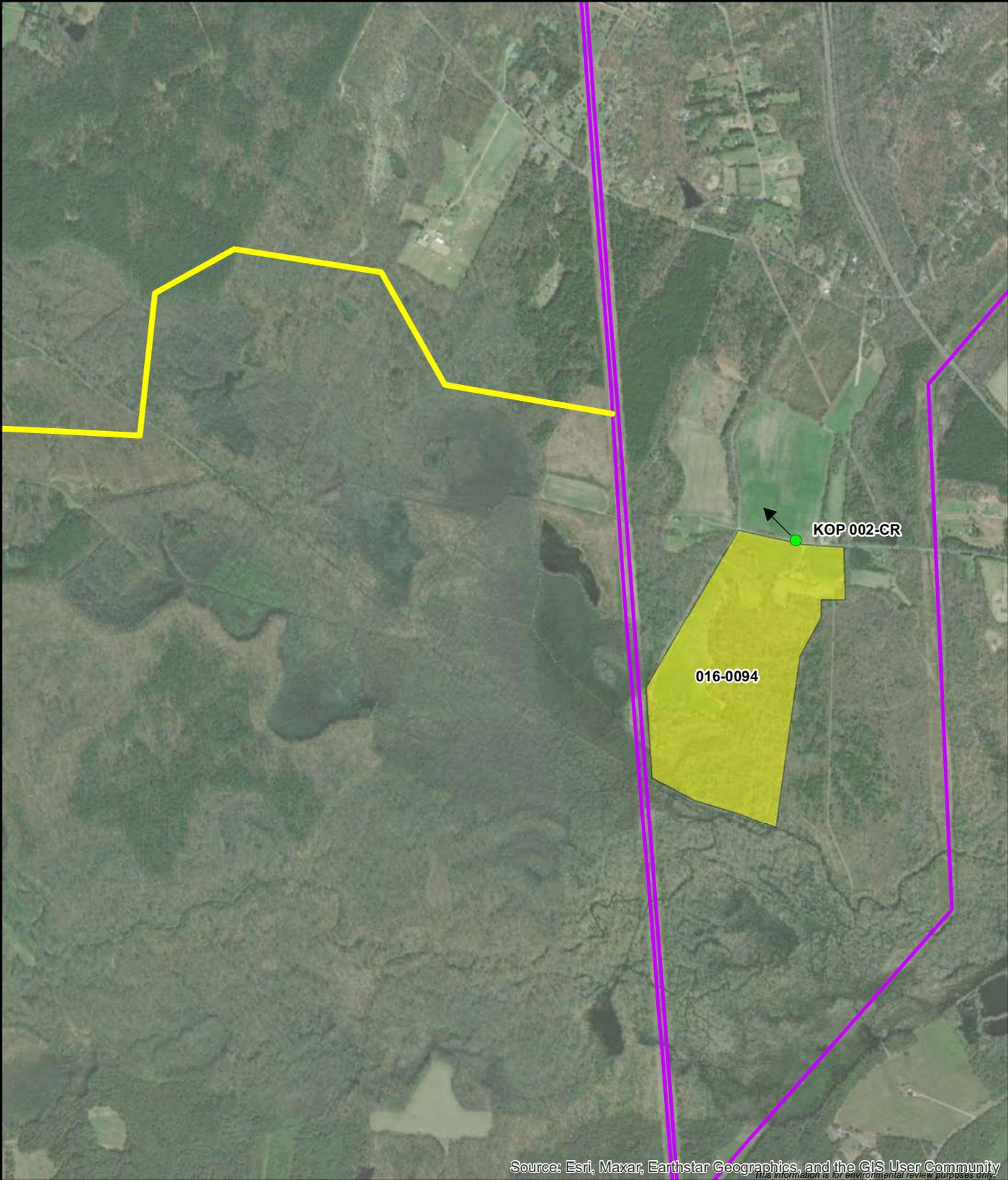


VIEWPOINT CONTEXT

Date of Photography: 21st May 2024 14:31
Camera: Nikon D800
Lens: Nikkor 50mm 1.4
Camera Height: 64 inches

Viewpoint Location UTM Zone 18N: 279222E 4226768N
View Direction: 116 degrees
Viewpoint Elevation: 267 feet
Distance to Development: 8406 feet
Horizontal Field of View: 95 degrees





Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



- Proposed Tributary Lines (Route 3)
- Existing Dominion Lines
- Architecture Resource
- Photo Point



Figure 11. Aerial photograph depicting land use and photo view for 016-0094.

Figure 12
Viewpoint KOP 002-CR
 Guinea Station Rd NW of Filippo Dr
 016-0094

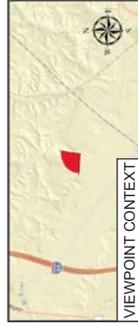
Pre-Application Analysis
Tributary



Existing View



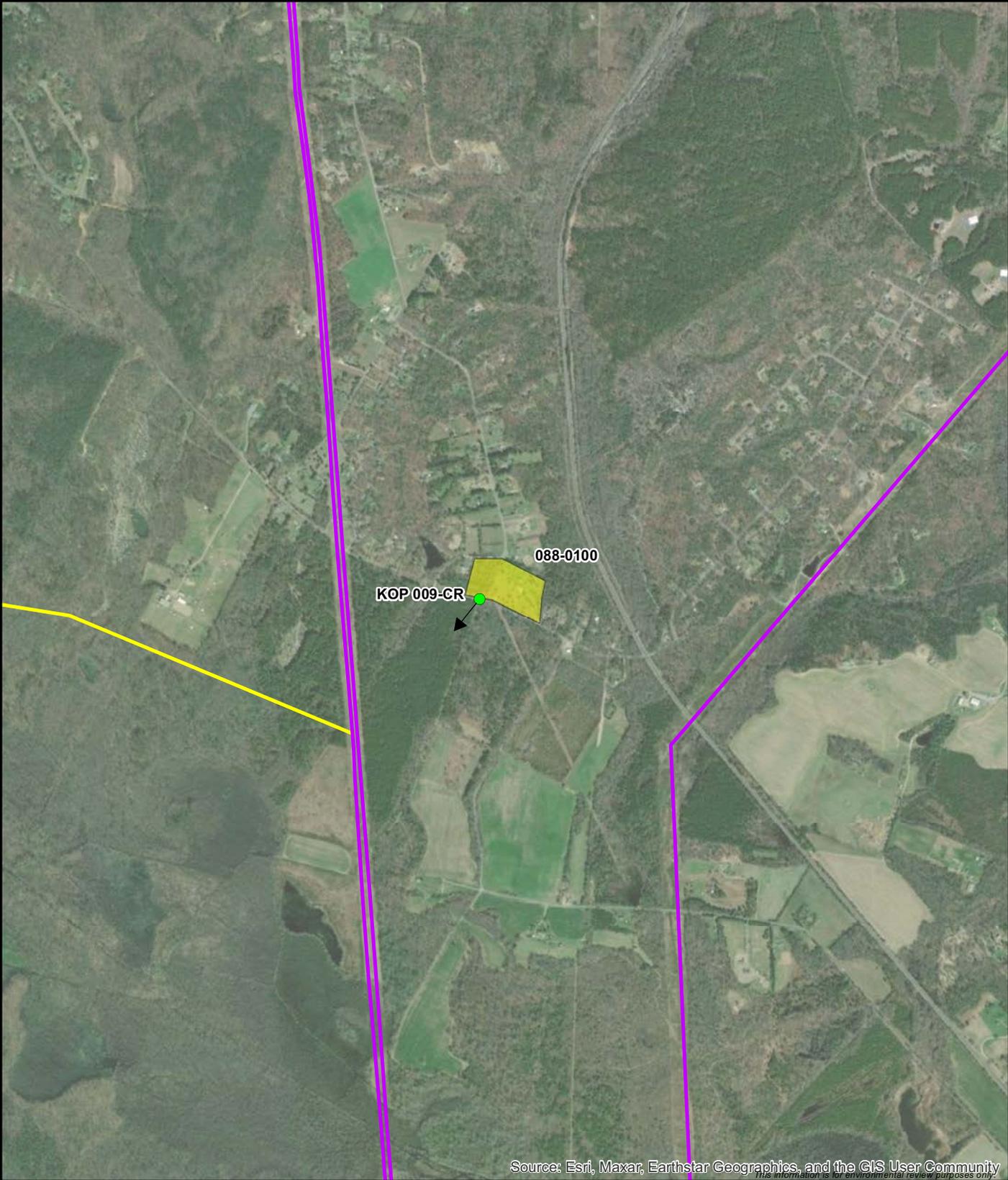
Proposed view showing hidden transmission line structures



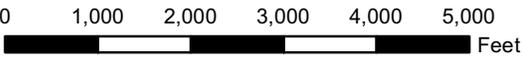
Date of Photography: 24th July 2024 16:19
Camera: Nikon D800
Lens: Nikkor 50mm 1.4
Camera Height: 64 inches

Viewpoint Location UTM Zone 18N: 284477E 4225548N
View Direction: 321 degrees
Viewpoint Elevation: 140 feet
Distance to Development: 1396 feet
Horizontal Field of View: 95 degrees





Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



1:24,000

- Proposed Tributary Lines (Route 3)
- Existing Dominion Lines
- Architecture Resource
- Photo Point



Figure 13. Aerial photograph depicting land use and photo view for 088-0100.

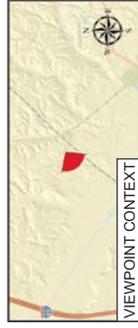
Figure 14
Viewpoint KOP 009-CR
 Guinea Station Rd E. of Nyland Rd
 086-0100
Pre-Application Analysis
Tributary



Existing View

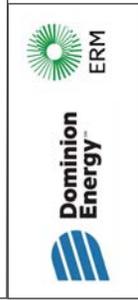


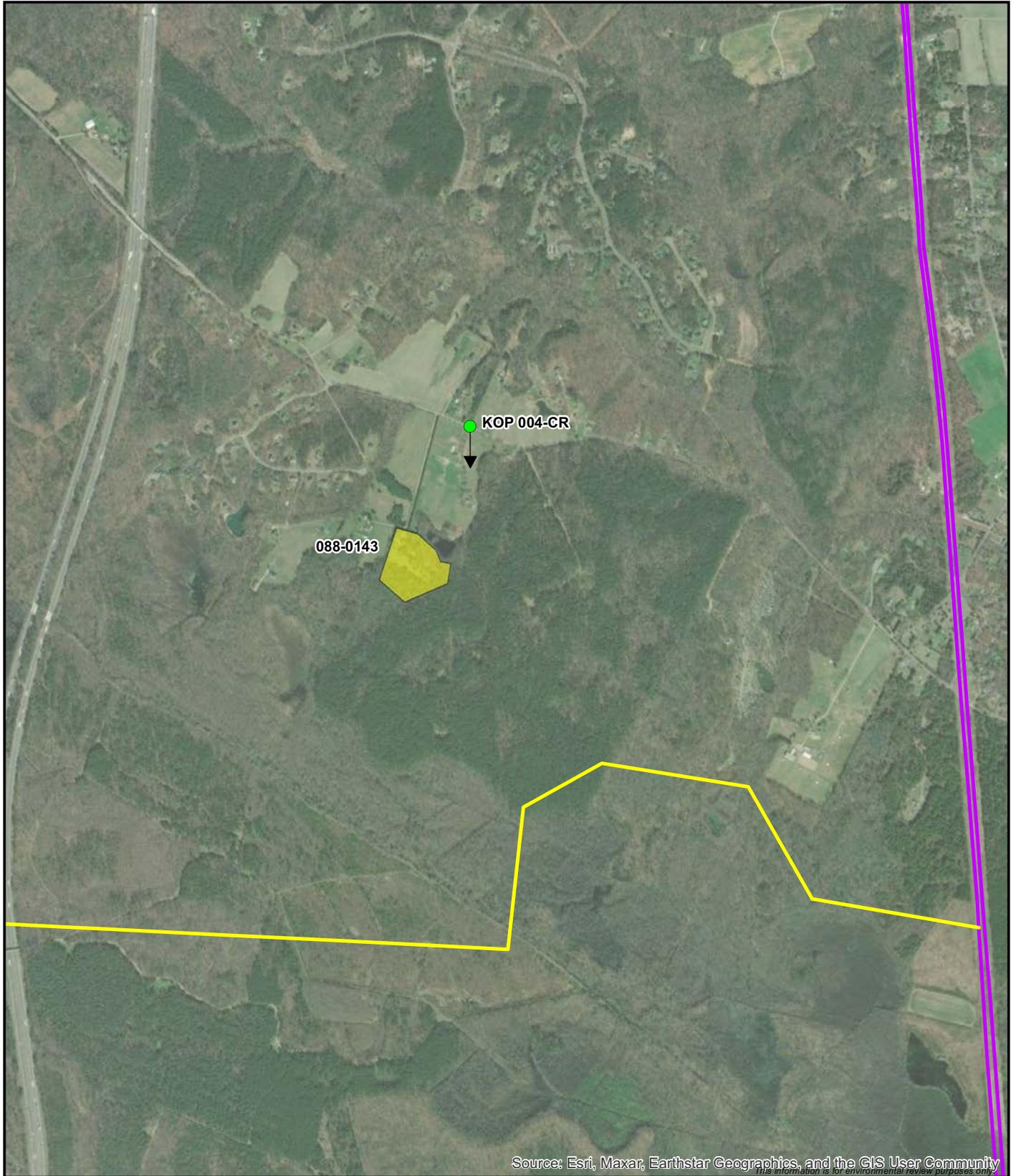
Proposed view showing hidden transmission line structures



Date of Photography: 21st May 2024 14:07
Camera: Nikon D800
Lens: Nikkor 50mm 1.4
Camera Height: 64 inches

Viewpoint Location UTM Zone 18N: 284295E 4226634N
View Direction: 235 degrees
Viewpoint Elevation: 196 feet
Distance to Development: 2319 feet
Horizontal Field of View: 95 degrees

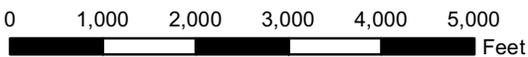




Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



1:24,000



- Proposed Tributary Lines (Route 3)
- Existing Dominion Lines
- Architecture Resource
- Photo Point



Figure 15. Aerial photograph depicting land use and photo view for 088-0143.



Existing View

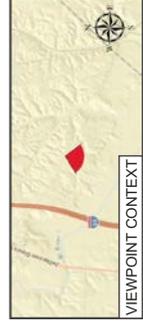


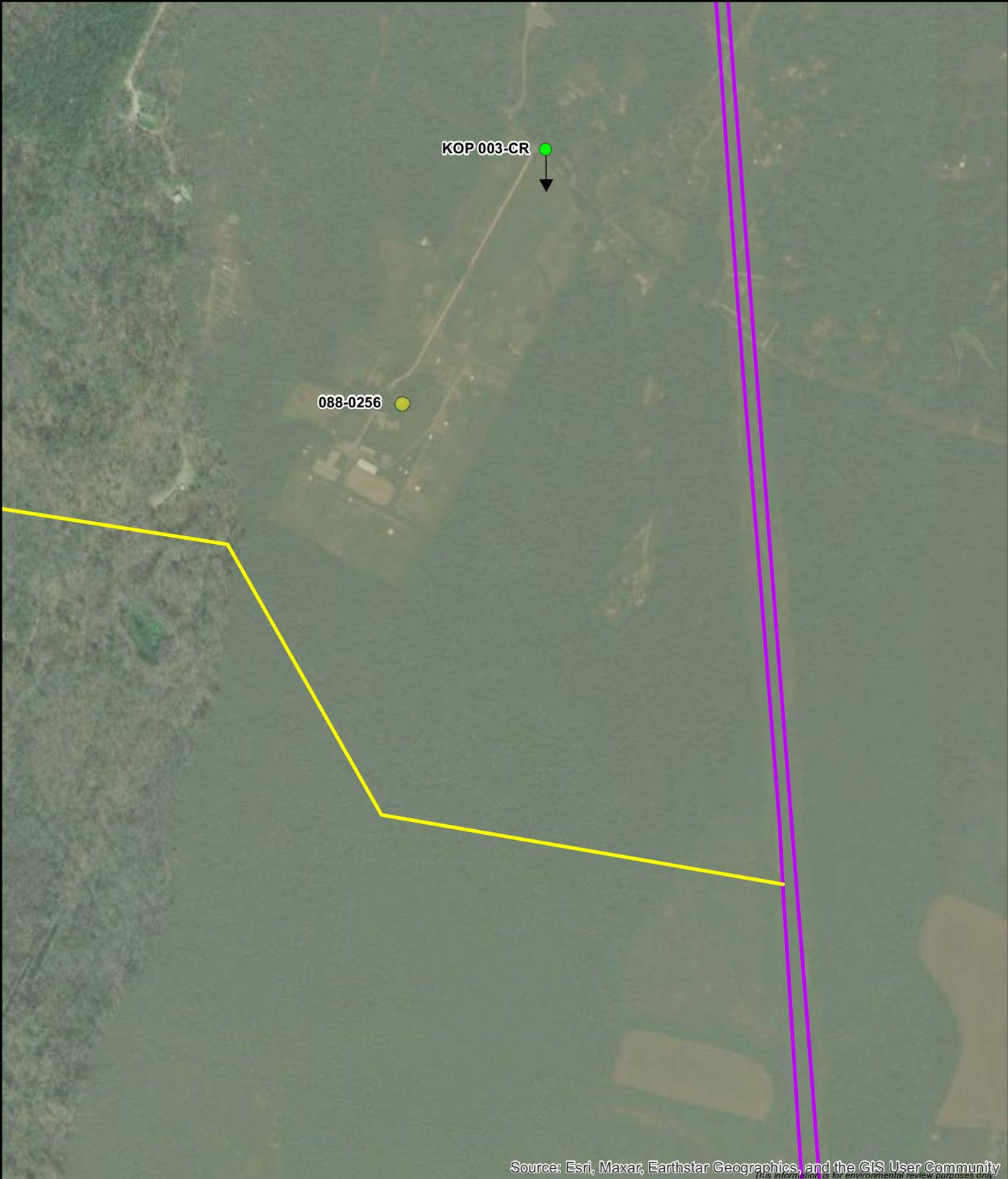
Proposed view showing hidden transmission line structures



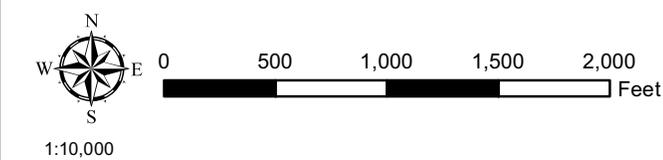
Viewpoint Location UTM Zone 18N: 282043E 4227872N
 View Direction: 190 degrees
 Viewpoint Elevation: 268 feet
 Distance to Development: 4135 feet
 Horizontal Field of View: 95 degrees

Date of Photography: 21st May 2024 13:18
 Camera: Nikon D800
 Lens: Nikkor 50mm 1.4
 Camera Height: 64 inches





Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



- Proposed Tributary Lines (Route 3)
- Architecture Resource
- Existing Dominion Lines
- Photo Point

C:\Users\Vincent.macek\OneDrive - ERM\Dominion Tributary\DOM TRIBUTARY ATT 5 7-2024\Dom Trib Attachment 5 Fig 17 rev.mxd | REVISED: 08/27/2024 | SCALE: 1:10,000

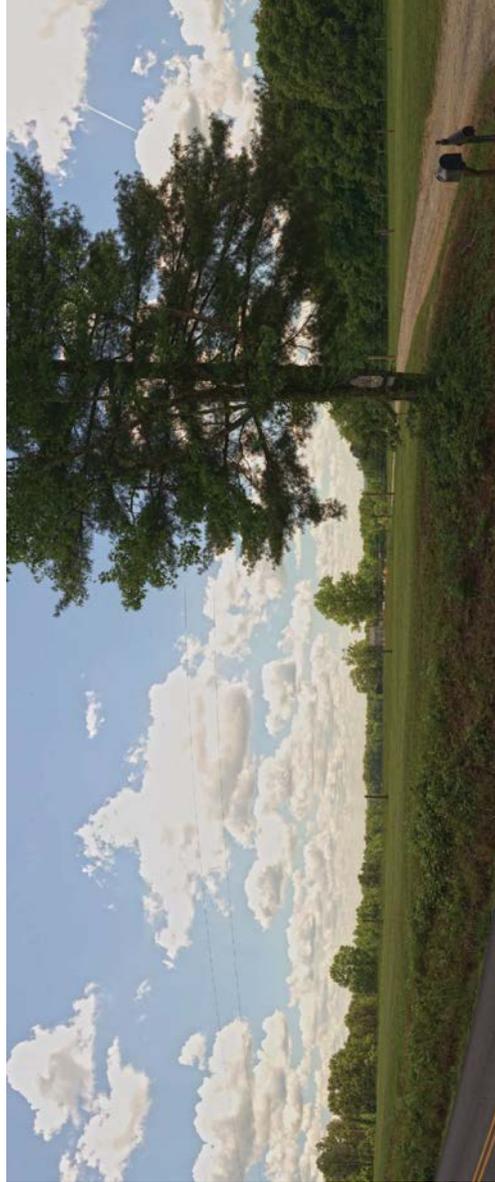
Figure 17. Aerial photograph depicting land use and photo view for 088-0256.

Figure 18
Viewpoint KOP 003-CR
 Guinea Station Rd at Graves Rd
 088-0286

Pre-Application Analysis
Tributary



Existing View



Proposed view showing transmission line structures



Date of Photography: 21st May 2024 13:41
Camera: Nikon D800
Lens: Nikkor 50mm 1.4
Camera Height: 65 inches

Viewpoint Location UTM Zone 18N: 283504E 4227125N
View Direction: 204 degrees
Viewpoint Elevation: 229 feet
Distance to Development: 2391 feet
Horizontal Field of View: 95 degrees

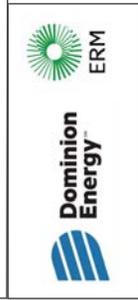
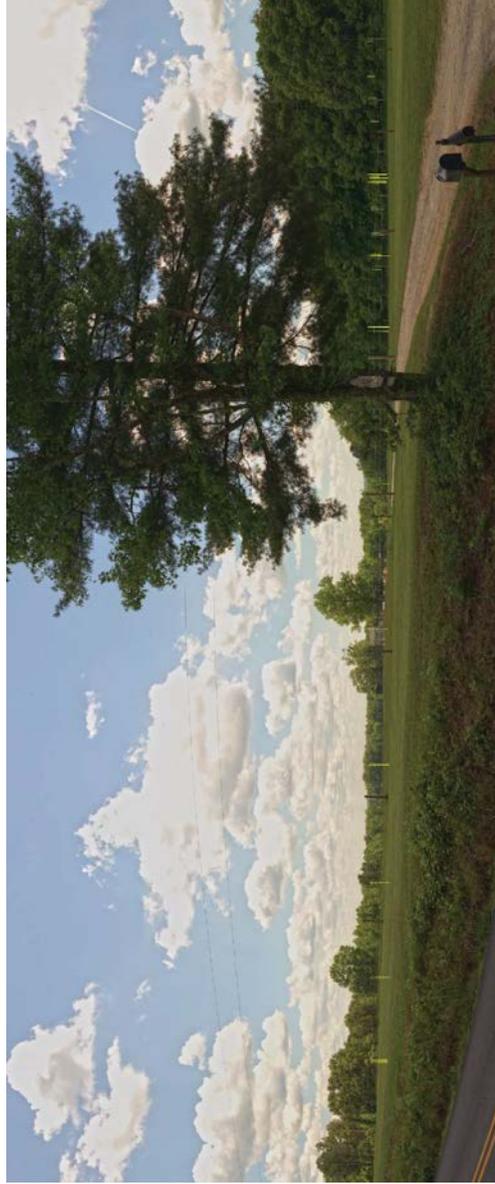


Figure 19
Viewpoint KOP 003-CR
 Guinea Station Rd at Graves Rd
 088-0286
Pre-Application Analysis
Tributary



Existing View

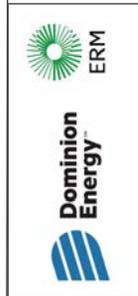


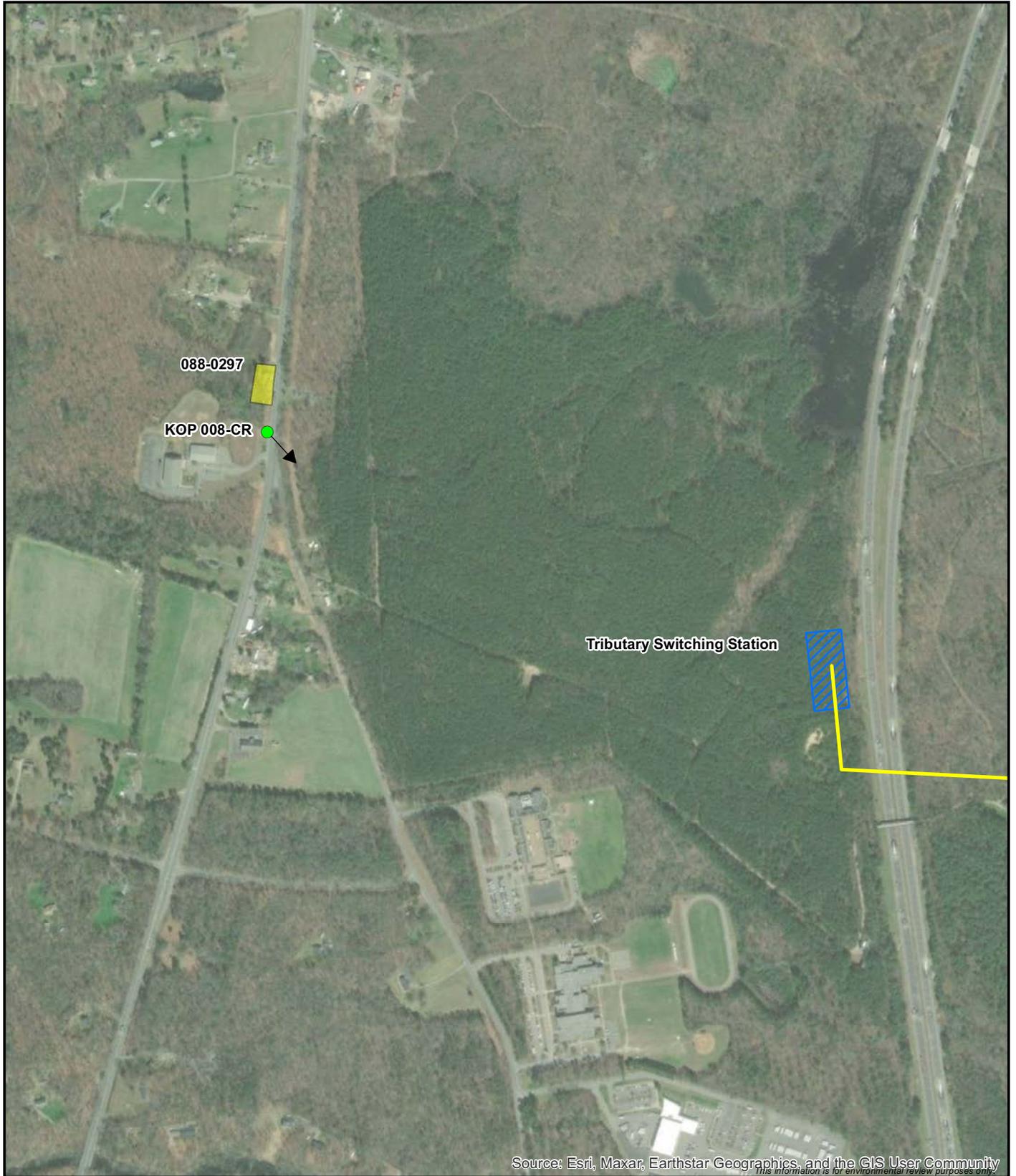
Proposed view showing hidden transmission line structures



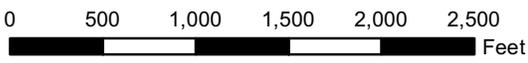
Date of Photography: 21st May 2024 13:41
Camera: Nikon D800
Lens: Nikkor 50mm 1.4
Camera Height: 65 inches

Viewpoint Location UTM Zone 18N: 283504E 4227125N
View Direction: 204 degrees
Viewpoint Elevation: 229 feet
Distance to Development: 2391 feet
Horizontal Field of View: 95 degrees





Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



1:12,000

-  Proposed Tributary Lines (Route 3)
-  Tributary Switching Station
-  Architecture Resource
-  Photo Point



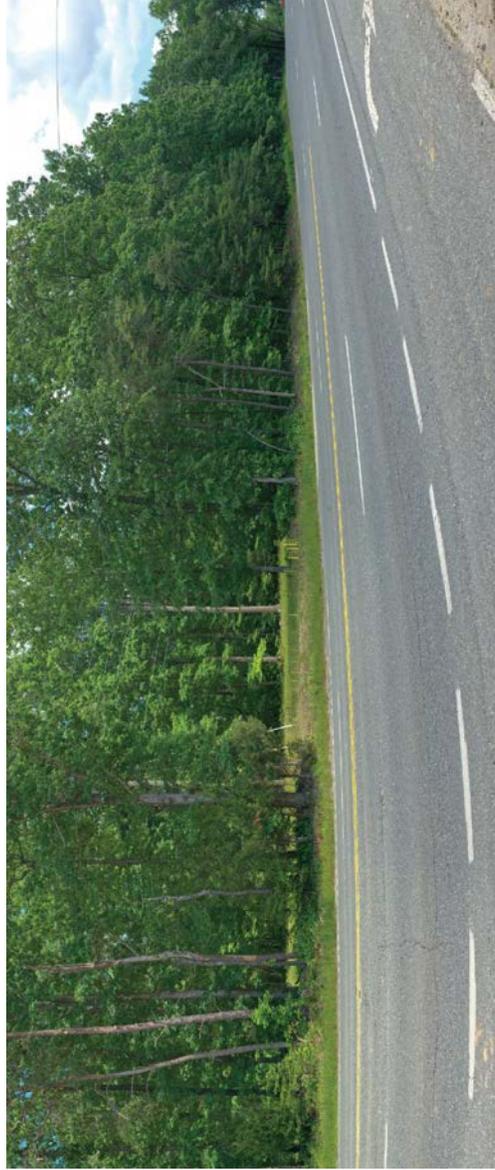
Figure 20. Aerial photograph depicting land use and photo view for 088-0297.

Figure 21
Viewpoint KOP 008-CR
 Patriot Hwy N of Hickory Ridge Rd
 088-0287

Pre-Application Analysis
Tributary



Existing View

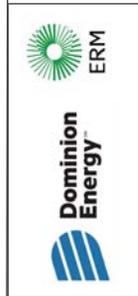


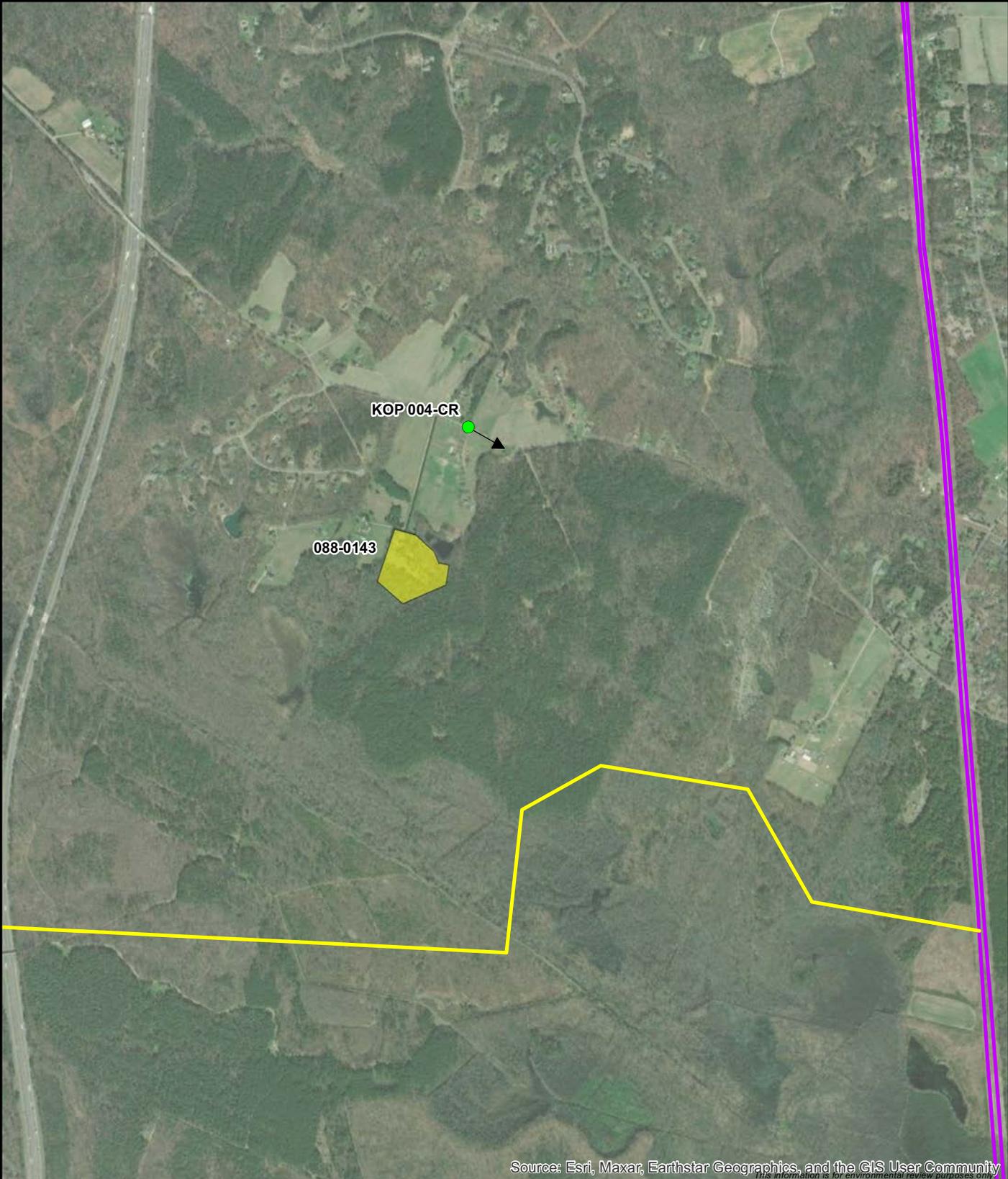
Proposed view showing hidden transmission line structures



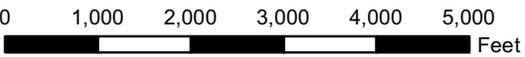
Date of Photography: 21st May 2024 14:31
Camera: Nikon D800
Lens: Nikkor 50mm 1.4
Camera Height: 64 inches

Viewpoint Location UTM Zone 18N: 279222E 4226768N
View Direction: 116 degrees
Viewpoint Elevation: 267 feet
Distance to Development: 8406 feet
Horizontal Field of View: 95 degrees





Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



1:24,000

- Proposed Tributary Lines (Route 3)
- Existing Dominion Lines
- Architecture Resource
- Photo Point



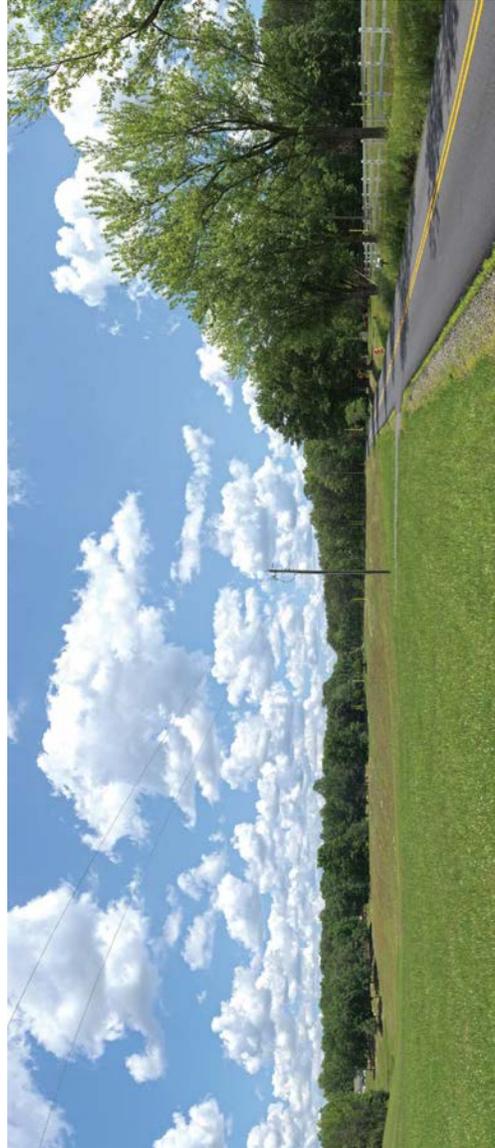
Figure 22. Aerial photograph depicting land use and photo view for 088-0143.

Figure 23
Viewpoint KOP 004-CR East
 Guinea Station Rd SE of Station Nye
 088-0143

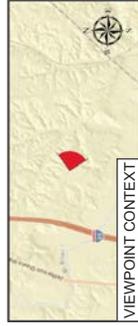
Pre-Application Analysis
Tributary



Existing View

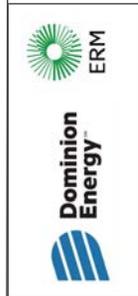


Proposed view showing hidden transmission line structures



Date of Photography: 21st May 2024 13:18
Camera: Nikon D800
Lens: Nikkor 50mm 1.4
Camera Height: 64 inches

Viewpoint Location UTM Zone 18N: 282043E 4227872N
View Direction: 190 degrees
Viewpoint Elevation: 268 feet
Distance to Development: 3173 feet
Horizontal Field of View: 95 degrees





Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



1:10,000

- Proposed Tributary Lines (Route 4)
- Existing Dominion Lines
- Architecture Resource
- Photo Point



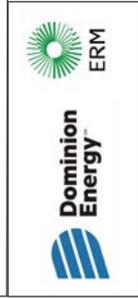
Figure 24. Aerial photograph depicting land use and photo view for 088-0256.



Existing View



Proposed view showing hidden transmission line structures



Viewpoint Location UTM Zone 18N: 283504E 4227125N
 View Direction: 273 degrees
 Viewpoint Elevation: 229 feet
 Distance to Development: 1887 feet
 Horizontal Field of View: 95 degrees

Date of Photography: 21st May 2024 13:41
 Camera: Nikon D800
 Lens: Nikkor 50mm 1.4
 Camera Height: 65 inches

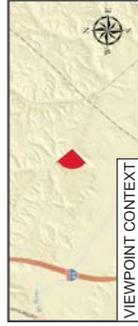
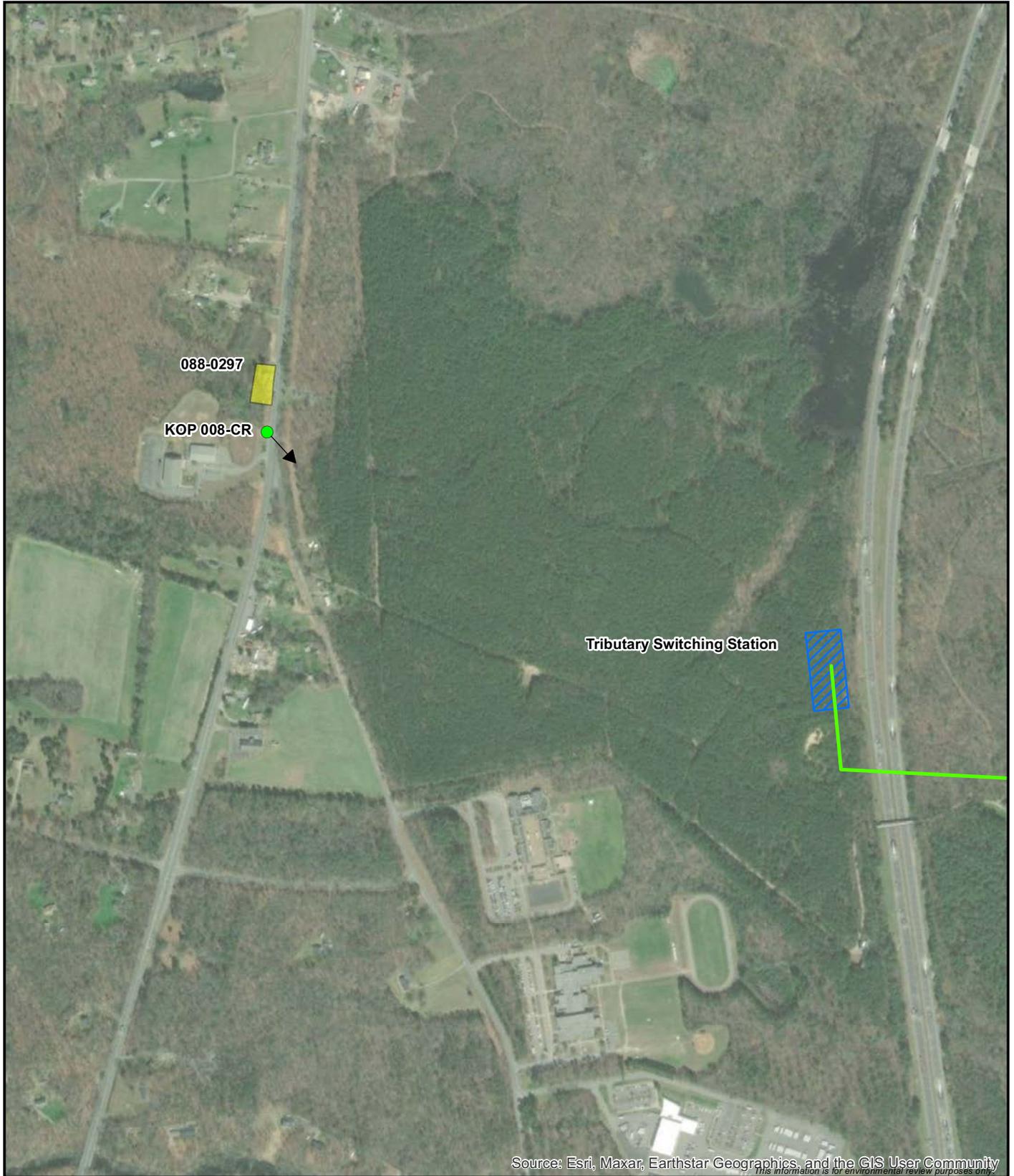


Figure 25
 Viewpoint KOP 003-CR West
 Guinea Station Rd at Graves Rd
 088-0286
Pre-Application Analysis
 Tributary



Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



1:12,000

-  Proposed Tributary Lines (Route 4)
-  Tributary Switching Station
-  Architecture Resource
-  Photo Point



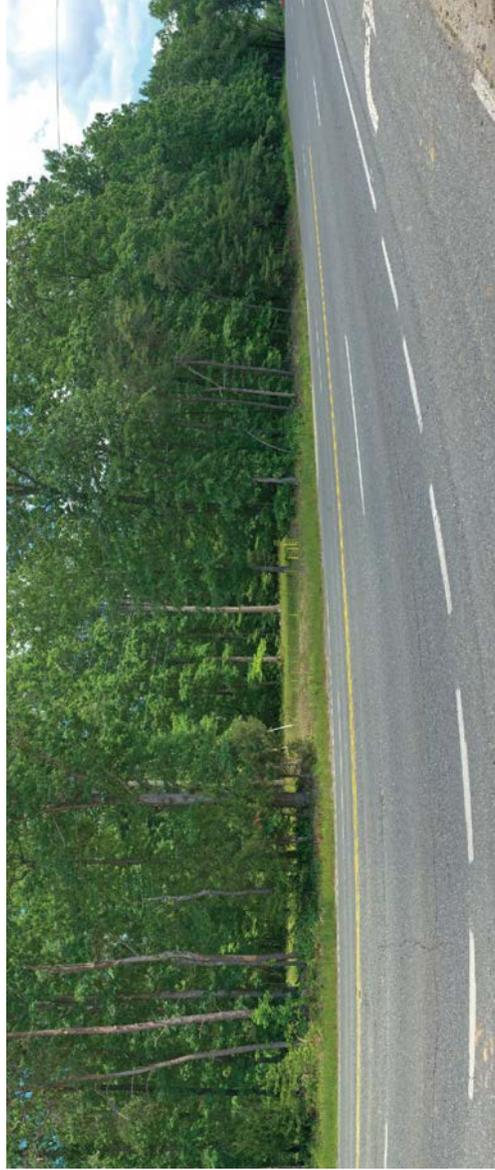
Figure 26. Aerial photograph depicting land use and photo view for 088-0297.

Figure 27
 Viewpoint KOP 008-CR
 Patriot Hwy N of Hickory Ridge Rd
 088-0287

**Pre-Application Analysis
 Tributary**



Existing View

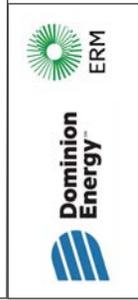


Proposed view showing hidden transmission line structures



Date of Photography: 21st May 2024 14:31
 Camera: Nikon D800
 Lens: Nikkor 50mm 1.4
 Camera Height: 64 inches

Viewpoint Location UTM Zone 18N: 279222E 4226768N
 View Direction: 116 degrees
 Viewpoint Elevation: 267 feet
 Distance to Development: 8406 feet
 Horizontal Field of View: 95 degrees



II. DESCRIPTION OF THE PROPOSED PROJECT

- C. Describe and furnish plan drawings of all new substations, switching stations, and other ground facilities associated with the proposed project. Include size, acreage, and bus configurations. Describe substation expansion capability and plans. Provide one-line diagrams for each.**

Response: The proposed Project requires the construction of the proposed 230 kV Tributary Station in Spotsylvania County, Virginia. The Company's proposed Tributary Station will provide interconnection to REC's customer, the SpotsyTech Campus.

The Company's proposed Tributary Station will consist of a 230 kV ring bus with four breakers installed initially to terminate the cut sections of Line #2090 and will have space to incorporate two additional 230 kV circuit breakers for future use. The 230 kV ring bus will be constructed to provide two 230 kV delivery points to REC's customer, the SpotsyTech Campus. The Tributary Station will be constructed on an approximately 2.2-acre parcel.

The one-line and general arrangement diagrams for the proposed Tributary Station are provided as Attachment II.C.1 and Attachment II.C.2, respectively.

III. IMPACT OF LINE ON SCENIC, ENVIRONMENTAL AND HISTORIC FEATURES

- A. Describe the character of the area that will be traversed by this line, including land use, wetlands, etc. Provide the number of dwellings within 500 feet, 250 feet and 100 feet of the centerline, and within the ROW for each route considered. Provide the estimated amount of farmland and forestland within the ROW that the proposed project would impact.

Response: **Proposed Route**

The Proposed Route is approximately 2.4 miles in length and is located entirely within Spotsylvania County, extending west from the #2090 Tap south of Guinea Station Road to the proposed Tributary Station, which is located adjacent to Interstate 95. The Proposed Route crosses through mostly forested and agricultural land, beginning at a parcel of managed timber, passing through undeveloped forest and the bottom section of the KOA Campground before crossing the Ni River. On the south side of the Ni River the route turns west and passes through a section of land classified as agricultural before continuing through undeveloped forest up to Interstate 95. On the west side of Interstate 95, the route passes through undeveloped forest located on the SpotsyTech Campus development parcel, which would be cleared and graded by the developer of the SpotsyTech Campus prior to the construction of the Project. The route terminates at the proposed Tributary Station on the SpotsyTech Campus development parcel.

According to County parcel data, zoning data, and aerial photo analysis, there are no residential dwellings, non-residential structures, or commercial buildings located within 500, 250, or 100 feet of the proposed centerline of the Proposed Route. There are no buildings within the right-of-way of the Proposed Route.

See Attachment III.A.1 for a map of farmland within the right-of-way that the Proposed Route would cross and Section 2.L of the DEQ Supplement for the estimated amount of farmland and forestland within the right-of-way of the Proposed Route.

For additional description of the character of the area that will be traversed by the Proposed Route and related impacts, see the DEQ Supplement, specifically as to land use (Sections 2.G and 2.L), wetlands (Section 2.D), forests (Section 2.L), agricultural lands (Section 2.L), historic resources (Section 2.I), and wildlife (Sections 2.G and 2.K).

Alternative Route 3

Alternative Route 3 is approximately 2.8 miles in length and is located entirely within Spotsylvania County, extending west from the #2090 Tap. Alternative Route 3 crosses through mostly forested and agricultural land, sharing an alignment with the Proposed Route for about 0.4 mile before turning northwest, beginning at

a parcel of managed timber and passing through undeveloped forest before turning west to cross a portion of the KOA Campground. On the west side of the KOA Campground, the route turns southwest/south and passes through undeveloped forest before crossing the Ni River. At this point, the route turns west and shares an alignment with the Proposed Route for the remaining approximately 1.2 miles, passing through a section of land classified as agricultural before continuing through undeveloped forest up to Interstate 95. On the west side of Interstate 95, the route passes through undeveloped forest located on the SpotsyTech Campus parcel which would be cleared and graded by the developer of the SpotsyTech Campus prior to the construction of the Project. The route terminates at the proposed Tributary Station on the SpotsyTech Campus development parcel.

According to County parcel data, zoning data, and aerial photo analysis, there are no residential dwellings, non-residential structures, or commercial buildings located within 500, 250, or 100 feet of the proposed centerline of the Proposed Route. There are no buildings within the right-of-way of the Proposed Route.

See Attachment III.A.1 for a map of farmland within the right-of-way that the Proposed Route would cross and Section 2.L of the DEQ Supplement for the estimated amount of farmland and forestland within the right-of-way of the Proposed Route.

For additional description of the character of the area that will be traversed by the Proposed Route and related impacts, see the DEQ Supplement, specifically as to land use (Sections 2.G and 2.L), wetlands (Section 2.D), forests (Section 2.L), agricultural lands (Section 2.L), historic resources (Section 2.I), and wildlife (Sections 2.G and 2.K).

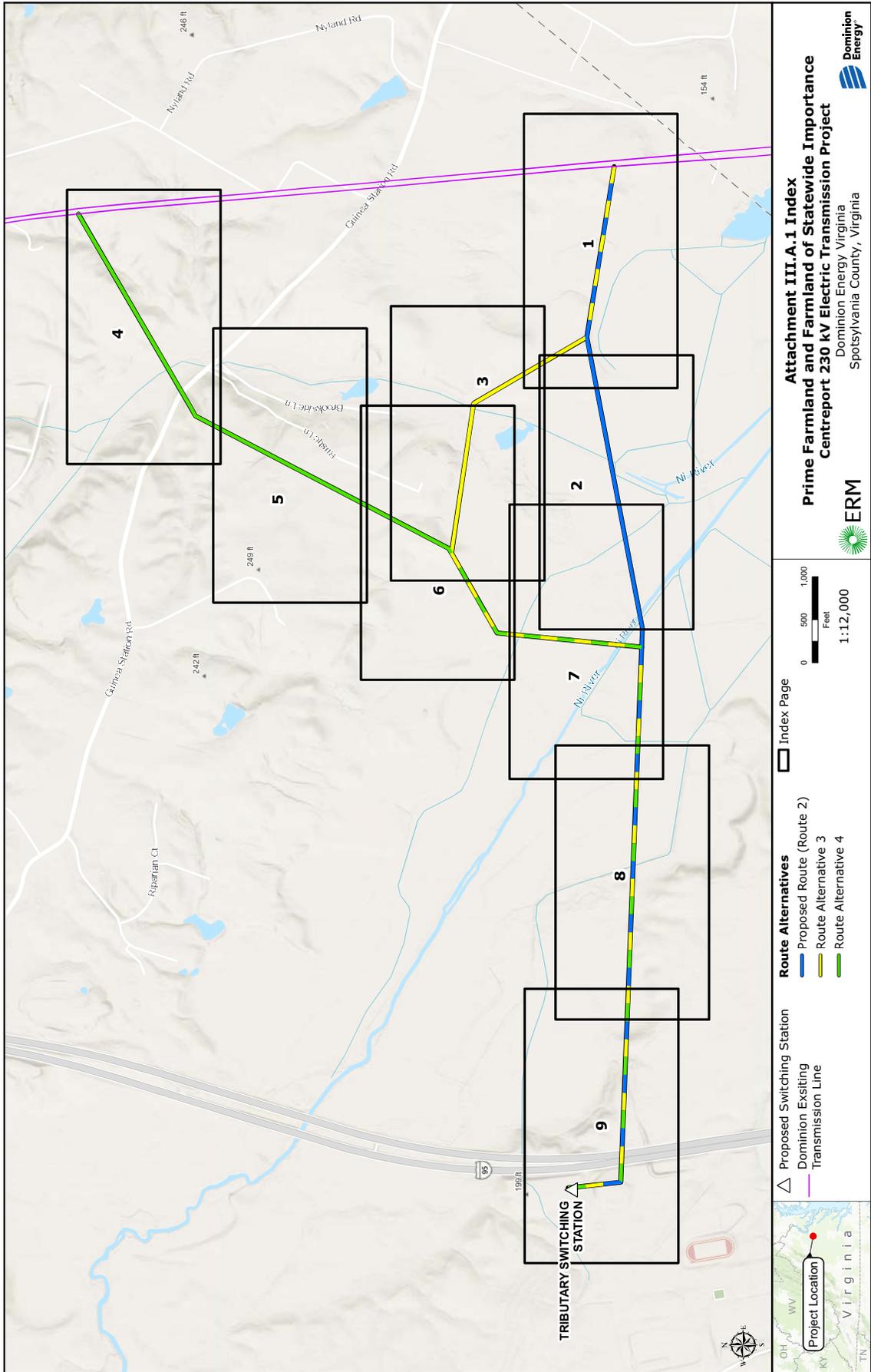
Alternative Route 4

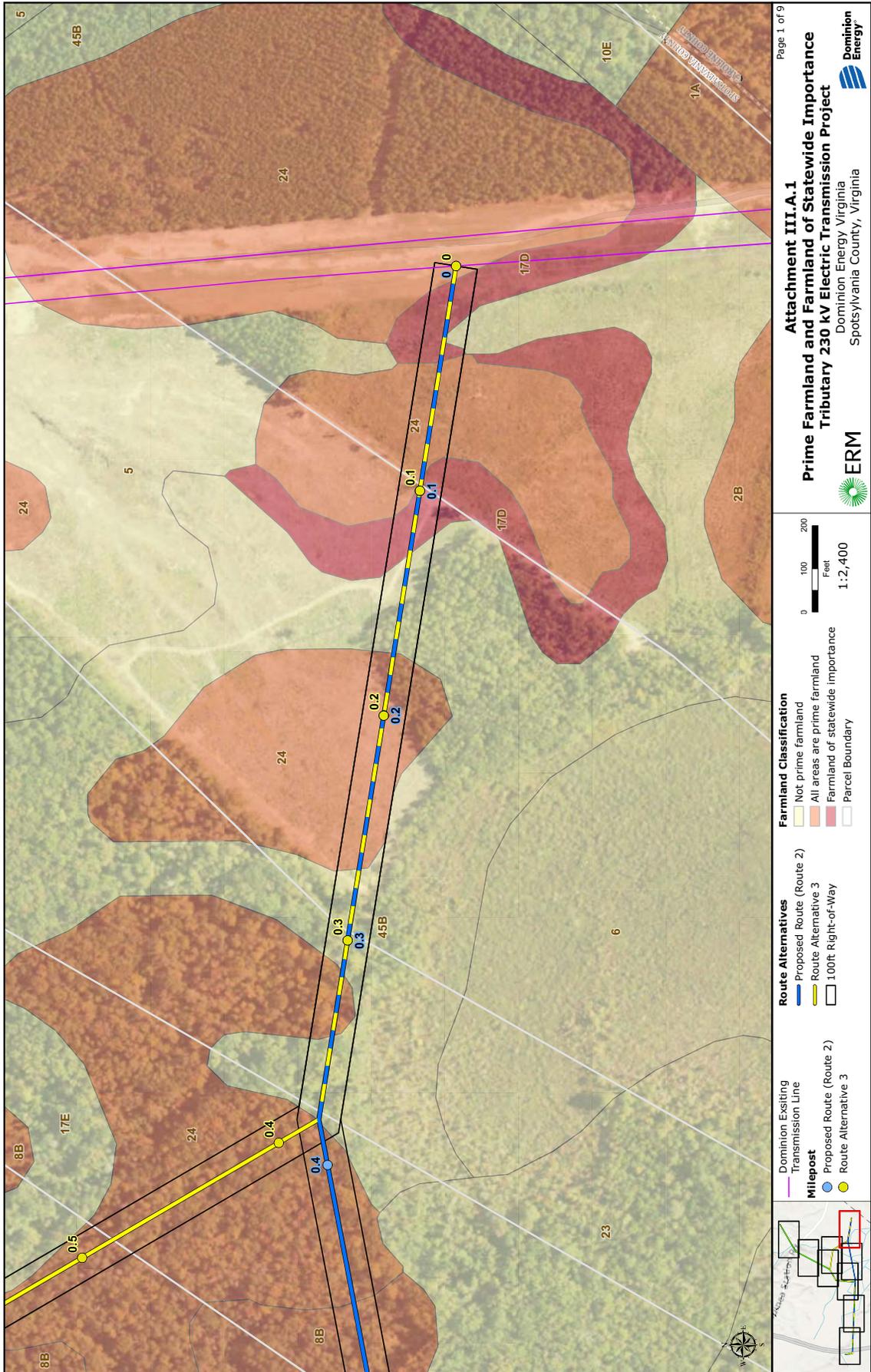
Alternative Route 4 is approximately 3.0 miles in length and is located entirely within Spotsylvania County, extending southwest from a cut-in at Structure #2090/82 along the Company's existing Line #2090 north of Guinea Station Road. Alternative Route 4 crosses through mostly forested and some agricultural land, routing southwest through undeveloped forested parcels. Alternative Route 4 crosses Beechwood Drive and Guinea Station Road, turning west/southwest at the western edge of the KOA Campground and south through undeveloped forested parcels and crossing the Ni River. At this point, the route turns west and shares an alignment with the Proposed Route for the remaining approximately 1.2 miles, passing through a section of land classified as agricultural before continuing through undeveloped forest up to Interstate 95. On the west side of Interstate 95, the route passes through undeveloped forest located on the SpotsyTech Campus parcel, which would be cleared and graded by the developer of the SpotsyTech Campus prior to the construction of the Project. The route terminates at the proposed Tributary Station on the SpotsyTech Campus development parcel.

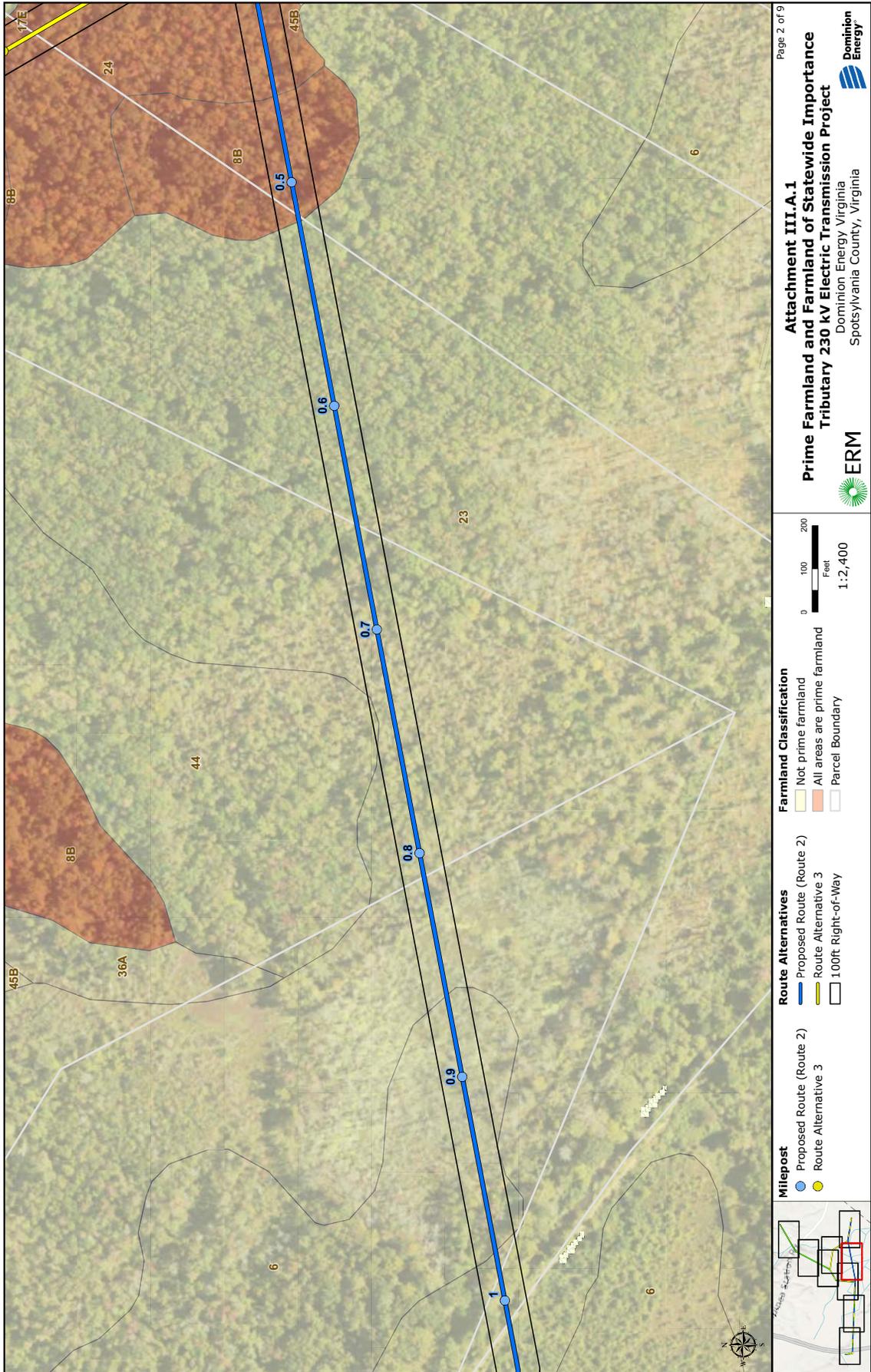
According to County parcel data, zoning data, and aerial photo analysis, there is one residential dwelling within 250 feet and two non-residential buildings located within 500 feet of the proposed centerline of Alternative Route 4. There are no buildings within the right-of-way of Alternative Route 4.

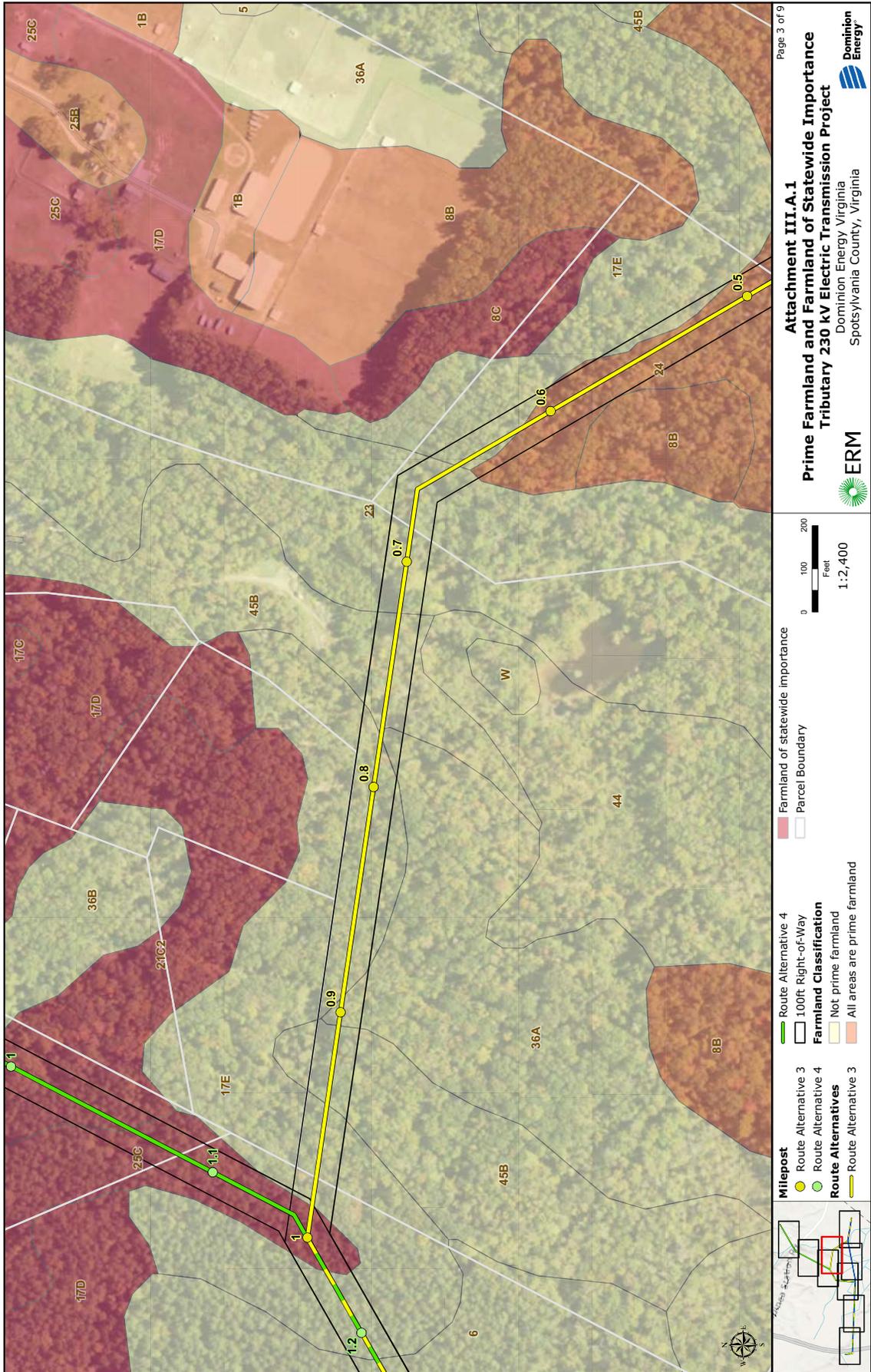
See Attachment III.A.1 for a map of farmland within the right-of-way that the Proposed Route would cross and Section 2.L of the DEQ Supplement for the estimated amount of farmland and forestland within the right-of-way of the Proposed Route.

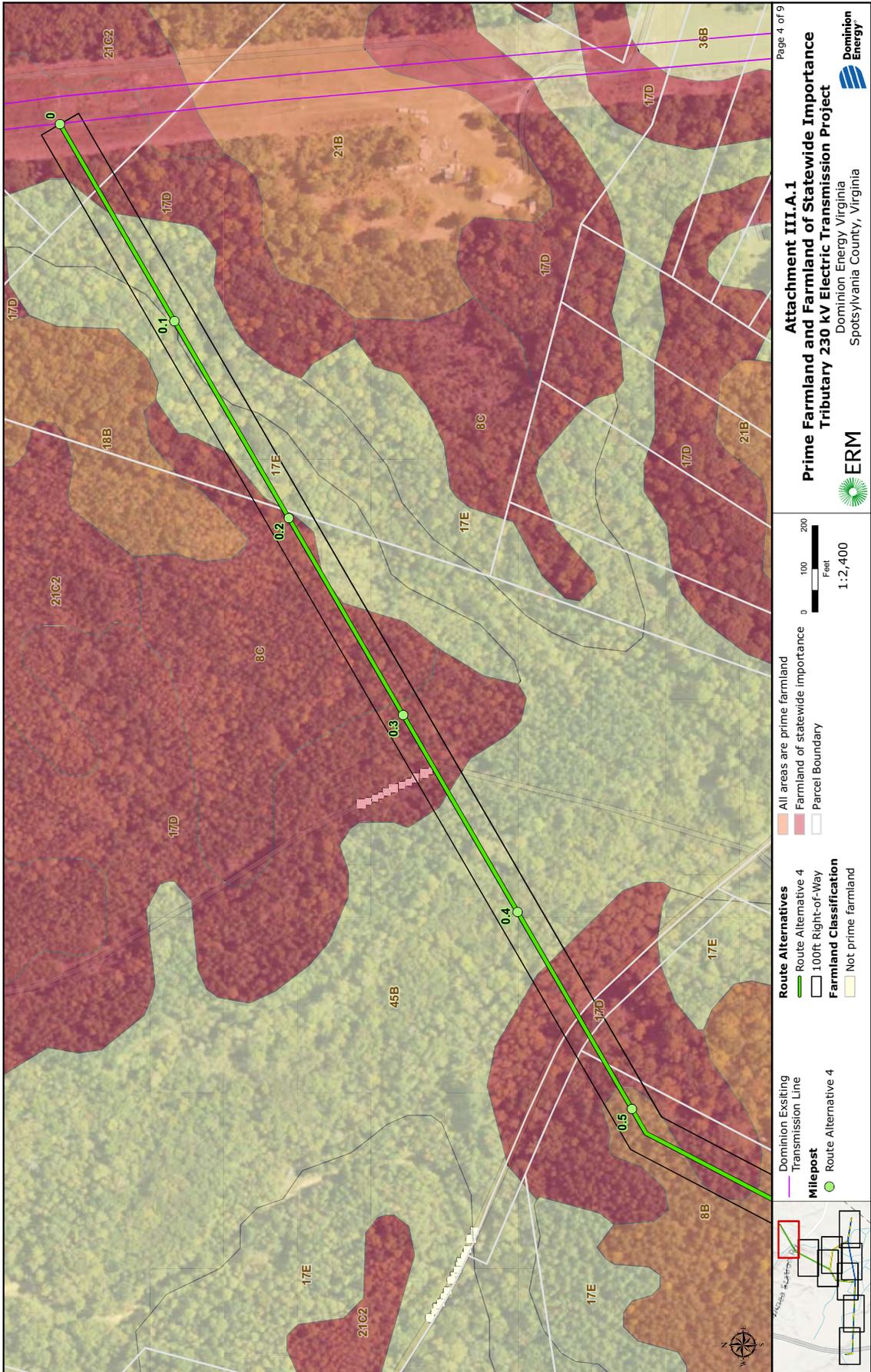
For additional description of the character of the area that will be traversed by the Proposed Route and related impacts, see the DEQ Supplement, specifically as to land use (Sections 2.G and 2.L), wetlands (Section 2.D), forests (Section 2.L), agricultural lands (Section 2.L), historic resources (Section 2.I), and wildlife (Sections 2.G and 2.K).











Page 4 of 9

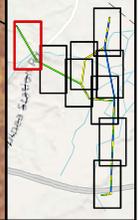
Attachment III.A.1
Prime Farmland and Farmland of Statewide Importance
Tributary 230 kV Electric Transmission Project
 Dominion Energy Virginia
 Spotsylvania County, Virginia

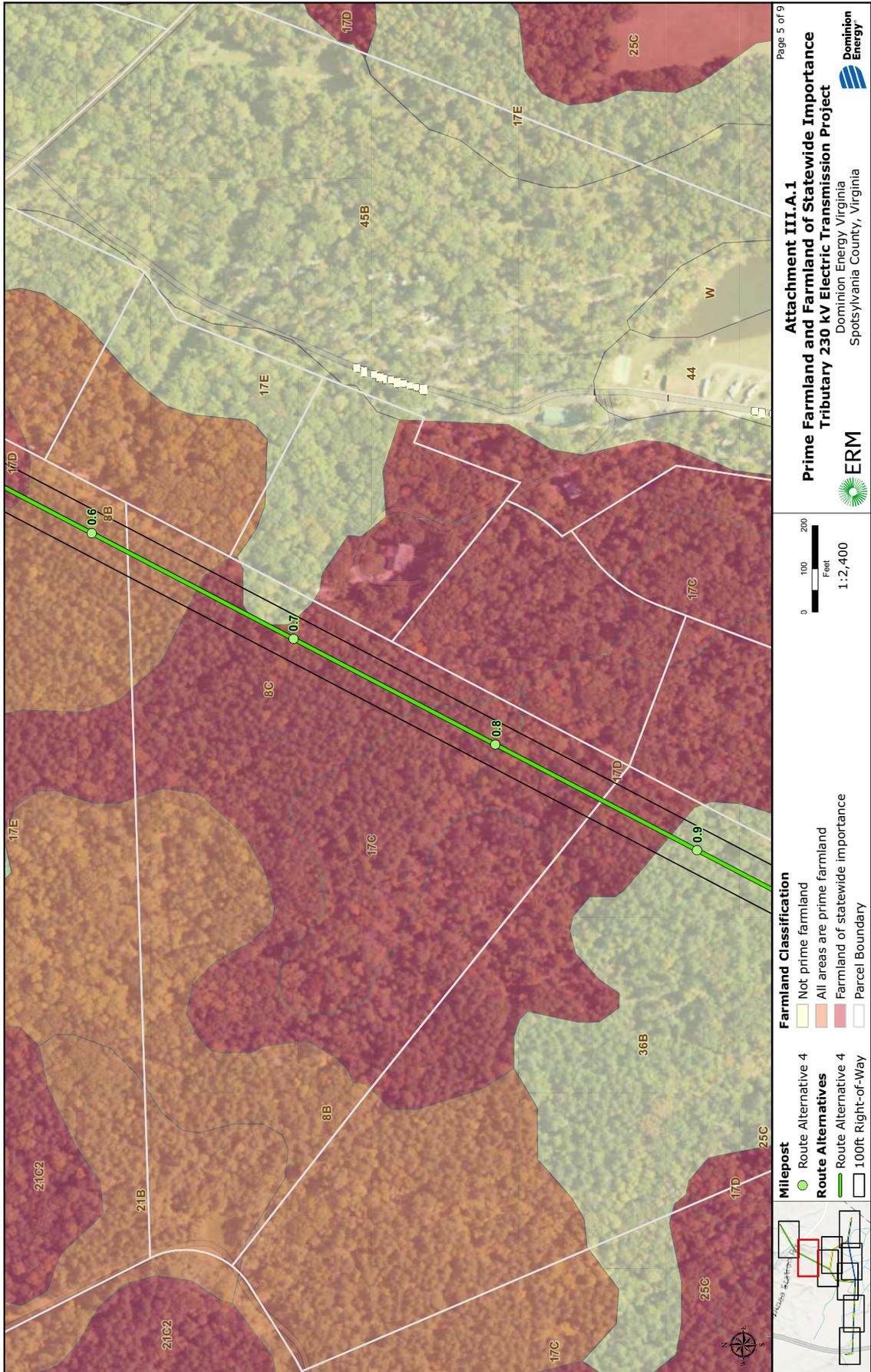
ERM
 Dominion Energy

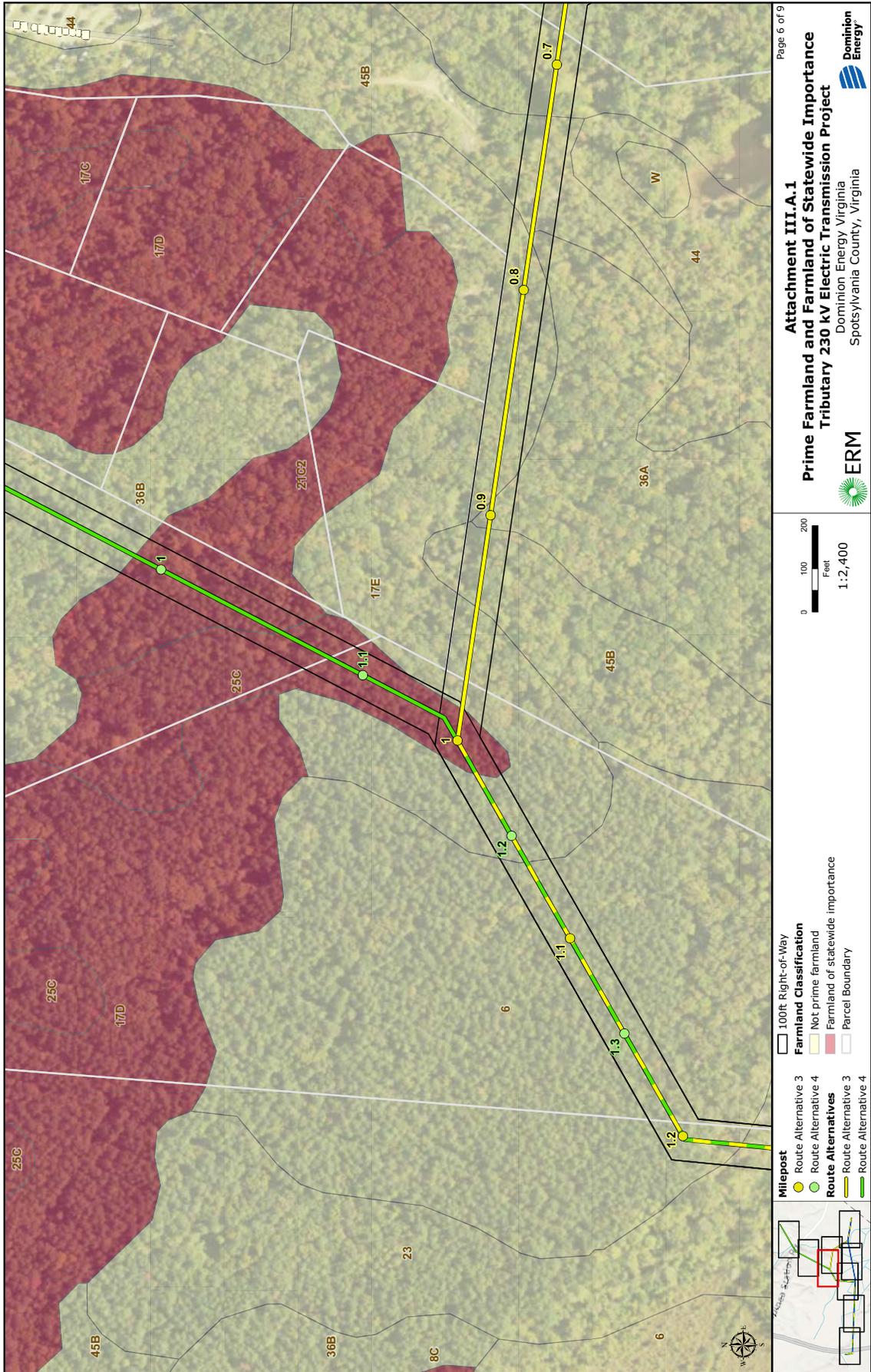
0 100 200
 Feet
 1:2,400

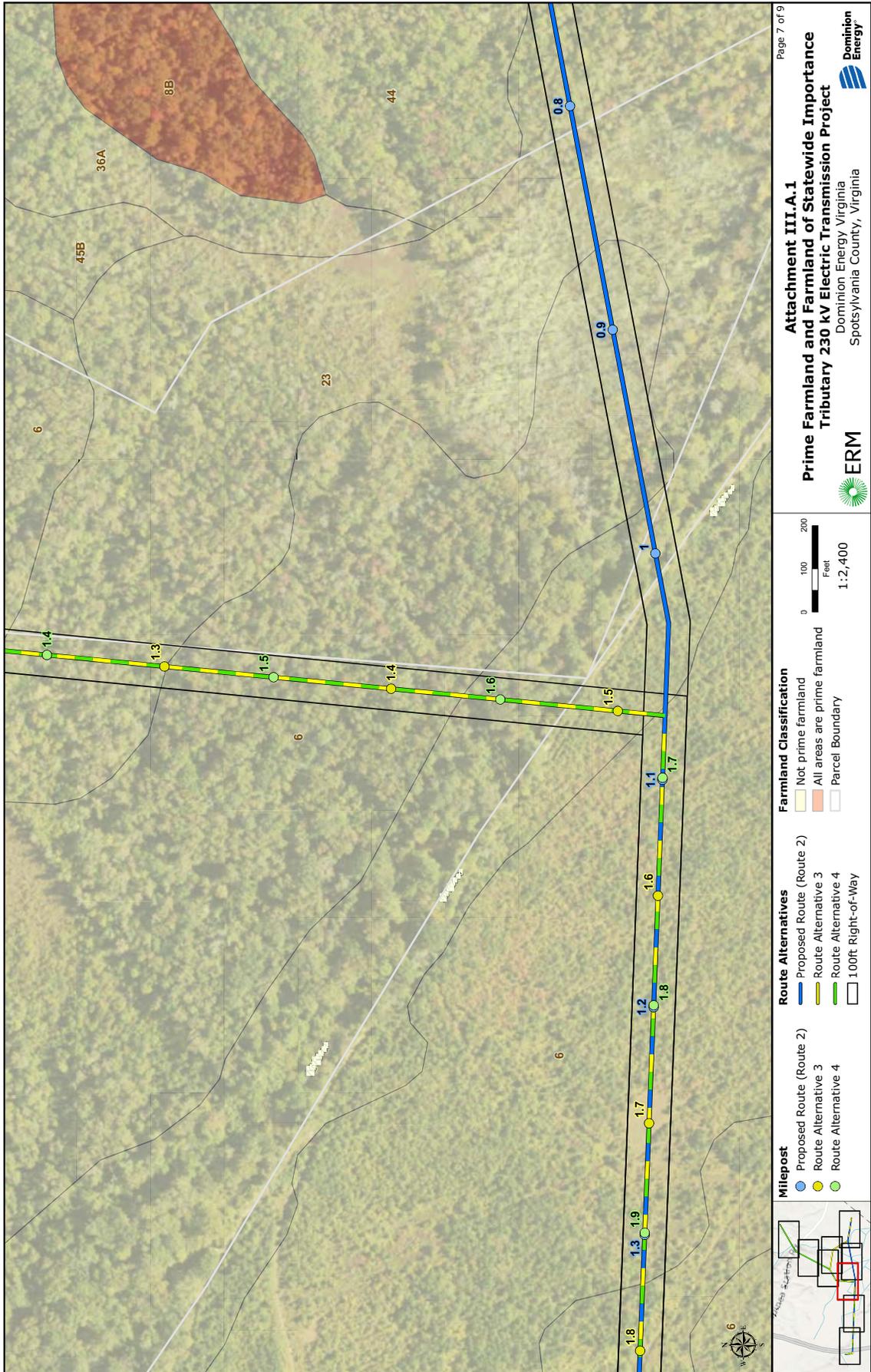
Route Alternatives
 Route Alternative 4
 100ft Right-of-Way
Farmland Classification
 Not prime farmland

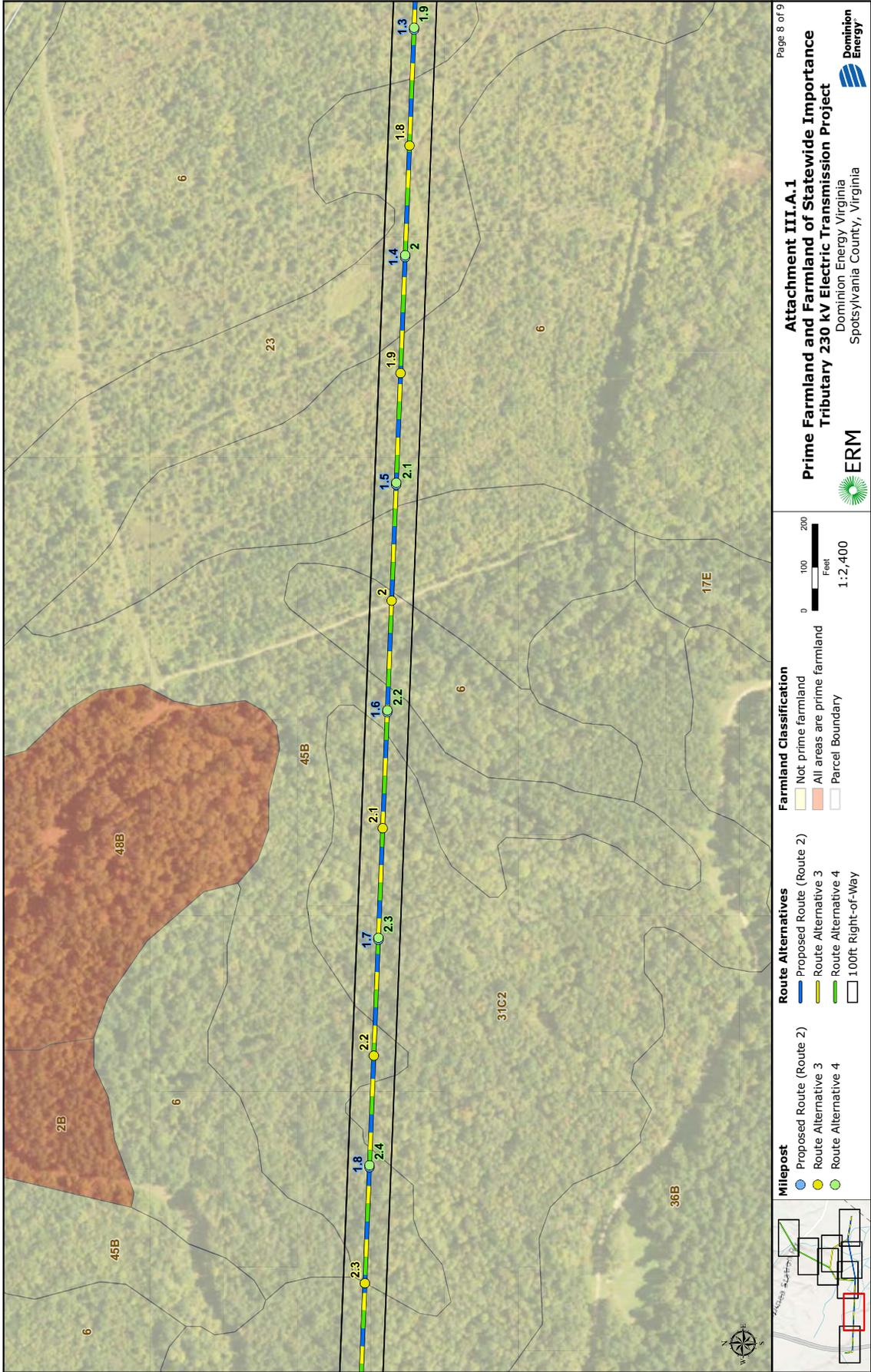
Dominion Existing Transmission Line
 Milepost
 Route Alternative 4











III. IMPACT OF LINE ON SCENIC, ENVIRONMENTAL AND HISTORIC FEATURES

B. Describe any public meetings the Applicant has had with neighborhood associations and/or officials of local, state or federal governments that would have an interest or responsibility with respect to the affected area or areas.

Response: In May 2024, the Company launched an internet website dedicated to the proposed Project: www.dominionenergy.com/tributary. The website includes a description and benefits of the proposed Project, an explanation of need, route map, photo simulations, and information on the Commission review process.

On May 14, 2024, the Company sent Project announcement letters to more than 400 property owners within the project study area. Each letter included information about the proposed Project, a study area map, fact sheet, and an invitation to the first community meeting. A copy of the letter is available on the project website. On September 20, 2024, the Company sent an updated letter describing the adjustments in the proposed Project routes. A copy of the letter is available on the Project website.

The Company mailed a postcard to the same list of property owners on May 20, 2024, to provide additional details about the June 13, 2024, community meeting. A copy of the postcard is available on the Project website.

On May 31, 2024, the Company mailed a letter announcing the preliminary routes under consideration. The letter explained how the public could view the routes on MapChat by ERM, an interactive mapping tool that was launched on the website. Users can search by address, zoom in, measure, and leave comments for the project team. A copy of the letter is available on the project website.

Newspaper print advertisements regarding the Project and virtual open house were placed in Free Lance Star on June 7. A copy of the advertisement placed in the Spotsylvania newspapers is included as Attachment III.B.1.

In addition, digital advertisements for the community meetings targeted residents in the Spotsylvania County area surrounding the Project. These paid digital and social media campaigns were also used to drive awareness of the Company's Project. A copy of those digital advertisements is included as Attachment III.B.2.

A community meeting was held on June 13, 2024, at Massaponax High School from 5:30-7:30 p.m. There were 18 attendees. At the open house, the Company made available details about construction, project timing, and the Commission approval process. Traditional open house materials have been posted on the website for the proposed Project, including simulations of the proposed Project from key locations. The key location simulations are included as Attachment III.B.3.

A second community meeting was held on July 30 from 5:00 p.m. to 7:00 p.m. at Massaponax High School, and there were 20 community members in attendance. The Company answered questions from the community in an open house-style meeting where community members could speak with Project team members individually. The project team shared changes that have been made to the routes based on feedback from the public, as well as simulations from various points along the route alternatives. Open house materials have been posted on the website for the proposed Project.

Environmental Justice

As set forth in Section 4.5 of the Environmental Routing Study, the Company researched the demographics of the surrounding communities using data from the U.S. Census Bureau's American Community Survey 5-Year Estimates (2018-2022). This screening identified six Census Block Groups ("CBGs") located within one mile of the Project infrastructure. A review of census data for several demographic characteristics identified populations within the Project study area that meet the Virginia Environmental Justice Act ("VEJA") thresholds for Environmental Justice Communities ("EJ Communities") (Va. Code §§ 2.2-234, 2.2-235).

Of the six CBGs within the Project study area, two CBGs are crossed by at least one route alternative. Both CBGs crossed appear to contain populations of color, including one CBG which meets the Limited English-Speaking threshold. One CBG crossed also meets low-income thresholds.

As set forth above in this Section III.B, the Company has engaged extensively all communities within the Project study area, including people in the EJ Community CBGs discussed herein. This engagement has translations of Project information into other languages. The Company believes that (i) its work has allowed for the fair treatment and meaningful involvement of all interested people, regardless of race, color, national origin, income, faith, or disability, and (ii) the Project's Proposed Route minimizes potential impacts to EJ Communities and other populations, and will not result in a significantly adverse and disproportionate impact on EJ Communities.

In addition to its evaluation of impacts, the Company has and will continue to engage the EJ Communities and others affected by the Project in a manner that allows them to meaningfully participate in the Project development and approval process so that the Company can take their views and input into consideration. See Attachment III.B.4 for a copy of the Company's Environmental Justice Policy.

**Dominion Energy
Electric Transmission**

Tributary 230 kV Electric
Transmission Project
Print Ads

What matters to you matters to us

We're working to meet Virginia's energy needs.
We'd like your input on an upcoming Tributary 230 kV
Electric Transmission Project in Spotsylvania County.

Join us for a Community Meeting

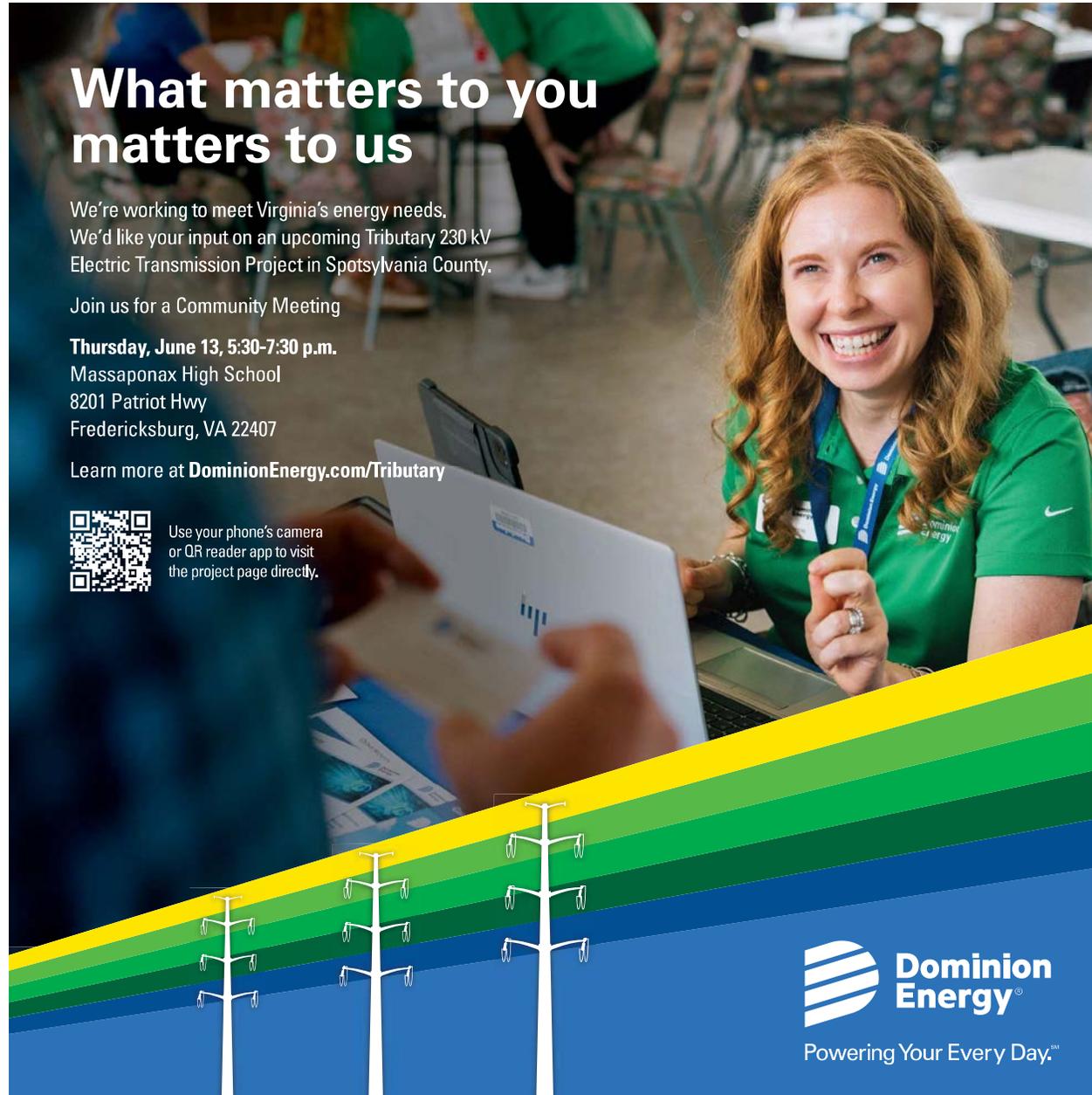
Thursday, June 13, 5:30-7:30 p.m.

Massaponax High School
8201 Patriot Hwy
Fredericksburg, VA 22407

Learn more at [DominionEnergy.com/Tributary](https://www.dominionenergy.com/Tributary)



Use your phone's camera
or QR reader app to visit
the project page directly.



**Dominion Energy
Electric Transmission**

Tributary 230 kV Electric
Transmission Project
Print Ads
Phase 2

We're working to meet Virginia's energy needs.

We'd like your input on an upcoming electric transmission project in Spotsylvania County.

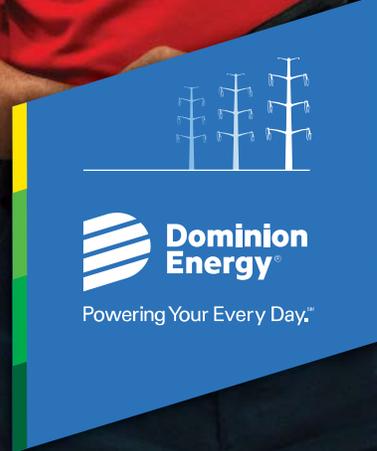
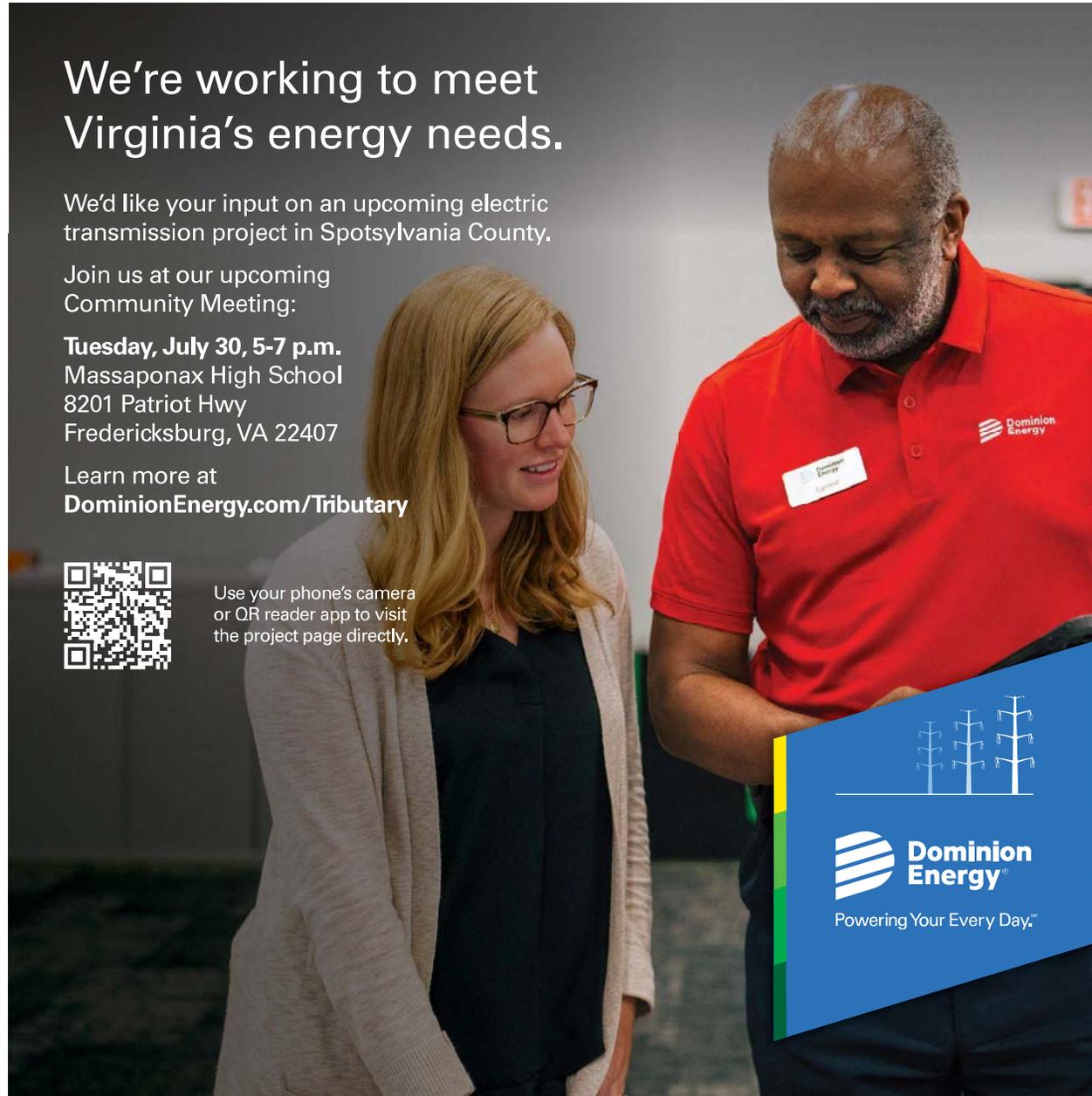
Join us at our upcoming
Community Meeting:

Tuesday, July 30, 5-7 p.m.
Massaponax High School
8201 Patriot Hwy
Fredericksburg, VA 22407

Learn more at
[DominionEnergy.com/Tributary](https://www.dominionenergy.com/Tributary)



Use your phone's camera
or QR reader app to visit
the project page directly.



DE Transmission Tributary

Report Date: May 24, 2024 – June 23, 2024

DET | Tributary | 5/24/24 – 6/23/24 | Overall Report

The Tributary campaign ran on Facebook, Google and Nextdoor through 6/23/24. These campaigns targeted customers over the age of 25 who resided in and around the project areas in Spotsylvania County, Virginia.

1,943,693 impressions of ads were delivered to target audiences.

21,119 clicks have taken audiences to the landing pages.

152,890 video views with an average 40.50% VCR.

1.09% CTR Most CTRs near or above benchmarks.

100,063 ad engagements such as reactions, likes, comments, shares and saves have been made on the ads.

Notable Creative

The DET Tributary Post-Event 300x600 Display ad had the highest CTR at 3.49%, which is 598% higher than the 0.50% Display benchmark.



Notable Insights

- Facebook ads had a CTR of 1.96% and 41,126 completed video views for a 43.92% VCR.
- Nextdoor ads performed well with a CTR of 0.44%, which is 193% above benchmark.
- Google Display ads performed well with a CTR of 1.13%, which is 126% above benchmark.
- Google Video ads had 20,789 completed video views for a 35.09% VCR, which is 134% above the 15% Google VCR benchmark.

DET | Tributary | 5/24/24 – 5/31/24 | Announcement Report

The Tributary campaign ran on Facebook, Google and Nextdoor through 5/31/24. These campaigns targeted customers over the age of 25 who resided in and around the project areas in Spotsylvania County, Virginia.

681,173 impressions

of ads were delivered to target audiences.

7,025 clicks

have taken audiences to the landing pages.

44,700 video views with an average 40.05% VCR.

1.03% CTR

Most CTRs near or above benchmarks.

29,676 ad engagements

such as reactions, likes, comments, shares and saves have been made on the ads.

Notable Creative

The DET Tributary Announcement

300x600 Display ad had the highest CTR at 2.87%, which is 474% higher than the 0.50% Display benchmark.

Notable Insights

- Facebook ads had a CTR of 1.81% and 12,998 completed video views for a 46.79% VCR.
- Nextdoor ads performed well with a CTR of 0.52%, which is 247% above benchmark.
- Google Display ads performed well with a CTR of 0.98%, which is 96% above benchmark.
- Google Video ads had 4,905 completed video views for a 28.99% VCR, which is 93% above the 15% Google VCR benchmark.



DET | Tributary | 6/1/24 – 6/13/24 | Pre-Event Report

The Tributary campaign ran on Facebook, Google and Nextdoor through 6/13/24. These campaigns targeted customers over the age of 25 who resided in and around the project areas in Spotsylvania County, Virginia.

635,310 impressions

of ads were delivered to target audiences.

7,012 clicks

have taken audiences to the landing pages.

63,147 video views with an average 43.90% VCR.

1.10% CTR

Most CTRs near or above benchmarks.

37,644 ad engagements

such as reactions, likes, comments, shares and saves have been made on the ads.

Notable Creative

The DET Tributary Pre-Event 300x600 Display ad had the highest CTR at 3.47%, which is 594% higher than the 0.50% Display benchmark.

Notable Insights

- Facebook ads had a CTR of 2.24% and 16,448 completed video views for a 46.85% VCR.
- Nextdoor ads performed well with a CTR of 0.42%, which is 180% above benchmark.
- Google Display ads performed well with a CTR of 1.45%, which is 190% above benchmark.
- Google Video ads had 11,275 completed video views for a 40.21% VCR, which is 168% above the 15% Google VCR benchmark.



DET | Tributary | 6/14/24 – 6/23/24 | Post-Event Report

The Tributary Post-Event campaign ran on Facebook, Google and Nextdoor through 6/23/24. These campaigns targeted customers over the age of 25 who resided in and around the project areas in Stafford County, Virginia.

627,210 impressions

of ads were delivered to target audiences.

7,082 clicks

have taken audiences to the landing pages.

45,043 video views with an average 36.16% VCR.

1.13% CTR

Most CTRs near or above benchmarks.

32,743 ad engagements

such as reactions, likes, comments, shares and saves have been made on the ads.

Notable Creative

The DET Tributary Post-Event 300x600 Display ad had the highest CTR at 3.49%, which is 598% higher than the 0.50% Display benchmark.



Notable Insights

- Facebook ads had a CTR of 1.83% and 11,680 completed video views for a 37.98% VCR.
- Nextdoor ads performed well with a CTR of 0.39%, which is 160% above benchmark.
- Google Display ads performed well with a CTR of 1.15%, which is 130% above benchmark.
- Google Video ads had 4,608 completed video views for a 32.26% VCR, which is 115% above the 15% Google VCR benchmark.

Summary:

- The Tributary Post-Event 300x600 Display ad was the highest-performing ad with a CTR of 3.49%.
- Females 65+ were the top engagers on Facebook. Females ages 25-34 were the top engagers on Google Video and Display.
- Nextdoor was the top-performing platform for the campaign and ended the campaign with a CTR 193% over the 0.15% Nextdoor benchmark.
- Video ads performed well in this campaign with 152,890 video views. There were 61,915 completed video views across the platforms for a total VCR of 40.50%.
- The energy industry information, electricity providers and renewable energy audience segments had the highest CTRs on Google.

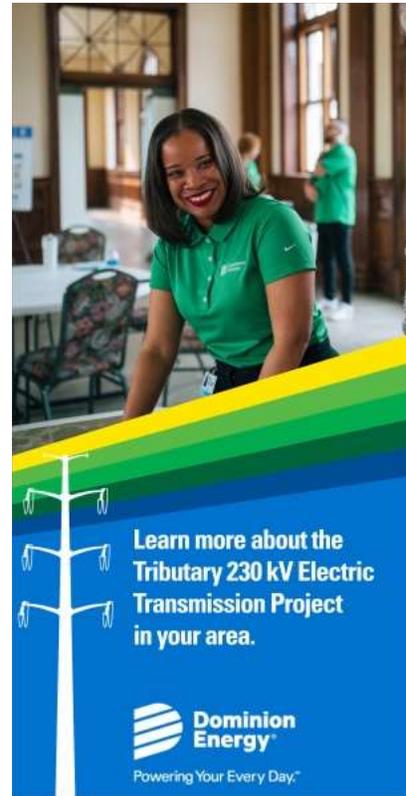
August 19, 2024

Platform Benchmarks:
Facebook CTR Benchmark: 0.90% | Twitter CTR Benchmark: 1.11% |
LinkedIn CTR Benchmark: 0.26%



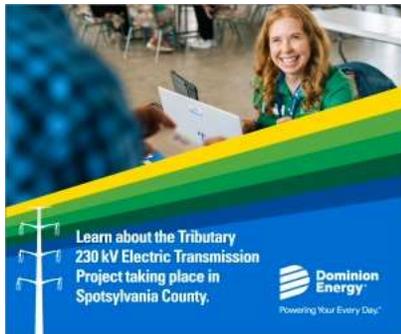
**Dominion Energy
Electric Transmission**

Tributary 230 kV Electric
Transmission Project
Announcement Display



Dominion Energy Electric Transmission

Tributary 230 kV Electric
Transmission Project
Pre-Event Display



Dominion Energy Electric Transmission

Tributary 230 kV Electric
Transmission Project
Post-Event Display

What matters to you matters to us.
Stay informed using our
interactive map tool.



What matters to you matters to us.
Stay informed using our
interactive map tool.



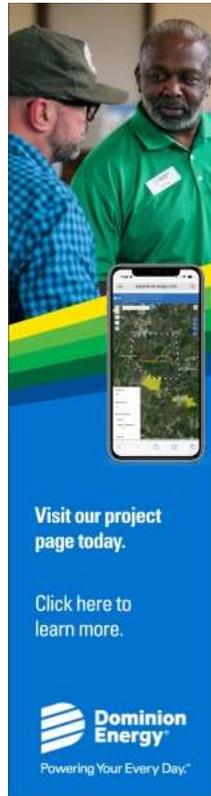
Visit our project page today.
Click here to learn more



Visit our project
page today.
Click here to learn more



Powering Your Every Day.™



Visit our project
page today.
Click here to
learn more.



Powering Your Every Day.™



What matters to you
matters to us.
Stay informed using our
interactive map tool.



Powering Your Every Day.™

**Dominion Energy
Electric Transmission**

Tributary 230 kV Electric
Transmission Project
Nextdoor Imagery

Announcement Image:



Pre-Event Image:

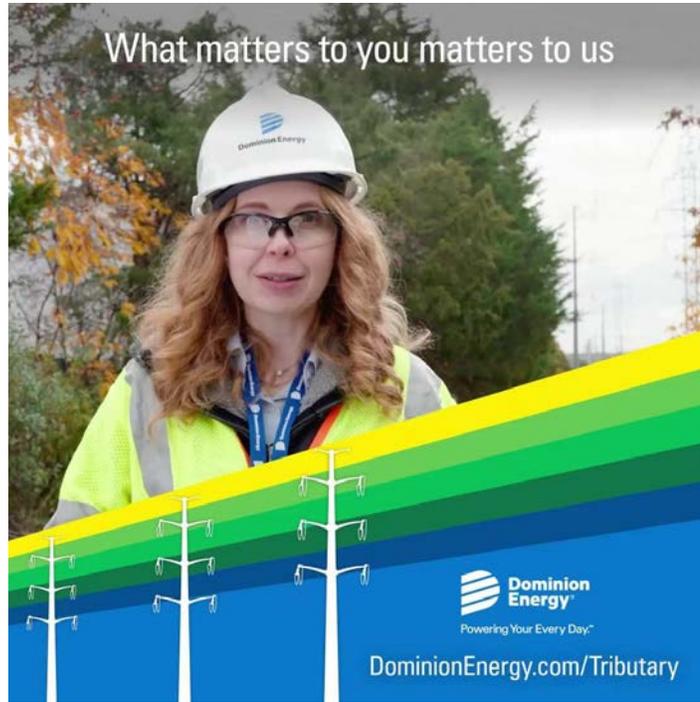


Post-Event Image:



**Dominion Energy
Electric Transmission**

Tributary 230 kV Electric
Transmission Project
Social Videos



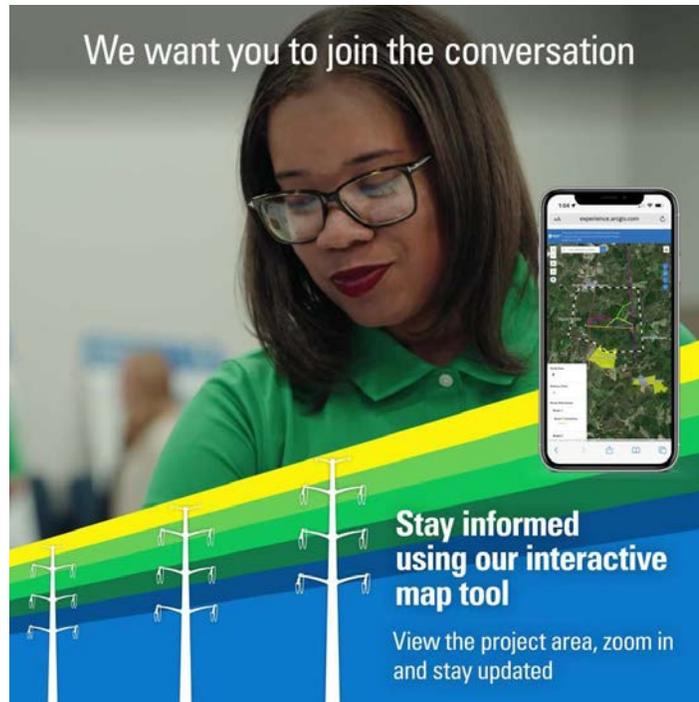
[Announcement Video \(Click to Play\)](#)



[Pre-event Video \(Click to Play\)](#)

**Dominion Energy
Electric Transmission**

Tributary 230 kV Electric
Transmission Project
Social Videos



[Post-Event Video \(Click to Play\)](#)

DE Transmission Tributary

Report Date: July 8, 2024 – August 6, 2024



Dominion
Energy



| charles ryan associates

DET | Tributary | 7/8/24 – 8/6/24 | Overall Report

The Tributary campaign ran on Facebook, Google and Nextdoor through 8/6/24. These campaigns targeted customers over the age of 25 who resided in and around the project areas in Spotsylvania County, VA.

1,727,809 impressions of ads were delivered to target audiences.

17,184 clicks

have taken audiences to the landing pages.

195,613 video views with an average 41.30% VCR.

0.99% CTR

Most CTRs near or above benchmarks.

101,709 ad engagements

such as reactions, likes, comments, shares and saves have been made on the ads.

Notable Creative

The DET Tributary 300x600 Display Pre-Event ad had the highest CTR at 10.17%, which is 1,934% higher than the 0.50% Display benchmark.



Notable Insights

- Facebook ads had a CTR of 1.70% and 42,272 completed video views for a 44.27% VCR.
- Nextdoor ads performed well with a CTR of 0.37%, which is 147% above benchmark.
- Google Display ads performed well with a CTR of 1.28%, which is 156% above benchmark.
- Google Video ads had 38,511 completed video views for a 38.46% VCR, which is 156% above the 15% Google VCR benchmark.

DET | Tributary | 7/8/24 – 7/16/24 | Announcement Report

The Tributary Announcement campaign ran on Facebook, Google and Nextdoor through 7/16/24. These campaigns targeted customers over the age of 25 who resided in and around the project areas in Spotsylvania County, VA.

516,342 impressions

of ads were delivered to target audiences.

5,584 clicks

have taken audiences to the landing pages.

74,674 video views with an average 44.98% VCR.

1.08% CTR

Most CTRs near or above benchmarks.

32,777 ad engagements

such as reactions, likes, comments, shares and saves have been made on the ads.

Notable Creative

The DET Tributary 300x600 Display Announcement ad had the highest CTR at 9.47%, which is 952% higher than the 0.50% Display benchmark.



Notable Insights

- Facebook ads had a CTR of 1.70% and 13,687 completed video views for a 44.45% VCR.
- Nextdoor ads performed well with a CTR of 0.37%, which is 147% above benchmark.
- Google Display ads performed well with a CTR of 1.35%, which is 170% above benchmark.
- Google Video ads had 19,902 completed video views for a 45.35% VCR, which is 202% above the 15% Google VCR benchmark.

DET | Tributary | 7/17/24 – 7/30/24 | Pre-Event Report

The Tributary Pre-Event campaign ran on Facebook, Google and Nextdoor through 7/30/24. These campaigns targeted customers over the age of 25 who resided in and around the project areas in Spotsylvania County, VA.

511,404 impressions

of ads were delivered to target audiences.

5,552 clicks

have taken audiences to the landing pages.

61,735 video views with an average 38.93% VCR.

1.09% CTR

Most CTRs near or above benchmarks.

37,266 ad engagements

such as reactions, likes, comments, shares and saves have been made on the ads.

Notable Creative

The DET Tributary 300x600 Display Pre-Event ad had the highest CTR at 10.17%, which is 1,934% higher than the 0.50% Display benchmark.

Notable Insights

- Facebook ads had a CTR of 1.90% and 15,852 completed video views for a 45.35% VCR.
- Nextdoor ads performed well with a CTR of 0.40%, which is 167% above benchmark.
- Google Display ads performed well with a CTR of 2.27%, which is 354% above benchmark.
- Google Video ads had 8,179 completed video views for a 30.54% VCR, which is 104% above the 15% Google VCR benchmark.



DET | Tributary | 7/31/24 – 8/6/24 | Post-Event Report

The Tributary Post-Event campaign ran on Facebook, Google and Nextdoor through 8/6/24. These campaigns targeted customers over the age of 25 who resided in and around the project areas in Spotsylvania County, VA.

700,063 impressions

of ads were delivered to target audiences.

6,048 clicks

have taken audiences to the landing pages.

59,204 video views with an average 39.12% VCR.

0.86% CTR

Most CTRs near or above benchmarks.

31,666 ad engagements

such as reactions, likes, comments, shares and saves have been made on the ads.

Notable Creative

The DET Tributary Post-Event 300x600 Display ad had the highest CTR at 5.47%, which is 994% higher than the 0.50% Display benchmark.



Notable Insights

- Facebook ads had a CTR of 1.52% and 12,733 completed video views for a 42.80% VCR.
- Nextdoor ads performed well with a CTR of 0.32%, which is 113% above benchmark.
- Google Display ads performed well with a CTR of 0.92%, which is 84% above benchmark.
- Google Video ads had 10,430 completed video views for a 35.41% VCR, which is 136% above the 15% Google VCR benchmark.

Summary:

- The Tributary Pre-Event 300x600 Display ad was the highest-performing ad with a CTR of 10.17%.
- Females 65+ were the top engagers within the Facebook campaigns, while males 25-34 were the top engagers within the Google campaigns.
- Facebook was the top-performing platform for the campaign and ended the campaign with a CTR 89% over the 0.90% Facebook benchmark.
- Video ads performed well in this campaign with 195,613 video views. There were 80,783 completed video views across the platforms for a total VCR of 41.30%.
- The electricity provider, energy industry information and home & garden audience segments had the highest CTRs on Google.

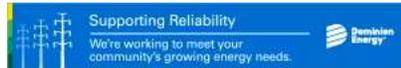
August 19, 2024

Platform Benchmarks:
Facebook CTR Benchmark: 0.90% | Twitter CTR Benchmark: 1.11% |
LinkedIn CTR Benchmark: 0.26%



**Dominion Energy
Electric Transmission**

Tributary 230 kV Electric
Transmission Project
Announcement Display
Phase 2



Dominion Energy Electric Transmission

Tributary 230 kV Electric
Transmission Project
Pre-Event Display
Phase 2



**Dominion Energy
Electric Transmission**

Tributary 230 kV Electric
Transmission Project
Nextdoor Imagery
Phase 2

Announcement Image:

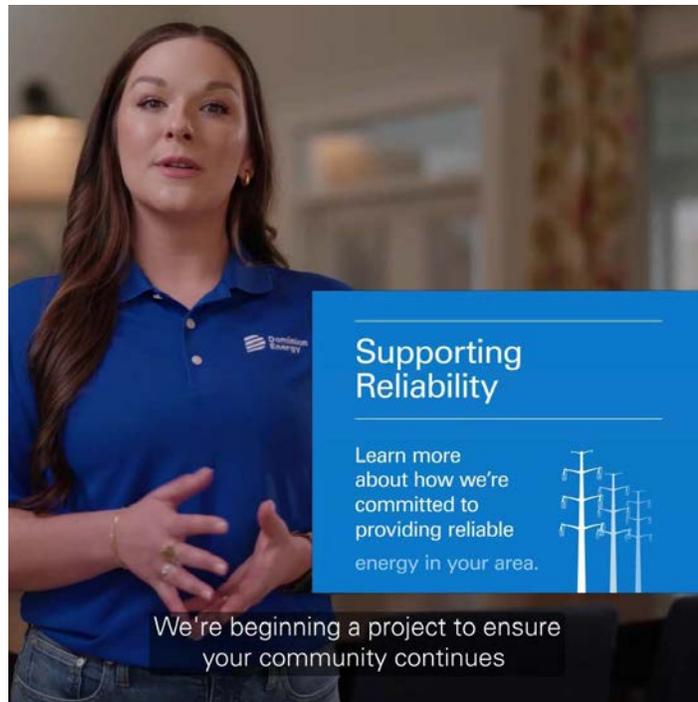


Pre-Event Image:

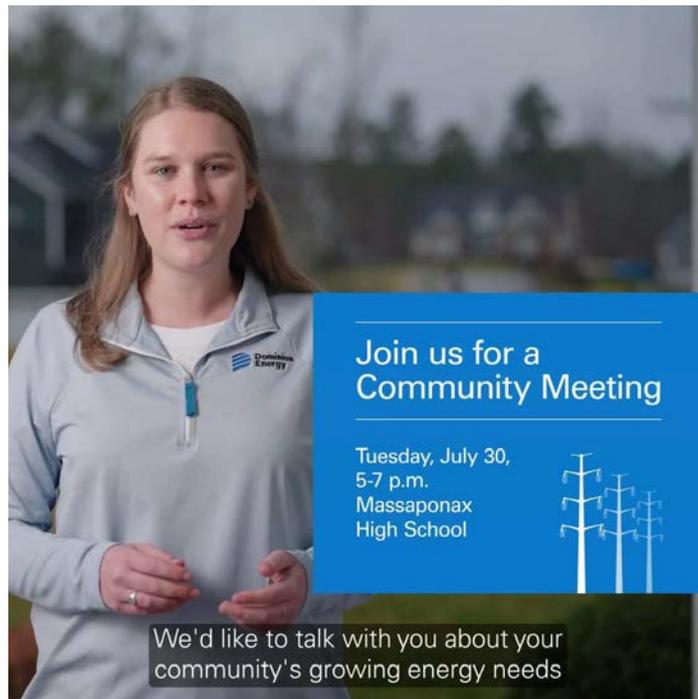


**Dominion Energy
Electric Transmission**

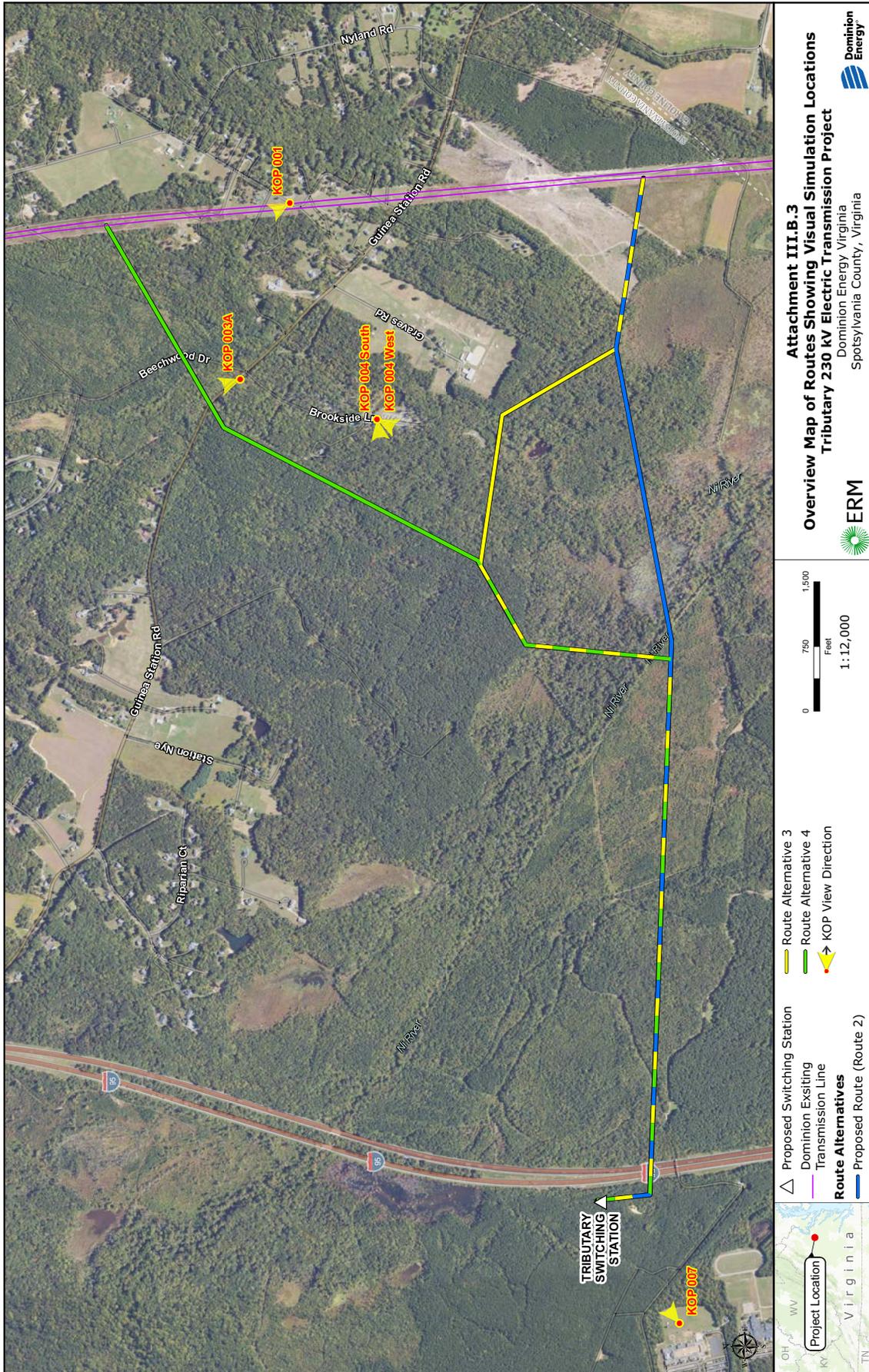
Tributary 230 kV Electric
Transmission Project
Social Videos
Phase 2



[Announcement Video \(Click to Play\)](#)



[Pre-event Video \(Click to Play\)](#)





Environmental Justice: Ongoing Commitment to Our Communities

At Dominion Energy, we are committed to providing reliable, affordable, clean energy in accordance with our values of safety, ethics, excellence, embrace change and team work. This includes listening to and learning all we can from the communities we are privileged to serve.

Our values also recognize that environmental justice considerations must be part of our everyday decisions, community outreach and evaluations as we move forward with projects to modernize the generation and delivery of energy.

To that end, communities should have a meaningful voice in our planning and development process, regardless of race, color, national origin, or income. Our neighbors should have early and continuing opportunities to work with us. We pledge to undertake collaborative efforts to work to resolve issues. We will advance purposeful inclusion to ensure a diversity of views in our public engagement processes.

Dominion Energy will be guided in meeting environmental justice expectations of fair treatment and sincere involvement by being inclusive, understanding, dedicated to finding solutions, and effectively communicating with our customers and our neighbors. We pledge to be a positive catalyst in our communities.

III. IMPACT OF LINE ON SCENIC, ENVIRONMENTAL AND HISTORIC FEATURES

- C. Detail the nature, location, and ownership of each building that would have to be demolished or relocated if the project is built as proposed.**

Response: No buildings would have to be demolished or relocated to construct the proposed Project along the Proposed Route or Alternative Routes.

III. IMPACT OF LINE ON SCENIC, ENVIRONMENTAL AND HISTORIC FEATURES

- D. Identify existing physical facilities that the line will parallel, if any, such as existing transmission lines, railroad tracks, highways, pipelines, etc. Describe the current use and physical appearance and characteristics of the existing ROW that would be paralleled, as well as the length of time the transmission ROW has been in use.**

Response: There are no opportunities for collocation with existing transmission infrastructure and limited opportunities to route adjacent to existing roads. The Proposed and Alternative Routes have no collocation with existing infrastructure.

III. IMPACT OF LINE ON SCENIC, ENVIRONMENTAL AND HISTORIC FEATURES

E. Indicate whether the Applicant has investigated land use plans in the areas of the proposed route and indicate how the building of the proposed line would affect any proposed land use.

Response: Section 15.2-2223 of the Code of Virginia details the requirement for every territory in the Commonwealth to develop and implement a comprehensive plan. It is upon the local planning commissions to adopt a comprehensive plan for its jurisdiction that provides guidance for physical development that considers existing and future land uses, anticipates development trends, and makes recommendations for guiding long-term planning-based decisions. A review of the comprehensive plan is required, at a minimum of every five years, to ensure continuity with current community goals and rate of development.

Zoning is used to implement objectives of the comprehensive plan through the creation of land use categories that group similar uses and establish development standards to guide orderly and efficient land use practices. Zoning ordinances may undergo modification by the local land manager and governing bodies or through requests from residents or businesses to change zoning designations or approved new uses.

Spotsylvania County has adopted a comprehensive plan and zoning ordinances for lands within its jurisdiction. The Spotsylvania County Comprehensive Plan was originally adopted in December 2021 and updated in July 2022 and July 2023. Caroline County has adopted a comprehensive plan and zoning ordinances for lands within its jurisdiction. The *Caroline County 2030 Comprehensive Plan* was originally adopted in January 2010 and amended through June 2023. These documents were reviewed to evaluate impacts of the Proposed and Alternative Routes on long-range land use planning.

The Spotsylvania County Comprehensive Plan discusses land use chapter discusses development goals for the county, which are framed around target industries and economic development zones, as well as the continued value of agricultural and forestal resources as industry and scenic amenities. The county's Primary Development Boundary ("PBD") defines the area in which public utilities are provided and is intended to develop with higher residential density and more intensive non-residential uses. This is intended to produce efficient development growth while maintaining the rural character and agricultural and forestal viability outside the boundary. The county has also established a Technology Zone Program which encourage business attraction, growth, and employment opportunities through tax incentives. The plan states that data centers are recognized for their potential fiscal benefits while having low transportation impacts.

In Spotsylvania County Comprehensive Plan notes the preference of data centers to be sited proximate to existing infrastructure to minimize extension of new

electric lines. The plan also encourages the maintenance of the County's rural agricultural and forestal character through preservation of existing forested areas and use of vegetative buffers to prevent visual impacts from developments.

All the route alternatives are located in a portion of the Technology Zone and PDB around North Roxbury Mill Road and I-95, crossing through adjacent land use zoned as Rural, Open Space from the existing Line #2090 to serve the Customer data center. The selection of the Proposed Route aligns with the County goals by minimizing crossing of public roads and being the shortest of the route alternatives.

The Project team met with the Spotsylvania County Planning and Zoning staff in March 2024. At that time, the Planning and Zoning staff did not identify any conflicting land uses; however, they provided information on multiple planned developments within the study area which have been avoided through the routing process. They expressed a preference to avoid residential areas and consider use of the undevelopable land south of the Ni River.

An approximately 1.0-square mile area of Caroline County is located within the southeast corner of the Study Area. This area is primarily National Wetland Inventory-mapped wetland associated with the convergence of the Ni and Po Rivers. The Caroline County Comprehensive Plan 2030 Future Land Use Map has this area mapped as Agricultural Preservation and Flood Plain. No planned developments were identified within this portion of the study area, and none of the Project infrastructure is located within the Caroline County portion of the study area.

Publicly available information, including the Spotsylvania County Transportation & Thoroughfare Plan and the VDOT Northern Virginia District project website, was reviewed to determine the impact of the Proposed Route on future road projects. The construction of the Proposed or Alternative Route 3 or 4 is not anticipated to impact any proposed projects.

According to the VDOT Six-Year Improvement Project Approved Projects map, VDOT is in the process of installing field devices for a variable speed limit system on Interstate 95 within the Project study area. The Spotsylvania County Thoroughfare Plan identifies Interstate 95 as a corridor of Statewide Significance, but there are no transportation plans that would be affected by the construction of the Project infrastructure.

III. IMPACT OF LINE ON SCENIC, ENVIRONMENTAL AND HISTORIC FEATURES

F. Government Bodies

- 1. Indicate if the Applicant determined from the governing bodies of each county, city and town in which the proposed facilities will be located whether those bodies have designated the important farmlands within their jurisdictions, as required by § 3.2-205 B of the Code.**
- 2. If so, and if any portion of the proposed facilities will be located on any such important farmland:**
 - a. Include maps and other evidence showing the nature and extent of the impact on such farmlands;**
 - b. Describe what alternatives exist to locating the proposed facilities on the affected farmlands, and why those alternatives are not suitable; and**
 - c. Describe the Applicant's proposals to minimize the impact of the facilities on the affected farmland.**

- Response:
1. Coordination with Spotsylvania County has concluded that no land is designated as important farmlands within the study area.
 2. Not applicable.

III. IMPACT OF LINE ON SCENIC, ENVIRONMENTAL AND HISTORIC FEATURES

G. Identify the following that lie within or adjacent to the proposed ROW:

- 1. Any district, site, building, structure, or other object included in the National Register of Historic Places maintained by the U.S. Secretary of the Interior;**
- 2. Any historic architectural, archeological, and cultural resources, such as historic landmarks, battlefields, sites, buildings, structures, districts or objects listed or determined eligible by the Virginia Department of Historic Resources ("DHR");**
- 3. Any historic district designated by the governing body of any city or county;**
- 4. Any state archaeological site or zone designated by the Director of the DHR, or its predecessor, and any site designated by a local archaeological commission, or similar body;**
- 5. Any underwater historic assets designated by the DHR, or predecessor agency or board;**
- 6. Any National Natural Landmark designated by the U.S. Secretary of the Interior;**
- 7. Any area or feature included in the Virginia Registry of Natural Areas maintained by the Virginia Department of Conservation and Recreation ("DCR");**
- 8. Any area accepted by the Director of the DCR for the Virginia Natural Area Preserves System;**
- 9. Any conservation easement or open space easement qualifying under §§ 10.1-1009 – 1016, or §§ 10.1-1700 – 1705, of the Code (or a comparable prior or subsequent provision of the Code);**
- 10. Any state scenic river;**
- 11. Any lands owned by a municipality or school district; and**
- 12. Any federal, state or local battlefield, park, forest, game or wildlife preserve, recreational area, or similar facility. Features, sites, and the like listed in 1 through 11 above need not be identified again.**

- Response:
1. None.
 2. None.
 3. None
 4. None
 5. None
 6. None
 7. None
 8. None
 9. None
 10. None

11. All proposed routes terminate on the west end of the Project near two Spotsylvania County public schools, Riverview Elementary School and Thornburg Middle School. These school parcels are located adjacent to the planned SpotsyTech Campus but are greater than 0.1 mile from the Proposed and Alternative Routes. Spotsylvania County School Board also has a Joint Fleet Management facility and an undeveloped parcel located adjacent to the south of Thornburg Middle School approximately 0.4 mile south of the Proposed and Alternative Routes where they are entering the Tributary Station.

12. The privately-owned KOA Campground is crossed by the Proposed and Alternative Routes. The crossings were routed on the southern half of the KOA Campground where the parcel is undeveloped and mapped by the NWI as wetland. U.S. Bike Route 1 makes use of Guinea Station Road through a portion of the study area and is crossed by Alternative Route 4.

III. IMPACT OF LINE ON SCENIC, ENVIRONMENTAL AND HISTORIC FEATURES

H. List any registered aeronautical facilities (airports, helipads) where the proposed route would place a structure or conductor within the federally-defined airspace of the facilities. Advise of contacts, and results of contacts, made with appropriate officials regarding the effect on the facilities' operations.

Response: The Federal Aviation Administration (“FAA”) is responsible for overseeing air transportation in the United States. The FAA 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 the FAA in conducting an obstruction evaluation is to ensure the safety of air navigation and the efficient utilization of navigable airspace by aircraft.

The Company has reviewed the FAA’s website¹⁹ to identify airports within 10 miles of the proposed Project. Based on this review, the following FAA-restricted airports are located within 10 miles of the Project:

Airport/Heliport Name	Approximate Distance and Direction from Nearest Project Facility (nautical miles)	Use
Robbie Campbell Memorial Airfield Airport	1.2 nm southwest of the Proposed Route, Alternative Route 3, Alternative Route 4, and the Tributary Switching Station	Private
Spotsylvania Regional Medical Center Heliport	2.9 nm north of Alternative Route 4	Private
Woodford Airpark Airport	4.4 nm south of the Proposed Route, Alternative Route 3, and Alternative Route 4	Private
Shannon Airport	5.5 nm north of Alternative Route 4’s cut-in to nearest existing runway Primary Surface	Public
Mary Washington Hospital Heliport	8.3 nm north of Alternative Route 4’s cut-in	Private

¹⁹ See <https://oaaaa.faa.gov/oaaaa/external/portal.jsp>.

Airport/Heliport Name	Approximate Distance and Direction from Nearest Project Facility (nautical miles)	Use
Mary Walker LZ Airport	8.6 nm southeast of the Proposed Route, and Alternative Route 3's cut-in	Private

Based on the current design plans, transmission line structures with typical heights ranging from 100 to 140 feet tall are anticipated to be used on the Proposed Route and Alternative Routes 3 and 4. It is anticipated that cranes will be used to install the structures. The nearest public use airport to the Project is the Shannon Airport, which is approximately 5.5 nautical miles north of the Project. Based on the ground elevations at the Project and airport, and the overall distance from the airport, the Project will not impact the airport's federally defined airspace.

The Project will have transmission line structures located below some of these surfaces, but the structures will not penetrate any of the surfaces. Portions of the Project would be within the transitional, approach, and horizontal surfaces for the airport, which will restrict the maximum tower heights, as the Project routes are located in areas with higher ground elevations than the 313 above mean sea level ("AMSL") of the airport.

Since the FAA manages air traffic in the United States, it will evaluate any physical objects that may affect the safety of aeronautical operations through an obstruction evaluation. If required during the permitting process, the Company will submit an FAA Form 7460-1 Notice pursuant to 14 CFR Part 77, for any tower locations that meet the review criteria. See also Section 2.O of the DEQ Supplement.

III. IMPACT OF LINE ON SCENIC, ENVIRONMENTAL AND HISTORIC FEATURES

- I. Advise of any scenic byways that are in close proximity to or that will be crossed by the proposed transmission line and describe what steps will be taken to mitigate any visual impacts on such byways. Describe typical mitigation techniques for other highways' crossings.**

Response: No scenic byways are in the Project study area. Perpendicular road crossings, which are preferred by VDOT and Spotsylvania County, will be utilized at other road crossings where possible to mitigate impacts. Due to existing development and constraints in the Project area, perpendicular crossings are not feasible in all road crossing locations.

III. IMPACT OF LINE ON SCENIC, ENVIRONMENTAL AND HISTORIC FEATURES

J. Identify coordination with appropriate municipal, state, and federal agencies.

Response: As described in detail in Sections III.B and V.D of the Appendix, the Company solicited feedback from Spotsylvania County regarding the proposed Project. Below is a list of coordination that has occurred with municipal, state, and federal agencies:

- Coordination with the U.S. Army Corps of Engineers, DEQ, Virginia Marine Resources Commission, and VDOT will take place as appropriate to obtain necessary approvals for the Project.
- Coordination took place with REC through multiple meetings.
- On June 10, 2024, an email correspondence was sent to VDOT staff sharing the alternative routes and requesting written feedback. See Section O and Attachment 2.O.1. of the DEQ Supplement for additional details.
- A letter dated August 29, 2024, was submitted to Spotsylvania County to describe the Project and request Comments. See Section V.D.
- A Stage I Pre-Application Analysis has been prepared and was submitted to VDHR on September 30, 2024. See Attachment 2.I.1 to the DEQ Supplement.
- On May 7, 2024, the Company solicited comments via letter from several federally recognized Native American tribes, including:

Name	Tribe
Chief Walt “Red Hawk” Brown	Cheroenhaka (Nottoway) Indian Tribe
Mary Frances Wilkerson	Cheroenhaka (Nottoway) Indian Tribe
Chief Stephen Adkins	Chickahominy Indian Tribe
Assistant Chief Reginald Stewart	Chickahominy Indian Tribe
Chief Gerald A. Stewart	Chickahominy Indian Tribe Eastern Division
Jessica Phillips	Chickahominy Indian Tribe Eastern Division
Dana Adkins	Chickahominy Tribe
Chief Mark Custalow	Mattaponi Tribe
Chief Diane Shields	Monacan Indian Nation
Chief Keith Anderson	Nansemond Indian Nation
Chief Lynette Allston	Nottoway Indian Tribe of Virginia
Ms. Beth Roach	Nottoway Indian Tribe of Virginia

Chief Robert Gray	Pamunkey Indian Tribe
Kendall Stevens	Pamunkey Indian Tribal Resource Office
Chief Charles (Bootsie) Bullock	Patawomeck Indian Tribe of Virginia
Chief G. Anne Richardson	Rappahannock Tribe
Assistant Chief	Rappahannock Tribe
Chief W. Frank Adams	Upper Mattaponi Indian Tribe
Leigh Mitchell	Upper Mattaponi Indian Tribe
Dr. Wenonah G. Haire	Catawba Indian Nation
Caitlin Rogers	Catawba Indian Nation
Katelyn Lucas	Delaware Nation, Oklahoma
Deborah Dotson	Delaware Nation, Oklahoma

A copy of the letter template and map is included as Attachment III.J.1.

See also Sections III.B, III.K and V.D of this Appendix, and the DEQ Supplement.

Dominion Energy Virginia
Electric Transmission
P.O. Box 26666, Richmond, VA 23261
DominionEnergy.com



May 7, 2024

Proposed Tributary 230 kV Electric Transmission Project

Dear [REDACTED]

Dominion Energy is dedicated to maintaining safe, reliable, and affordable electric service in the communities we serve. You are receiving this project announcement letter as part of our efforts to proactively communicate early with Tribal Nations who may have an interest in this area. With your unique perspective, you can help us better plan projects in their earliest stages. Please note, this letter is not a notification of formal government-to-government consultation from any state or federal agency. Dominion Energy has been and continues to be committed to creating and maintaining strong, open, supportive, and mutually beneficial relationships with Tribal Nations.

We are reaching out to you now as we have an upcoming project in Spotsylvania County, Virginia, and you may have an interest in this area. A new substation, known as Tributary Substation, and a new double-circuit 230 kilovolt (kV) electric transmission line are needed to support recent development.

Enclosed is a project study area map for your reference. This project requires review by the Virginia State Corporation Commission (SCC). We are currently in the conceptual phase of the project and will have preliminary routes to share in the coming weeks. Providing your input now allows us to consider any concerns you may have as we work to meet the project's needs. Please feel free to notify other relevant organizations that may have an interest in the project area. For reference, other recipients of this letter include county and state historic, cultural, and scenic organizations, as well as Tribal Nations.

In summer 2024, we will host community meetings where you can meet the project team and have your questions answered. Please provide your comments by July 10, 2024, so we have adequate time to review and consider your comments in our project design. More information about the project is available on our website, [DominionEnergy.com/tributary](https://www.dominionenergy.com/tributary).

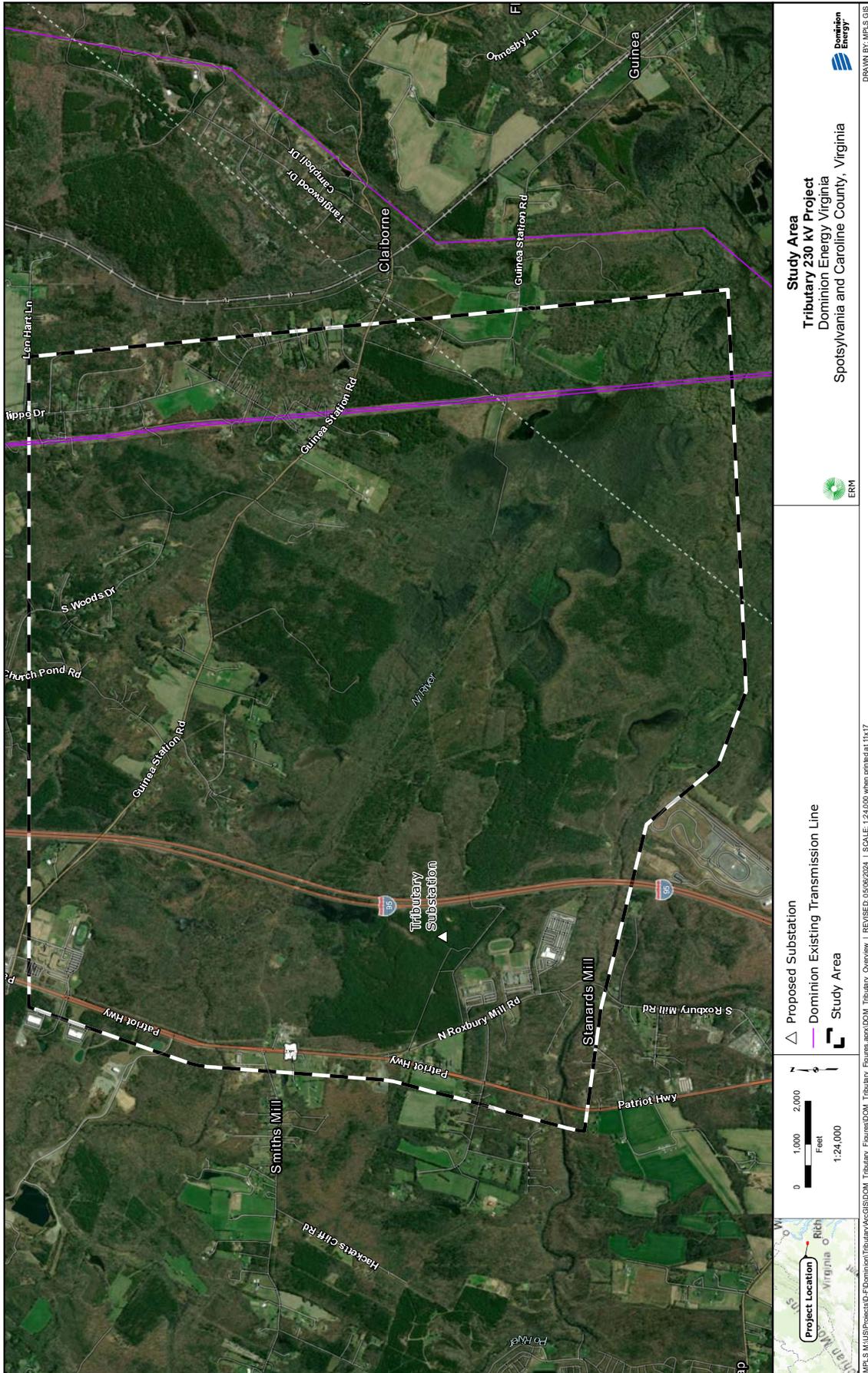
If you would like any additional information, have questions, or would like to set up a meeting to discuss the project, please contact me by email at ann.gordon.mickel@dominionenergy.com or by calling 804-363-9783. You may also contact Ken Custalow, our Tribal Liaison Manager. He can be reached by email at ken.custalow@dominionenergy.com.

Sincerely,

A handwritten signature in black ink that reads "Ann Gordon Mickel".

Ann Gordon Mickel
Electric Transmission Communications

Enclosure: Project Study Area Map
cc Ken Custalow



Study Area
Tributory 230 kV Project
 Dominion Energy Virginia
 Spotsylvania and Caroline County, Virginia

ERM

Proposed Substation
 Dominion Existing Transmission Line
 Study Area

0 1,000 2,000
 Feet
 1:24,000

Project Location
 Virginia

MPLS \MPLS\Projects\0-F-Dominion\Tributory\WCS\GIS\DOM_Tributory_Figures.aprx\DOM_Tributory_Figures.aprx\DOM_Tributory_Figures.aprx\DOM_Tributory_Figures.aprx | REVISED: 05/06/2024 | SCALE: 1:24,000 when printed at 11x17
 DRAWN BY: MPLS SIS

III. IMPACT OF LINE ON SCENIC, ENVIRONMENTAL AND HISTORIC FEATURES

K. Identify coordination with any non-governmental organizations or private citizen groups.

Response: On May 7, 2024, the Company solicited comments via letter from the community leaders, environmental groups, and business groups identified below. A copy of the letter template is included as Attachment III.K.1.

Name	Organization
Ms. Elizabeth S. Kostelny	Preservation Virginia
Mr. Thomas Gilmore	American Battlefield Trust
Mr. Jim Campi	American Battlefield Trust
Mr. Max Hokit	American Battlefield Trust
Mr. Steven Williams	Colonial National Historical Park
Ms. Eleanor Breen, PhD, RPA	Council of Virginia Archaeologists
Ms. Elaine Chang	National Trust for Historic Preservation
Ms. Leighton Powell	Scenic Virginia
Ms. Julie Bolthouse	Piedmont Environmental Council
Mr. John McCarthy	Piedmont Environmental Council
Dr. Cassandra Newby-Alexander, Dean	Norfolk State University
Mr. Roger Kirchen, Archaeologist	Virginia Department of Historic Resources
Ms. Adrienne Birge-Wilson	Virginia Department of Historic Resources
Mr. Dave Dutton	Dutton + Associates, LLC

Dominion Energy Virginia
Electric Transmission
P.O. Box 26666, Richmond, VA 23261-6666
DominionEnergy.com



May 7, 2024

Proposed Tributary 230 kV Electric Transmission Project

Dear [REDACTED]

At Dominion Energy, we are dedicated to finding the best solution for our long-term needs in the communities we serve. As a valued stakeholder with a vested interest in the community, we invite you to participate in the development of a new electric transmission line and substation in Spotsylvania County, Virginia.

A new substation, known as Tributary Substation and double-circuit 230 kilovolt (kV) electric transmission are required to address recent development in Spotsylvania County

This project is currently in the conceptual phase, and we are seeking your input prior to filing an application with the Virginia State Corporation Commission (SCC) in fall 2024. Doing so allows us to hear any concerns you may have as we work to meet the project's needs. Please feel free to notify other relevant organizations that may have an interest in the project area. For reference, other recipients of this letter include countywide and statewide historic, cultural, and scenic organizations, as well as Native American Tribes.

Enclosed, you will find an overview map with the study area under consideration. We are currently in the conceptual phase of the project and will have preliminary routes to share in the coming weeks. Please visit the project website at DominionEnergy.com/tributary for more project information.

We appreciate your assistance as we move through the planning process. In summer 2024, we will host community meetings where you can meet the project team and have your questions answered. Please provide your comments by July 10, 2024, so we have adequate time to review and consider your comments in our project design.

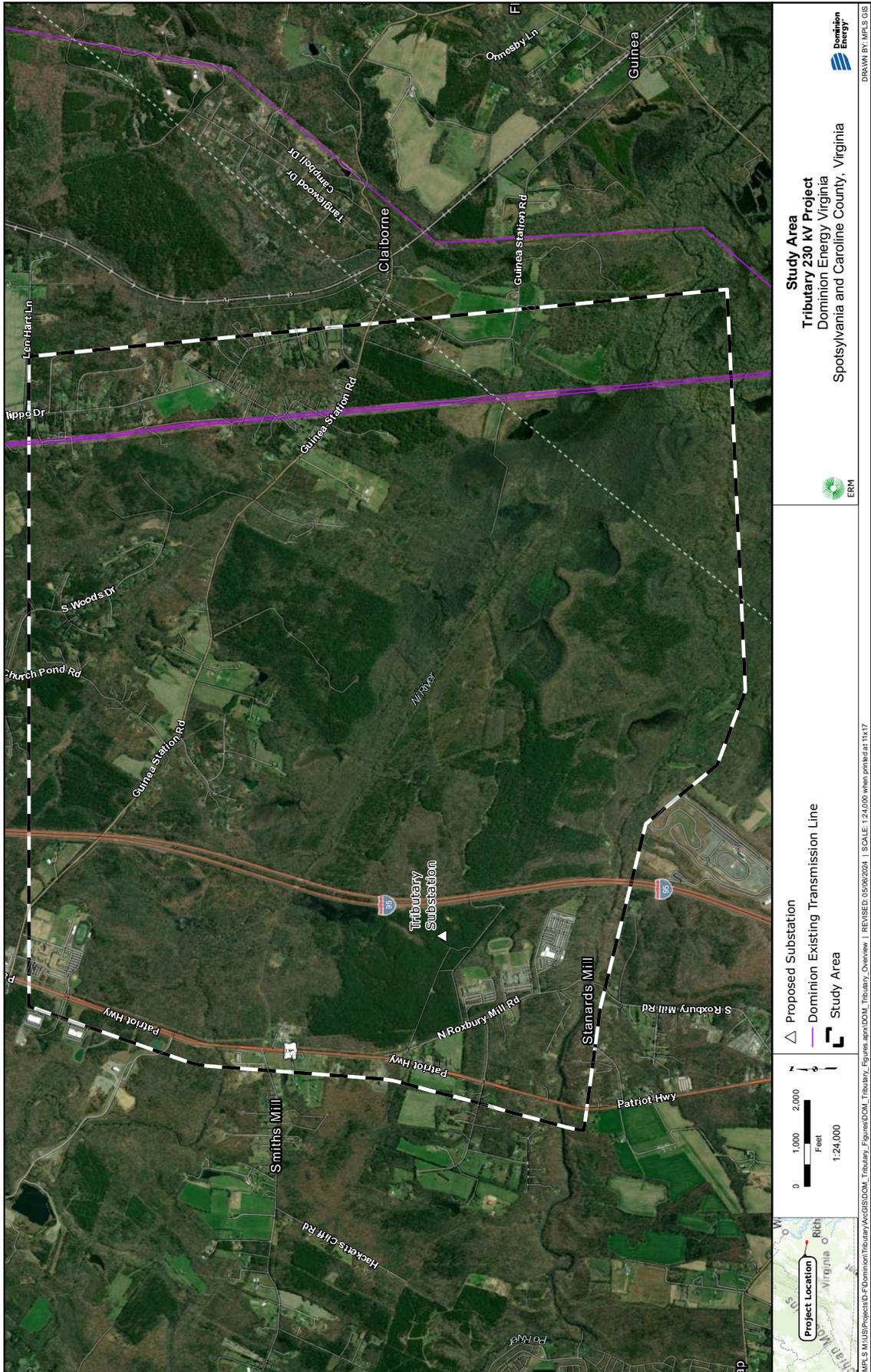
If you would like any additional information, have questions, or would like to set up a meeting to discuss the project, please do not hesitate to contact me by sending an email to ann.gordon.mickel@dominionenergy.com or calling 804-363-9783.

Sincerely,

A handwritten signature in blue ink that reads "Ann Gordon Mickel".

Ann Gordon Mickel
Communications Consultant
The Electric Transmission Project Team

Enclosure: Project Study Area Map



III. IMPACT OF LINE ON SCENIC, ENVIRONMENTAL AND HISTORIC FEATURES

L. Identify any environmental permits or special permissions anticipated to be needed.

Response: The permits or special permissions that are likely to be required for the proposed Project are listed below.

Potential Permits

Activity	Potential Permit	Agency/Organization
Impacts to wetlands and other waters of the U.S.	Nationwide Permit 57	U.S. Army Corps of Engineers
Impacts to wetlands and other waters of the U.S.	Virginia Water Protection Permit	Virginia Department of Environmental Quality
Discharge of stormwater from construction	Construction General Permit	Virginia Department of Environmental Quality
Aerial Crossing over state-owned bottomlands	Subaqueous Habitat Management Permit (VGP5)	Virginia Marine Resources Commission
Work within VDOT rights-of-way	Land Use Permit	Virginia Department of Transportation

IV. HEALTH ASPECTS OF ELECTROMAGNETIC FIELDS ("EMF")

- A. Provide the calculated maximum electric and magnetic field levels that are expected to occur at the edge of the ROW. If the new transmission line is to be constructed on an existing electric transmission line ROW, provide the present levels as well as the maximum levels calculated at the edge of ROW after the new line is operational.**

Response: Public exposure to magnetic fields is best estimated by field levels from power lines calculated at annual average loading. For any day of the year, the EMF levels associated with average conditions provide the best estimate of potential exposure. Maximum (peak) values are less relevant as they may occur for only a few minutes or hours each year.

This section describes the levels of EMF associated with the proposed transmission lines. EMF levels are provided for future (2029) annual average and maximum (peak) loading conditions.

Proposed Project – Projected Average Loading in 2029

EMF levels were calculated for the proposed Project at the *projected average* load condition of 1913 A for the 230 kV Line #2090 extension at an operating voltage of 230 kV when supported on the proposed Project structures. See Attachment IV.A.a.

These field levels were calculated at mid-span where the conductors are closest to the ground at a projected average load operating temperature. Values were calculated under the assumption that the current travels in the same direction for all lines.

EMF levels at the edge of the rights-of-way for the proposed Project at the projected average peak loading for a typical span:

Proposed Project - Projected Average Loading (2029)				
Attachment	Left Edge of ROW Per II.A.5 Drawing View		Right Edge of ROW Per II.A.5 Drawing View	
	<u>Electric Field</u> (kV/m)	<u>Magnetic Field</u> (mG)	<u>Electric Field</u> (kV/m)	<u>Magnetic Field</u> (mG)
IV.A.a	0.524	190	0.674	211

Proposed Project – Projected Peak Loading in 2029

EMF levels were calculated for the proposed Project at the *projected peak* load condition of 2943 A for the 230 kV Line #2090 extension at an operating voltage

of 230 kV when supported on the proposed Project structures. See Attachment IV.A.b.

These field levels were calculated at mid-span where the conductors are closest to the ground at a projected peak load operating temperature. Values were calculated under the assumption that the current travels in the same direction for all lines.

EMF levels at the edge of the rights-of-way for the proposed Project at the projected peak loading for a typical span:

Proposed Project - Projected Peak Loading (2029)				
Attachment	Left Edge of ROW Per II.A.5 Drawing View		Right Edge of ROW Per II.A.5 Drawing View	
	<u>Electric Field</u> (kV/m)	<u>Magnetic Field</u> (mG)	<u>Electric Field</u> (kV/m)	<u>Magnetic Field</u> (mG)
IV.A.b	0.586	300	0.608	315

3D BPF Calculation Notes:
 1) All wire positions are modeled at the specified weather case and wind direction. Height above ground determined by the modeled ground TIN.
 2) All wire positions are modeled at the specified weather case and wind direction. Height above ground determined by the modeled ground TIN.
 3) Ground return is being ignored for magnetic field calculations.

3D BPF Calculation Notes:
 1) All wire positions are modeled at the specified weather case and wind direction. Height above ground determined by the modeled ground TIN.
 2) All wire positions are modeled at the specified weather case and wind direction. Height above ground determined by the modeled ground TIN.
 3) Ground return is being ignored for magnetic field calculations.

3D BPF Calculation Notes:
 1) All wire positions are modeled at the specified weather case and wind direction. Height above ground determined by the modeled ground TIN.
 2) All wire positions are modeled at the specified weather case and wind direction. Height above ground determined by the modeled ground TIN.
 3) Ground return is being ignored for magnetic field calculations.

Section Data for 3D BPF Results:

Section	Section Name	Phase	Current (kA)	Height (ft)	Radius (ft)	Condition	Weather	Wind Dir (deg)	Wind Spd (ft/s)	Temp (deg F)	Humidity (%)	Pressure (psf)
1	100-1143-04F	A	0.0	0.0	0.0							
2	100-1143-04F	B	0.0	0.0	0.0							
3	100-1143-04F	C	0.0	0.0	0.0							
4	100-1143-04F	D	0.0	0.0	0.0							
5	100-1143-04F	E	0.0	0.0	0.0							
6	100-1143-04F	F	0.0	0.0	0.0							
7	100-1143-04F	G	0.0	0.0	0.0							
8	100-1143-04F	H	0.0	0.0	0.0							
9	100-1143-04F	I	0.0	0.0	0.0							
10	100-1143-04F	J	0.0	0.0	0.0							
11	100-1143-04F	K	0.0	0.0	0.0							
12	100-1143-04F	L	0.0	0.0	0.0							
13	100-1143-04F	M	0.0	0.0	0.0							
14	100-1143-04F	N	0.0	0.0	0.0							
15	100-1143-04F	O	0.0	0.0	0.0							
16	100-1143-04F	P	0.0	0.0	0.0							
17	100-1143-04F	Q	0.0	0.0	0.0							
18	100-1143-04F	R	0.0	0.0	0.0							
19	100-1143-04F	S	0.0	0.0	0.0							
20	100-1143-04F	T	0.0	0.0	0.0							
21	100-1143-04F	U	0.0	0.0	0.0							
22	100-1143-04F	V	0.0	0.0	0.0							
23	100-1143-04F	W	0.0	0.0	0.0							
24	100-1143-04F	X	0.0	0.0	0.0							
25	100-1143-04F	Y	0.0	0.0	0.0							
26	100-1143-04F	Z	0.0	0.0	0.0							
27	100-1143-04F	AA	0.0	0.0	0.0							
28	100-1143-04F	AB	0.0	0.0	0.0							
29	100-1143-04F	AC	0.0	0.0	0.0							
30	100-1143-04F	AD	0.0	0.0	0.0							
31	100-1143-04F	AE	0.0	0.0	0.0							
32	100-1143-04F	AF	0.0	0.0	0.0							
33	100-1143-04F	AG	0.0	0.0	0.0							
34	100-1143-04F	AH	0.0	0.0	0.0							
35	100-1143-04F	AI	0.0	0.0	0.0							
36	100-1143-04F	AJ	0.0	0.0	0.0							
37	100-1143-04F	AK	0.0	0.0	0.0							
38	100-1143-04F	AL	0.0	0.0	0.0							
39	100-1143-04F	AM	0.0	0.0	0.0							
40	100-1143-04F	AN	0.0	0.0	0.0							
41	100-1143-04F	AO	0.0	0.0	0.0							
42	100-1143-04F	AP	0.0	0.0	0.0							
43	100-1143-04F	AQ	0.0	0.0	0.0							
44	100-1143-04F	AR	0.0	0.0	0.0							
45	100-1143-04F	AS	0.0	0.0	0.0							
46	100-1143-04F	AT	0.0	0.0	0.0							
47	100-1143-04F	AU	0.0	0.0	0.0							
48	100-1143-04F	AV	0.0	0.0	0.0							
49	100-1143-04F	AW	0.0	0.0	0.0							
50	100-1143-04F	AX	0.0	0.0	0.0							
51	100-1143-04F	AY	0.0	0.0	0.0							
52	100-1143-04F	AZ	0.0	0.0	0.0							
53	100-1143-04F	BA	0.0	0.0	0.0							
54	100-1143-04F	BB	0.0	0.0	0.0							
55	100-1143-04F	BC	0.0	0.0	0.0							
56	100-1143-04F	BD	0.0	0.0	0.0							
57	100-1143-04F	BE	0.0	0.0	0.0							
58	100-1143-04F	BF	0.0	0.0	0.0							
59	100-1143-04F	BG	0.0	0.0	0.0							
60	100-1143-04F	BH	0.0	0.0	0.0							
61	100-1143-04F	BI	0.0	0.0	0.0							
62	100-1143-04F	BJ	0.0	0.0	0.0							
63	100-1143-04F	BK	0.0	0.0	0.0							
64	100-1143-04F	BL	0.0	0.0	0.0							
65	100-1143-04F	BM	0.0	0.0	0.0							
66	100-1143-04F	BN	0.0	0.0	0.0							
67	100-1143-04F	BO	0.0	0.0	0.0							
68	100-1143-04F	BP	0.0	0.0	0.0							
69	100-1143-04F	BQ	0.0	0.0	0.0							
70	100-1143-04F	BR	0.0	0.0	0.0							
71	100-1143-04F	BS	0.0	0.0	0.0							
72	100-1143-04F	BT	0.0	0.0	0.0							
73	100-1143-04F	BU	0.0	0.0	0.0							
74	100-1143-04F	BV	0.0	0.0	0.0							
75	100-1143-04F	BW	0.0	0.0	0.0							
76	100-1143-04F	BX	0.0	0.0	0.0							
77	100-1143-04F	BY	0.0	0.0	0.0							
78	100-1143-04F	BZ	0.0	0.0	0.0							
79	100-1143-04F	CA	0.0	0.0	0.0							
80	100-1143-04F	CB	0.0	0.0	0.0							
81	100-1143-04F	CC	0.0	0.0	0.0							
82	100-1143-04F	CD	0.0	0.0	0.0							
83	100-1143-04F	CE	0.0	0.0	0.0							
84	100-1143-04F	CF	0.0	0.0	0.0							
85	100-1143-04F	CG	0.0	0.0	0.0							
86	100-1143-04F	CH	0.0	0.0	0.0							
87	100-1143-04F	CI	0.0	0.0	0.0							
88	100-1143-04F	CJ	0.0	0.0	0.0							
89	100-1143-04F	CK	0.0	0.0	0.0							
90	100-1143-04F	CL	0.0	0.0	0.0							
91	100-1143-04F	CM	0.0	0.0	0.0							
92	100-1143-04F	CN	0.0	0.0	0.0							
93	100-1143-04F	CO	0.0	0.0	0.0							
94	100-1143-04F	CP	0.0	0.0	0.0							
95	100-1143-04F	CQ	0.0	0.0	0.0							
96	100-1143-04F	CR	0.0	0.0	0.0							
97	100-1143-04F	CS	0.0	0.0	0.0							
98	100-1143-04F	CT	0.0	0.0	0.0							
99	100-1143-04F	CU	0.0	0.0	0.0							
100	100-1143-04F	CV	0.0	0.0	0.0							
101	100-1143-04F	CW	0.0	0.0	0.0							
102	100-1143-04F	CX	0.0	0.0	0.0							
103	100-1143-04F	CY	0.0	0.0	0.0							
104	100-1143-04F	CZ	0.0	0.0	0.0							
105	100-1143-04F	DA	0.0	0.0	0.0							
106	100-1143-04F	DB	0.0	0.0	0.0							
107	100-1143-04F	DC	0.0	0.0	0.0							
108	100-1143-04F	DD	0.0	0.0	0.0							
109	100-1143-04F	DE	0.0	0.0	0.0							
110	100-1143-04F	DF	0.0	0.0	0.0							
111	100-1143-04F	DG	0.0	0.0	0.0							
112	100-1143-04F	DH	0.0	0.0	0.0							
113	100-1143-04F	DI	0.0	0.0	0.0							
114	100-1143-04F	DJ	0.0	0.0	0.0							
115	100-1143-04F	DK	0.0	0.0	0.0							

IV. HEALTH ASPECTS OF ELECTROMAGNETIC FIELDS (“EMF”)

B. If the Applicant is of the opinion that no significant health effects will result from the construction and operation of the line, describe in detail the reasons for that opinion and provide references or citations to supporting documentation.

Response: The conclusions of multidisciplinary scientific review panels assembled by national and international scientific agencies during the past few decades are the foundation of the Company’s opinion that no adverse health effects are anticipated to result from the operation of the proposed Project. Each of these panels has evaluated the scientific research related to health and extremely low frequency (“ELF”) EMF, also referred to as power-frequency (50/60 Hertz (“Hz”)) EMF, and provided conclusions that form the basis of guidance to governments and industries. The Company regularly monitors the recommendations of these expert panels to guide their approach to EMF.

Research on EMF and human health varies widely in approach. Some studies evaluate the effects on biological responses of high, short-term EMF exposure not typically found in people’s day-to-day lives, while others evaluate the effects of common, low EMF exposures found throughout communities. Studies also have evaluated the possibility of effects (*e.g.*, cancer, neurodegenerative diseases, and reproductive effects) 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 scientific agencies to identify, review, and summarize the results of this large and diverse research.

The reviews of ELF 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 (“EFHRAN”), the International Commission on Non-Ionizing Radiation Protection (“ICNIRP”), the World Health Organization (“WHO”), the IEEE’s International Committee on Electromagnetic Safety (“ICES”), the Scientific Committee on Health, Environmental and Emerging Risks (“SCHEER”) (formerly the Scientific Committee on Emerging and Newly Identified Health Risks [“SCENIHR”]) of the European Commission, and the Swedish Radiation Safety Authority (“SSM”) (formerly the Swedish Radiation Protection Authority [“SSI”]) (WHO, 2007; SCENIHR, 2009, 2015; EFHRAN, 2010, 2012; ICNIRP, 2010; SSM, 2015, 2016, 2018, 2019, 2020, 2021, 2022; ICES, 2019; SCHEER, 2023). 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 transmission lines and other parts of the electric system, appliances, etc., are a cause of any adverse health effects.

The most recent reviews on this topic include the 2015 and 2023 reports by SCENIHR and SCHEER, respectively, and annual reviews published by SSM (i.e., for the years 2015 through 2022). These reports, similar to previous reviews, found that the scientific evidence does not confirm the existence of any adverse health effects caused by environmental or community exposure to EMF.

WHO has recommended that countries adopt recognized international standards published by ICNIRP and ICES. Typical levels of EMF from Dominion Energy Virginia's high voltage power lines outside its property and rights-of-way are far below the screening reference levels of EMF recommended for the general public and still lower than exposures equivalent to restrictions to limits on fields within the body (ICNIRP, 2010; ICES, 2019).

Thus, based on the conclusions of scientific reviews and the levels of EMF associated with the proposed Project, the Company has determined that no adverse health effects are anticipated to result from the operation of the proposed Project.

References

European Health Risk Assessment Network on Electromagnetic Fields Exposure (EFHRAN). Report on the Analysis of Risks Associated to Exposure to EMF: *In Vitro* and *In Vivo* (Animals) Studies. Milan, Italy: EFHRAN, 2010.

European Health Risk Assessment Network on Electromagnetic Fields Exposure (EFHRAN). Risk Analysis of Human Exposure to Electromagnetic Fields (Revised). Report D2 of the EFHRAN Project. Milan, Italy: EFHRAN, 2012.

International Commission on Non-ionizing Radiation Protection (ICNIRP). Guidelines for limiting exposure to time-varying electric and magnetic fields (1 Hz to 100 kHz). *Health Phys* 99: 818-36, 2010.

International Committee on Electromagnetic Safety (ICES). IEEE Standard for Safety Levels with Respect to Human Exposure to Electromagnetic Fields 0 to 300 GHz. IEEE Std C95.1-2019. New York, NY: IEEE, 2019.

Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR). Health Effects of Exposure to EMF. Brussels, Belgium: European Commission, 2009.

Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR). Opinion on Potential Health Effects of Exposure to Electromagnetic Fields (EMF). Brussels, Belgium: European Commission, 2015.

Scientific Committee on Health, Environmental and Emerging Risks (SCHEER). Preliminary Opinion on Potential Health Effects of Exposure to Electromagnetic Fields (EMF): Update with regard to frequencies between 1Hz and 100 kHz. Brussels, Belgium: European Commission, 2023.

Swedish Radiation Safety Authority (SSM). Research 2015:19. Recent Research on EMF and Health Risk - Tenth report from SSM's Scientific Council on Electromagnetic Fields. Stockholm, Sweden: Swedish Radiation Safety Authority (SSM), 2015.

Swedish Radiation Safety Authority (SSM). Research 2016:15. Recent Research on EMF and Health Risk - Eleventh report from SSM's Scientific Council on Electromagnetic Fields, 2016. Including Thirteen years of electromagnetic field research monitored by SSM's Scientific Council on EMF and health: How has the evidence changed over time? Stockholm, Sweden: Swedish Radiation Safety Authority (SSM), 2016.

Swedish Radiation Safety Authority (SSM). Research 2018:09. Recent Research on EMF and Health Risk - Twelfth report from SSM's Scientific Council on Electromagnetic Fields, 2017. Stockholm, Sweden: Swedish Radiation Safety Authority (SSM), 2018.

Swedish Radiation Safety Authority (SSM). Research 2019:08. Recent Research on EMF and Health Risk – Thirteenth Report from SSM's Scientific Council on Electromagnetic Fields, 2018. Stockholm, Sweden: Swedish Radiation Safety Authority (SSM), 2019.

Swedish Radiation Safety Authority (SSM). Research 2020:04. Recent Research on EMF and Health Risk – Fourteenth Report from SSM's Scientific Council on Electromagnetic Fields, 2019. Stockholm, Sweden: Swedish Radiation Safety Authority (SSM), 2020.

Swedish Radiation Safety Authority (SSM). Research 2021:08. Recent Research on EMF and Health Risk – Fifteenth report from SSM's Scientific Council on Electromagnetic Fields, 2020. Stockholm, Sweden: Swedish Radiation Safety Authority (SSM), 2021.

Swedish Radiation Safety Authority (SSM). Research 2022:16. Recent Research on EMF and Health Risk – Sixteenth report from SSM's Scientific Council on Electromagnetic Fields, 2021. Stockholm, Sweden: Swedish Radiation Safety Authority (SSM), 2022.

World Health Organization (WHO). Environmental Health Criteria 238: Extremely Low Frequency (ELF) Fields. Geneva, Switzerland: World Health Organization, 2007.

IV. HEALTH ASPECTS OF ELECTROMAGNETIC FIELDS (“EMF”)

C. Describe and cite any research studies on EMF the Applicant is aware of that meet the following criteria:

1. **Became available for consideration since the completion of the Virginia Department of Health’s most recent review of studies on EMF and its subsequent report to the Virginia General Assembly in compliance with 1985 Senate Joint Resolution No. 126;**
2. **Include findings regarding EMF that have not been reported previously and/or provide substantial additional insight into findings; and**
3. **Have been subjected to peer review.**

Response: The Virginia Department of Health (“VDH”) conducted its most recent review and issued its report on the scientific evidence on potential health effects of extremely low frequency ELF EMF in 2000: “[T]he Virginia Department of Health is of the opinion that there is no conclusive and convincing evidence that exposure to extremely low frequency EMF emanated from nearby high voltage transmission lines is causally associated with an increased incidence of cancer or other detrimental health effects in humans.”²⁰

The continuing scientific research on ELF EMF exposure and health has resulted in many peer-reviewed publications since 2000. The accumulating research results have been regularly and repeatedly reviewed and evaluated by national and international health, scientific, and government agencies, including most notably:

- WHO, which published one of the most comprehensive and detailed reviews of the relevant scientific peer-reviewed literature in 2007;
- SCHEER (formerly SCENIHR), a committee of the European Commission, which published its assessments in 2009, 2015 and 2023;
- The SSM, which has published annual reviews of the relevant peer-reviewed scientific literature since 2003, with its most recent review published in 2022; and,
- EFHRAN, which published its reviews in 2010 and 2012.

The above reviews provide detailed analyses and summaries of relevant recent peer-reviewed scientific publications. The conclusions of these reviews that the evidence overall does not confirm the existence of any adverse health effects due to exposure to EMF below scientifically established guideline values are consistent

²⁰ See <http://www.vdh.virginia.gov/content/uploads/sites/12/2016/02/highfinal.pdf>.

with the conclusions of the VDH report. With respect to the statistical association observed in some of the childhood leukemia epidemiologic studies, the most recent comprehensive review of the literature by SCENIHR, published in 2015, concluded that “no mechanisms have been identified and no support is existing [*sic*] from experimental studies that could explain these findings, which, together with shortcomings of the epidemiological studies prevent a causal interpretation” (SCENIHR, 2015, p. 16). In their 2023 Preliminary Opinion providing an update on the potential health effects of exposure to electromagnetic fields in the 1 Hz to 100 kilohertz (“kHz”) range, SCHEER concluded that “overall, there is weak evidence concerning the association of ELF-MF [magnetic field] exposure with childhood leukaemia” (SCHEER 2023, p. 2).

While research is continuing on multiple aspects of EMF exposure and health, many of the recent publications have focused on an epidemiologic assessment of the relationship between EMF exposure and childhood leukemia and EMF exposure and neurodegenerative diseases. Of these, the following recent publications, published following the inclusion date (June 2014) for the SCENIHR (2015) report through March 2024, provide additional evidence and contribute to clarification of previous findings. Overall, new research studies have not provided evidence to alter the previous conclusions of scientific and health organizations, including WHO and SCENIHR.

Epidemiologic studies of EMF and childhood leukemia published during the above referenced period include:

- Bunch et al. (2015) assessed the potential association between residential proximity to high voltage underground cables and development of childhood cancer in the United Kingdom largely using the same epidemiologic data as in a previously published study on overhead transmission lines (Bunch et al., 2014). No statistically significant associations or trends were reported with either distance to underground cables or calculated magnetic fields from underground cables for any type of childhood cancers.
- Pedersen et al. (2015) published a case-control study that investigated the potential association between residential proximity to power lines and childhood cancer in Denmark. The study included all cases of leukemia (n=1,536), central nervous system tumors, and malignant lymphoma (n=417) diagnosed before the age of 15 between 1968 and 2003 in Denmark, along with 9,129 healthy control children matched on sex and year of birth. Considering the entire study period, no statistically significant increases were reported for any of the childhood cancer types.
- Salvan et al. (2015) compared measured magnetic-field levels in the bedroom for 412 cases of childhood leukemia under the age of 10 and 587 healthy control children in Italy. Although the statistical power of the study was limited because of the small number of highly exposed subjects, no consistent statistical associations or trends were reported between measured magnetic-field levels

and the occurrence of leukemia among children in the study.

- Bunch et al. (2016) and Swanson and Bunch (2018) published additional analyses using data from an earlier study (Bunch et al., 2014). Bunch et al. (2016) reported that the association with distance to power lines observed in earlier years was linked to calendar year of birth or year of cancer diagnosis, rather than the age of the power lines. Swanson and Bunch (2018) re-analyzed data using finer exposure categories (*e.g.*, cut-points of every 50-meter distance) and broader groupings of diagnosis date (*e.g.*, 1960-1979, 1980-1999, and 2000 and after) and reported no overall associations between exposure categories and childhood leukemia for the later periods (1980 and after), and consistent pattern for the periods prior to 1980.
- Crespi et al. (2016) conducted a case-control epidemiologic study of childhood cancers and residential proximity to high voltage power lines (60 kV to 500 kV) in California. Childhood cancer cases, including 5,788 cases of leukemia and 3,308 cases of brain tumor, diagnosed under the age of 16 between 1986 and 2008, were identified from the California Cancer Registry. Controls, matched on age and sex, were selected from the California Birth Registry. Overall, no consistent statistically significant associations for leukemia or brain tumor and residential distance to power lines were reported.
- Kheifets et al. (2017) assessed the relationship between calculated magnetic-field levels from power lines and development of childhood leukemia within the same study population evaluated in Crespi et al. (2016). In the main analyses, which included 4,824 cases of leukemia and 4,782 controls matched on age and sex, the authors reported no consistent patterns, or statistically significant associations between calculated magnetic-field levels and childhood leukemia development. Similar results were reported in subgroup and sensitivity analyses. In two subsequent studies, Amoon et al. (2018a, 2019) examined the potential impact of residential mobility (*i.e.*, moving residences between birth and diagnosis) on the associations reported in Crespi et al. (2016) and Kheifets et al. (2017). Amoon et al. (2018a) concluded that changing residences was not associated with either calculated magnetic-field levels or proximity to the power lines, while Amoon et al. (2019) concluded that while uncontrolled confounding by residential mobility had some impact on the association between EMF exposure and childhood leukemia, it was unlikely to be the primary driving force behind the previously reported associations in Crespi et al. (2016) and Kheifets et al. (2017).
- Amoon et al. (2018b) conducted a pooled analysis of 29,049 cases and 68,231 controls from 11 epidemiologic studies of childhood leukemia and residential distance from high voltage power lines. The authors reported no statistically-significant association between childhood leukemia and proximity to transmission lines of any voltage. Among subgroup analyses, the reported associations were slightly stronger for leukemia cases diagnosed before 5 years

of age and in study periods prior to 1980. Adjustment for various potential confounders (*e.g.*, socioeconomic status, dwelling type, residential mobility) had little effect on the estimated associations.

- Kyriakopoulou et al. (2018) assessed the association between childhood acute leukemia and parental occupational exposure to social contacts, chemicals, and electromagnetic fields. The study was conducted at a major pediatric hospital in Greece and included 108 cases and 108 controls matched for age, gender, and ethnicity. Statistically non-significant associations were observed between paternal exposure to magnetic fields and childhood acute leukemia for any of the exposure periods examined (1 year before conception; during pregnancy; during breastfeeding; and from birth until diagnosis); maternal exposure was not assessed due to the limited sample size. No associations were observed between childhood acute leukemia and exposure to social contacts or chemicals.
- Auger et al. (2019) examined the relationship between exposure to EMF during pregnancy and risk of childhood cancer in a cohort of 784,000 children born in Quebec. Exposure was defined using residential distance to the nearest high voltage transmission line or transformer station. The authors reported statistically non-significant associations between proximity to transformer stations and any cancer, hematopoietic cancer, or solid tumors. No associations were reported with distance to transmission lines.
- Crespi et al. (2019) investigated the relationship between childhood leukemia and distance from high voltage lines and calculated magnetic-field exposure, separately and combined, within the California study population previously analyzed in Crespi et al. (2016) and Kheifets et al. (2017). The authors reported that neither close proximity to high voltage lines nor exposure to calculated magnetic fields alone were associated with childhood leukemia; an association was observed only for those participants who were both close to high voltage lines (< 50 meters) and had exposure to high calculated magnetic fields (≥ 0.4 microtesla [μT]) (*i.e.*, ≥ 4 milligauss [mG]). No associations were observed with low-voltage power lines (< 200 kV). In a subsequent study, Amoon et al. (2020) examined the potential impact of dwelling type on the associations reported in Crespi et al. (2019). Amoon et al. (2020) concluded that while the type of dwelling at which a child resides (*e.g.*, single-family home, apartment, duplex, mobile home) was associated with socioeconomic status and race or ethnicity, it was not associated with childhood leukemia and did not appear to be a potential confounder in the relationship between childhood leukemia and magnetic-field exposure in this study population.
- Swanson et al. (2019) conducted a meta-analysis of 41 epidemiologic studies of childhood leukemia and magnetic-field exposure published between 1979 and 2017 to examine trends in childhood leukemia development over time. The authors reported that while the estimated risk of childhood leukemia initially

increased during the earlier period, a statistically non-significant decline in estimated risk has been observed from the mid-1990s until the present (i.e., 2019).

- Talibov et al. (2019) conducted a pooled analysis of 9,723 cases and 17,099 controls from 11 epidemiologic studies to examine the relationship between parental occupational exposure to magnetic fields and childhood leukemia. No statistically significant association was found between either paternal or maternal exposure and leukemia (overall or by subtype). No associations were observed in the meta-analyses.
- Núñez-Enríquez et al. (2020) assessed the relationship between residential magnetic-field exposure and B-lineage acute lymphoblastic leukemia (“B-ALL”) in children under 16 years of age in Mexico. The study included 290 cases and 407 controls matched on age, gender, and health institution; magnetic-field exposure was assessed through the collection of 24-hour measurements in the participants’ bedrooms. While the authors reported some statistically significant associations between elevated magnetic-field levels and development of B-ALL, the results were dependent on the chosen cut-points.
- Seomun et al. (2021) performed a meta-analysis based on 33 previously published epidemiologic studies investigating the potential relationship between magnetic-field exposure and childhood cancers, including leukemia and brain cancer. For childhood leukemia, the authors reported statistically significant associations with some, but not all, of the chosen cut-points for magnetic-field exposure. The associations between magnetic-field exposure and childhood brain cancer were statistically non-significant. The study provided limited new insight as most of the studies included in the current meta-analysis, were included in previously conducted meta- and pooled analyses.
- Amoon et al. (2022) conducted a pooled analysis of four studies of residential exposure to magnetic fields and childhood leukemia published following a 2010 pooled analysis by Kheifets et al. (2010). The study by Amoon et al. (2022) compared the exposures of 24,994 children with leukemia to the exposures of 30,769 controls without leukemia in California, Denmark, Italy, and the United Kingdom. Exposure was assessed by measured or calculated magnetic fields at their residences. The exposure of these two groups to magnetic fields were found not to significantly differ. A decrease in the combined effect estimates in epidemiologic studies was observed over time, and the authors concluded that their findings, based on the most recent studies, were “not in line” with previous pooled analyses that reported an increased risk of childhood leukemia.
- Brabant et al. (2022) performed a literature review and meta-analysis of studies of childhood leukemia and magnetic-field exposure. The overall analysis included 21 epidemiologic studies published from 1979 to 2020. The authors reported a statistically significant association, which they noted was “mainly

explained by the studies conducted before 2000.” The authors reported a statistically significant association between childhood leukemia and measured or calculated magnetic-field exposures $> 0.4 \mu\text{T}$ (4 mG); no statistically significant overall associations were reported between childhood leukemia and lower magnetic-field exposure ($< 0.4 \mu\text{T}$ [4 mG]), residential distance from power lines, or wire coding configuration. An association between childhood leukemia and electric blanket use was also reported. The overall results were likely influenced by the inclusion of a large number of earlier studies; 10 of the 21 studies in the main analysis were published prior to 2000. Studies published prior to 2000 included fewer studies deemed to be of higher study quality, as determined by the authors, compared to studies published after 2000.

- Nguyen et al. (2022) investigated whether potential pesticide exposure from living in close proximity to commercial plant nurseries confounds the association between magnetic-field exposure and childhood leukemia development reported within the California study population previously analyzed in Crespi et al. (2016) and Kheifets et al. (2017). The authors in Nguyen et al. (2022) noted that while the association between childhood leukemia and magnetic-field exposure was “slightly attenuated” after adjusting for nursery proximity or when restricting to subjects living > 300 meters from nurseries, their results “do not support plant nurseries as an explanation for observed childhood leukemia risks.” The authors further noted that close residential proximity to nurseries may be an independent risk factor for childhood leukemia.
- Guo et al. (2023) reported conducting a systematic review and meta-analysis of studies published from 2015 to 2022 that evaluated associations between magnetic-field exposure and childhood leukemia development. Three meta-analyses were conducted to evaluate the relationship using different exposure metrics. In the first meta-analysis, magnetic-field levels ranging from $0.4 \mu\text{T}$ (4 mG) to $0.2 \mu\text{T}$ (2 mG) were associated with a statistically significant reduced risk of childhood leukemia development (i.e., a protective association). In the second meta-analysis, exposure was based on wiring configuration codes, and the reported pooled relative risk estimates demonstrated a statistically significant increased association with childhood leukemia. In the third meta-analysis, exposure was categorized into groupings of magnetic-field strength; no statistically significant associations with childhood leukemia were reported for any of the groupings, including for magnetic-field levels $\geq 0.4 \mu\text{T}$ (4 mG). There are significant limitations of this study that prevent meaningful interpretations of the results. Most of the analyses of magnetic fields did not state whether measurements and calculations were included, and the authors provided no description of the methods used for their analyses, no data tables to support their findings, and no references to the number and type of studies included. In fact, much of the article’s introduction discusses ionized radiation. The authors also do not report relevant metrics for evaluating meta-analyses such as study heterogeneity.

- Malagoli et al. (2023) examined associations between exposure to magnetic fields from high voltage power lines (≥ 132 kV) and childhood leukemia development in a case-control study of children in Italy. The study included 182 cases diagnosed with childhood leukemia between 1998 and 2019 and 726 controls matched based on age, sex, and Italian province. The authors assessed magnetic-field exposure by calculating the distance from each participant's residence to the nearest high voltage power line and classifying that distance into one of three exposed categories (participants living < 100 meters, 100 to < 200 meters, or 200 to < 400 meters from the power lines) or as unexposed (participants living ≥ 400 meters from the power lines). The authors reported a non-statistically significant association between childhood leukemia and a residence distance of < 100 meters; no statistically significant associations were reported for any distance, including when stratifying by age (< 5 or ≥ 5 years) or when restricting to acute lymphoblastic leukemia (ALL).
- Nguyen et al. (2023) extended their previous investigation (Nguyen et al., 2022) into whether pesticide exposure was an independent risk factor or confounder for childhood leukemia in the presence of magnetic-field exposure from high voltage power lines by examining the potential impact of specific pesticide exposure factors (*e.g.*, intended use, chemical class, active ingredient). The authors found no statistically significant associations between distance to high voltage power lines or magnetic-field exposure and childhood leukemia, including when adjusting for pesticide exposures. Several of the examined pesticides were determined by the authors to be potential independent risk factors for childhood leukemia.
- Zagar et al. (2023) examined the relationship between magnetic fields and childhood cancers, including childhood leukemia, in Slovenia. Cancer cases, including 194 cases of leukemia, were identified from the Slovenian Cancer Registry; cases were then classified into one of five calculated magnetic-field exposure levels (ranging from $< 0.1 \mu\text{T}$ [< 1 mG] to $\geq 0.4 \mu\text{T}$ [≥ 4 mG]) based on residential distance to high voltage (*e.g.*, 110-kV, 220-kV, and 400-kV) power lines. The authors reported that less than 1% of Slovenian children and adolescents lived in an area near high voltage power lines. No differences in the development of childhood cancers, including leukemia, brain tumors, or all cancers combined, were reported across the five exposure categories.
- Crespi et al. (2024) assessed the association between residential proximity to electricity transformers in multi-story residential buildings and childhood leukemia development in the International Transformer Exposure study. Participants were required to live in an apartment building that contained a built-in transformer; exposure was estimated using the participants' apartment location relative to the transformer and categorized as high exposure (located above or adjacent to the transformer), intermediate exposure (located on the same floor as apartments in the high exposure category), or unexposed (all other apartments). In the pooled analyses of five countries' data, a total of 74 cases

and 20,443 controls were included; 18 of the 74 cases were identified in the intermediate or high exposure categories. No significant associations were reported between proximity to residential transformers and childhood leukemia. Sensitivity analyses performed using the data from one of the five countries (Finland) where a cohort study design was used, also reported no significant associations. The authors concluded that the evidence for an elevated risk of childhood leukemia from proximity to residential transformers was “weak.”

- Duarte-Rodríguez et al. (2024) conducted a population-based case-control study to examine the geographical distribution of childhood ALL cases in Mexico City, Mexico. Cases and controls were geolocated using the most recent residential address, and a spatial scan statistic was used to detect spatial clusters of cancer cases. The authors identified eight spatial clusters of cases, representing nearly 40% of all cases included in the study (n=1,054 cases). The authors noted that six of the eight spatial clusters were located in proximity to high voltage power lines and high voltage electric installations (distances not specified), and that the remaining two clusters were located near former petrochemical industrial facility sites. Since the study did not directly assess magnetic-field exposure and made no conclusions about magnetic-field exposure and cancer development, this study adds little value to the existing literature regarding a potential association between exposure to ELF EMF and childhood leukemia development.
- Malavolti et al. (2024) examined the association between magnetic-field exposure from transformer stations and childhood leukemia in the same Italian study population as Malagoli et al. (2023). Magnetic-field exposure was estimated based on residential distance to the nearest transformer station, and participants were then categorized as exposed or unexposed using two different distance cut-points: residing within a radius of 15 or 25 meters from the transformer station (exposed); residing ≥ 15 meters or ≥ 25 meters from the transformer station (unexposed). No significant associations were reported for all leukemias, or ALL specifically, when either distance cut-point was used, and in fact no association at all (an odds ratio = 1.0) was observed when the more stringent cut-point of 15 meters was used. In sub-analyses that stratified by participant age (< 5 years vs. ≥ 5 years), no significant associations were reported for either age category.

Epidemiologic studies of EMF and neurodegenerative diseases published during the above referenced period include:

- Seelen et al. (2014) conducted a population-based case-control study in the Netherlands and included 1,139 cases diagnosed with amyotrophic lateral sclerosis (“ALS”) between 2006 and 2013 and 2,864 frequency-matched controls. The shortest distance from the case and control residences to the nearest high voltage power line (50 to 380 kV) was determined by geocoding. No statistically significant associations between residential proximity to power

lines with voltages of either 50 to 150 kV or 220 to 380 kV and ALS were reported.

- Sorahan and Mohammed (2014) analyzed mortality from neurodegenerative diseases in a cohort of approximately 73,000 electricity supply workers in the United Kingdom. Cumulative occupational exposure to magnetic-fields was calculated for each worker in the cohort based on their job titles and job locations. Death certificates were used to identify deaths from neurodegenerative diseases. No associations or trends for any of the included neurodegenerative diseases (Alzheimer's disease, Parkinson's disease, and ALS) were observed with various measures of calculated magnetic fields.
- Koeman et al. (2015, 2017) analyzed data from the Netherlands Cohort Study of approximately 120,000 men and women who were enrolled in the cohort in 1986 and followed up until 2003. Lifetime occupational history, obtained through questionnaires, and job-exposure matrices on ELF magnetic fields and other occupational exposures were used to assign exposure to study subjects. Based on 1,552 deaths from vascular dementia, the researchers reported a statistically not significant association of vascular dementia with estimated exposure to metals, chlorinated solvents, and ELF magnetic fields. However, because no exposure-response relationship for cumulative exposure was observed and because magnetic fields and solvent exposures were highly correlated with exposure to metals, the authors attributed the association with ELF magnetic fields and solvents to confounding by exposure to metals (Koeman et al., 2015). Based on a total of 136 deaths from ALS among the cohort members, the authors reported a statistically significant, approximately two-fold association with ELF magnetic fields in the highest exposure category. This association, however, was no longer statistically significant when adjusted for exposure to insecticides (Koeman et al., 2017).
- Fischer et al. (2015) conducted a population-based case-control study that included 4,709 cases of ALS diagnosed between 1990 and 2010 in Sweden and 23,335 controls matched to cases on year of birth and sex. The study subjects' occupational exposures to ELF magnetic fields and electric shocks were classified based on their occupations, as recorded in the censuses and corresponding job-exposure matrices. Overall, neither magnetic fields nor electric shocks were related to ALS.
- Vergara et al. (2015) conducted a mortality case-control study of occupational exposure to electric shock and magnetic fields and ALS. They analyzed data on 5,886 deaths due to ALS and over 58,000 deaths from other causes in the United States between 1991 and 1999. Information on occupation was obtained from death certificates and job-exposure matrices were used to categorize exposure to electric shocks and magnetic fields. Occupations classified as "electric occupations" were moderately associated with ALS. The authors reported no consistent associations for ALS, however, with either electric

shocks or magnetic fields, and they concluded that their findings did not support the hypothesis that exposure to either electric shocks or magnetic fields explained the observed association of ALS with “electric occupations.”

- Pedersen et al. (2017) investigated the occurrence of central nervous system diseases among approximately 32,000 male Danish electric power company workers. Cases were identified through the national patient registry between 1982 and 2010. Exposure to ELF magnetic fields was determined for each worker based on their job titles and area of work. A statistically significant increase was reported for dementia in the high exposure category when compared to the general population, but no exposure-response pattern was identified, and no similar increase was reported in the internal comparisons among the workers. No other statistically significant increases among workers were reported for the incidence of Alzheimer’s disease, Parkinson’s disease, motor neuron disease, multiple sclerosis, or epilepsy, when compared to the general population, or when incidence among workers was analyzed across estimated exposure levels.
- Vinceti et al. (2017) examined the association between ALS and calculated magnetic-field levels from high voltage power lines in Italy. The authors included 703 ALS cases and 2,737 controls; exposure was assessed based on residential proximity to high voltage power lines. No statistically significant associations were reported and no exposure-response trend was observed. Similar results were reported in subgroup analyses by age, calendar period of disease diagnosis, and study area.
- Checkoway et al. (2018) investigated the association between Parkinsonism²¹ and occupational exposure to magnetic fields and several other agents (endotoxins, solvents, shift work) among 800 female textile workers in Shanghai. Exposure to magnetic fields was assessed based on the participants’ work histories. The authors reported no statistically significant associations between Parkinsonism and occupational exposure to any of the agents under study, including magnetic fields.
- Gunnarsson and Bodin (2018) conducted a meta-analysis of occupational risk factors for ALS. The authors reported a statistically significant association between occupational exposures to EMF, estimated using a job-exposure matrix, and ALS among the 11 studies included. Statistically significant associations were also reported between ALS and jobs that involve working with electricity, heavy physical work, exposure to metals (including lead) and chemicals (including pesticides), and working as a nurse or physician. The authors reported some evidence for publication bias. In a subsequent publication, Gunnarsson and Bodin (2019) updated their previous meta-

²¹ Parkinsonism is defined by Checkoway et al. (2018) as “a syndrome whose cardinal clinical features are bradykinesia, rest tremor, muscle rigidity, and postural instability. Parkinson disease is the most common neurodegenerative form of [parkinsonism]” (p. 887).

analysis to also include Parkinson's disease and Alzheimer's disease. A slight, statistically significant association was reported between occupational exposure to EMF and Alzheimer's disease; no association was observed for Parkinson's disease.

- Huss et al. (2018) conducted a meta-analysis of 20 epidemiologic studies of ALS and occupational exposure to magnetic fields. The authors reported a weak overall association; a slightly stronger association was observed in a subset analysis of six studies with full occupational histories available. The authors noted substantial heterogeneity among studies, evidence for publication bias, and a lack of a clear exposure-response relationship between exposure and ALS.
- Jalilian et al. (2018) conducted a meta-analysis of 20 epidemiologic studies of occupational exposure to magnetic fields and Alzheimer's disease. The authors reported a moderate, statistically significant overall association; however, they noted substantial heterogeneity among studies and evidence for publication bias.
- Rösli and Jalilian (2018) performed a meta-analysis using data from five epidemiologic studies examining residential exposure to magnetic fields and ALS. A statistically non-significant negative association was reported between ALS and the highest exposed group, where exposure was defined based on distance from power lines or calculated magnetic-field level.
- Gervasi et al. (2019) assessed the relationship between residential distance to overhead power lines in Italy and risk of Alzheimer's dementia and Parkinson's disease. The authors included 9,835 cases of Alzheimer's dementia and 6,810 cases of Parkinson's disease; controls were matched by sex, year of birth, and municipality of residence. A weak, statistically non-significant association was observed between residences within 50 meters of overhead power lines and both Alzheimer's dementia and Parkinson's disease, compared to distances of over 600 meters.
- Peters et al. (2019) examined the relationship between ALS and occupational exposure to both magnetic fields and electric shock in a pooled study of data from three European countries. The study included 1,323 ALS cases and 2,704 controls matched for sex, age, and geographic location; exposure was assessed based on occupational title and defined as low (background), medium, or high. Statistically significant associations were observed between ALS and ever having been exposed above background levels to either magnetic fields or electric shocks; however, no clear exposure-response trends were observed with exposure duration or cumulative exposure. The authors also noted significant heterogeneity in risk by study location.
- Filippini et al. (2020) investigated the associations between ALS and several

environmental and occupational exposures, including electromagnetic fields, within a case-control study in Italy. The study included 95 cases and 135 controls matched on age, gender, and residential province; exposure to electromagnetic fields was assessed using the participants' responses to questions related to occupational use of electric and electronic equipment, occupational EMF exposure, and residential distance to overhead power lines. The authors reported a statistically significant association between ALS and residential proximity to overhead power lines and a statistically non-significant association between ALS and occupational exposure to EMF; occupational use of electric and electronic equipment was associated with a statistically non-significant decrease in ALS development.

- Huang et al. (2020) conducted a meta-analysis of 43 epidemiologic studies examining potential occupational risk factors for dementia or mild cognitive impairment. The authors included five cohort studies and seven case-control studies related to magnetic-field exposure. For both study types, the authors reported positive associations between dementia and work-related magnetic-field exposures. The paper, however, provided no information on the occupations held by the study participants, their magnetic-field exposure levels, or how magnetic-field levels were assessed; therefore, the results are difficult to interpret. The authors also reported a high level of heterogeneity among studies. Thus, this analysis adds little, if any, to the overall weight of evidence on a potential association between dementia and magnetic fields.
- Jalilian et al. (2020) conducted a meta-analysis of ALS and occupational exposure to both magnetic fields and electric shocks within 27 studies from Europe, the United States, and New Zealand. A weak, statistically significant association was reported between magnetic-field exposure and ALS; however, the authors noted evidence of study heterogeneity and publication bias. No association was observed between ALS and electric shocks.
- Chen et al. (2021) conducted a case-control study to examine the association between occupational exposure to electric shocks, magnetic fields, and motor neuron disease (“MND”) in New Zealand. The study included 319 cases with a MND diagnosis (including ALS) and 604 controls, matched on age and gender; exposure was assessed using the participants' occupational history questionnaire responses and previously developed job-exposure matrices for electric shocks and magnetic fields. The authors reported no associations between MND and exposure to magnetic fields; positive associations were reported between MND and working at a job with the potential for electric shock exposure.
- Grebeneva et al. (2021) evaluated disease rates among electric power company workers in the Republic of Kazakhstan. The authors included three groups of “exposed” workers who “were in contact with equipment generating [industrial frequency EMF]” (a total of 161 workers), as well as 114 controls “who were

not associated with exposure to electromagnetic fields.” Disease rates were assessed “based on analyzing the sick leaves of employees” from 2010 to 2014 and expressed as “incidence rate per 100 employees.” The authors reported a higher “incidence rate” of “diseases of the nervous system” in two of the exposed categories compared to the non-exposed group. No meaningful conclusions from the study could be drawn, however, because no specific diagnoses within “diseases of the nervous system” were identified in the paper and no clear description was provided on how the authors defined and calculated “incidence rate” for the evaluated conditions. In addition, no measured or calculated magnetic-field levels were presented by the authors.

- Filippini et al. (2021) conducted a meta-analysis to assess the dose-response relationship between residential exposure to magnetic fields and ALS. The authors identified six ALS epidemiologic studies, published between 2009 and 2020, that assessed exposure to residential magnetic fields by either distance from overhead power lines or magnetic-field modeling. They reported a decrease in risk of ALS in the highest exposure categories for both distance-based and modeling-based exposure estimates. The authors also reported that their dose-response analyses “showed little association between distance from power lines and ALS;” the data were too sparse to conduct a dose-response analysis for modeled magnetic-field estimates. The authors noted that their study was limited by small sample size, “imprecise” exposure categories, the potential for residual confounding, and by “some publication bias.”
- Jalilian et al. (2021) conducted a meta-analysis of occupational exposure to ELF magnetic fields and electric shocks and development of ALS. The authors included 27 studies from Europe, the United States, and New Zealand that were published between 1983 and 2019. A weak, statistically significant association was reported between magnetic-field exposure and ALS, and no association was observed between electric shocks and ALS. Indications of publication bias and “moderate to high” heterogeneity were identified for the studies of magnetic-field exposure and ALS, and the authors noted that “the results should be interpreted with caution.”
- Goutman et al. (2022) examined occupational exposures, including “electromagnetic radiation” exposure, and associations with ALS in a case-control study of Michigan workers across various industries. The study included 381 cases diagnosed with ALS, all patients at the University of Michigan’s Pranger ALS clinic, and 272 controls recruited from an online database for the University of Michigan. Participants were enrolled from 2010 to 2020 and completed a written survey of their work history and occupational exposures to nine exposure categories, including electromagnetic fields, particulate matter (PM), and pesticides. Exposure to electromagnetic fields was ascertained with a binary question asking whether they were “[e]xposed to power lines, transformation [*sic*] stations or other EM [electromagnetic radiation]?” The analysis was adjusted for age, sex, and military service. No

association was observed between electromagnetic field exposure and ALS, while exposure to PM, pesticides, and metals, among others, were determined by the authors to be “associated with an increased ALS risk in this cohort.”

- Sorahan and Nichols (2022) investigated magnetic-field exposure and mortality from MND in a large cohort of employees of the former Central Electricity Generating Board of England and Wales. The study included nearly 38,000 employees first hired between 1942 and 1982 and still employed in 1987. Estimates of exposure magnitude, frequency, and duration were calculated using data from the power stations and the employees’ job histories, and were described in detail in a previous publication (Renew et al., 2003). Mortality from MND in the total cohort was observed to be similar to national rates. No statistically significant dose-response trends were observed with lifetime, recent, or distant magnetic-field exposure; statistically significant associations were observed for some categories of recent exposure, but not for the highest exposure category.
- Duan et al. (2023) conducted a meta-summary of ALS and exposure to magnetic fields, which was 1 of 22 non-genetic risk factors evaluated across 67 studies for its association with ALS. Six of the 67 studies examined magnetic-field exposure and associations with ALS; of the six studies identified, the authors included four case-control studies and one cohort study in their meta-analysis. Pooling results from these studies resulted in significant increased odds of ALS among individuals with higher (but undefined) exposure to magnetic fields. However, this pooled odds ratio for magnetic-field exposure (1.22) was below the minimum odds ratio threshold of 1.3 set by the authors as the criterion for defining an exposure as an ALS risk factor. In addition, the authors identified “substantial” heterogeneity between studies evaluating magnetic-field exposure and ALS.
- In a subsequent publication of the same study as Goutman et al. (2022), Goutman et al. (2023) assessed the potential for the same nine exposure categories, including “electromagnetic radiation” exposure, to be risk factors for ALS progression, including survival and onset segment (bulbar, cervical, lumbar). Electromagnetic field exposure was not significantly associated with ALS survival or with bulbar onset compared to lumbar, but was significantly associated with cervical onset compared to lumbar. It is worth noting that an association with cervical onset compared to lumbar was observed in the majority (7/9) of the exposure categories. The authors make no concluding statements on electromagnetic field exposure and ALS and instead emphasize that occupational pesticide exposure and working in military operations were significantly associated with worse ALS survival.
- Saucier et al. (2023) carried out three systematic reviews of studies that evaluated relationships between urbanization, air pollution, and water pollution, and ALS development. The authors identified five studies that assessed

whether electromagnetic fields (of varying frequencies) and high voltage infrastructure were significant urbanization risk factors for ALS, but make no conclusion about magnetic-field exposure and ALS development based on these studies, therefore adding little value to the existing literature.

- Vasta et al. (2023) examined the relationship between residential distance to power lines and ALS development in a cohort study of 1,098 participants in Italy. The authors reported no differences in the age of ALS onset or ALS progression rate between low-exposed and high-exposed participants based on residential distance to power lines at the time of the participants' diagnosis. Similarly, no differences were observed when exposure was based on residential distance to repeater antennas.
- Vitturi et al. (2023) conducted a systematic review and meta-analysis of case-control studies examining potential occupational risk factors related to multiple sclerosis, including solvents, mercury, pesticides, and low-frequency magnetic fields. The authors included 24 studies in their review, but only one of the included studies investigated exposure to magnetic fields (Pedersen et al., 2017, discussed above), thereby adding little new information to the existing body of research.

References

Amoon AT, Oksuzyan S, Crespi CM, Arah OA, Cockburn M, Vergara X, Kheifets L. Residential mobility and childhood leukemia. *Environ Res* 164:459-466, 2018a.

Amoon AT, Crespi CM, Ahlbom A, Bhatnagar M, Bray I, Bunch KJ, Clavel J, Feychting M, Hemon D, Johansen C, Kreis C, Malagoli C, Marquant F, Pedersen C, Raaschou-Nielsen O, Rösli M, Spycher BD, Sudan M, Swanson J, Tittarelli A, Tuck DM, Tynes T, Vergara X, Vinceti M, Wunsch-Filho V, Kheifets L. Proximity to overhead power lines and childhood leukaemia: an international pooled analysis. *Br J Cancer* 119:364-373, 2018b.

Amoon AT, Arah OA, Kheifets L. The sensitivity of reported effects of EMF on childhood leukemia to uncontrolled confounding by residential mobility: a hybrid simulation study and an empirical analysis using CAPS data. *Cancer Causes Control* 30:901-908, 2019.

Amoon AT, Crespi CM, Nguyen A, Zhao X, Vergara X, Arah OA, and Kheifets L. The role of dwelling type when estimating the effect of magnetic fields on childhood leukemia in the California Power Line Study (CAPS). *Cancer Causes Control* 31:559-567, 2020.

Amoon AT, Swanson J, Magnani C, Johansen C, Kheifets L. Pooled analysis of recent studies of magnetic fields and childhood leukemia. *Environ Res* 204(Pt A):111993, 2022.

Auger N, Bilodeau-Bertrand M, Marcoux S, Kosatsky T. Residential exposure to electromagnetic fields during pregnancy and risk of child cancer: A longitudinal cohort study. *Environ Res* 176:108524, 2019.

Brabant C, Geerinck A, Beudart C, Tirelli E, Geuzaine C, Bruyère O. Exposure to magnetic fields and childhood leukemia: a systematic review and meta-analysis of case-control and cohort studies. *Rev Environ Health* 38(2):229-253, 2022.

Bunch KJ, Keegan TJ, Swanson J, Vincent TJ, Murphy MF. Residential distance at birth from overhead high voltage powerlines: childhood cancer risk in Britain 1962-2008. *Br J Cancer* 110:1402-1408, 2014.

Bunch KJ, Swanson J, Vincent TJ, Murphy MF. Magnetic fields and childhood cancer: an epidemiological investigation of the effects of high voltage underground cables. *J Radiol Prot* 35:695-705, 2015.

Bunch KJ, Swanson J, Vincent TJ, Murphy MF. Epidemiological study of power lines and childhood cancer in the UK: further analyses. *J Radiol Prot* 36:437-455, 2016.

Checkoway H, Ilango S, Li W, Ray RM, Tanner CM, Hu SC, Wang X, Nielsen S, Gao DL, Thomas DB. Occupational exposures and parkinsonism among Shanghai women textile workers. *Am J Ind Med* 61:886-892, 2018.

Chen GX, Mannetje A, Douwes J, Berg LH, Pearce N, Kromhout H, Glass B, Brewer N, McLean DJ. Occupational exposure to electric shocks and extremely low-frequency magnetic fields and motor neurone disease. *Am J Epidemiol* 190(3):393-402, 2021.

Crespi CM, Vergara XP, Hooper C, Oksuzyan S, Wu S, Cockburn M, Kheifets L. Childhood leukaemia and distance from power lines in California: a population-based case-control study. *Br J Cancer* 115:122-128, 2016.

Crespi CM, Swanson J, Vergara XP, Kheifets L. Childhood leukemia risk in the California Power Line Study: Magnetic fields versus distance from power lines. *Environ Res* 171:530-535, 2019.

Crespi CM, Sudan M, Juutilainen J, Roivainen P, Hareuveny R, Huss A, Kandel S, Karim-Kos HE, Thuróczy G, Jakab Z, Spycher BD, Flueckiger B, Vermeulen R, Vergara X, Kheifets L. International study of childhood leukemia in residences near electrical transformer rooms. *Environ Res* 249:118459, 2024.

Duan QQ, Jiang Z, Su WM, Gu XJ, Wang H, Cheng YF, Cao B, Gao X, Wang Y, Chen YP. Risk factors of amyotrophic lateral sclerosis: a global meta-summary. *Front Neurosci* 17:1177431, 2023.

Duarte-Rodríguez DA, Flores-Lujano J, McNally RJQ, et al. Evidence of spatial clustering of childhood acute lymphoblastic leukemia cases in Greater Mexico

City: report from the Mexican Inter-Institutional Group for the identification of the causes of childhood leukemia. *Front Oncol* 14:1304633, 2024.

European Health Risk Assessment Network on Electromagnetic Fields Exposure (EFHRAN). Report on the Analysis of Risks Associated to Exposure to EMF: *In Vitro* and *In Vivo* (Animals) Studies. Milan, Italy: EFHRAN, 2010.

European Health Risk Assessment Network on Electromagnetic Fields Exposure (EFHRAN). Risk Analysis of Human Exposure to Electromagnetic Fields (Revised). Report D2 of the EFHRAN Project. Milan, Italy: EFHRAN, 2012.

Filippini T, Tesauro M, Fiore M, Malagoli C, Consonni M, Violi F, Iacuzio L, Arcolin E, Oliveri Conti G, Cristaldi A, Zuccarello P, Zucchi E, Mazzini L, Pisano F, Gagliardi I, Patti F, Mandrioli J, Ferrante M, Vinceti M. Environmental and occupational risk factors of amyotrophic lateral sclerosis: A population-based case-control study. *Int J Environ Res Public Health* 17(8):2882, 2020.

Filippini T, Hatch EE, Vinceti M. Residential exposure to electromagnetic fields and risk of amyotrophic lateral sclerosis: a dose-response meta-analysis. *Sci Rep* 11(1):11939, 2021.

Fischer H, Kheifets L, Huss A, Peters TL, Vermeulen R, Ye W, Fang F, Wiebert P, Vergara XP, Feychting M. Occupational Exposure to Electric Shocks and Magnetic Fields and Amyotrophic Lateral Sclerosis in Sweden. *Epidemiology* 26:824-830, 2015.

Gervasi F, Murtas R, Decarli A, Giampiero Russo A. Residential distance from high voltage overhead power lines and risk of Alzheimer's dementia and Parkinson's disease: a population-based case-control study in a metropolitan area of Northern Italy. *Int J Epidemiol* 48(6):1949-1957, 2019.

Grebeneva OV, Rybalkina DH, Ibrayeva LK, Shadetova AZ, Drobchenko EA, Aleshina NY. Evaluating occupational morbidity among energy enterprise employees in industrial region of Kazakhstan. *Russian Open Medical Journal* 10(3):e0319, 2021.

Goutman SA, Boss J, Godwin C, Mukherjee B, Feldman EL, Batterman SA. Associations of self-reported occupational exposures and settings to ALS: a case-control study. *Int Arch Occup Environ Health* 95(7):1567-1586, 2022.

Goutman SA, Boss J, Godwin C, Mukherjee B, Feldman EL, Batterman SA. Occupational history associates with ALS survival and onset segment. *Amyotroph Lateral Scler Frontotemporal Degener* 24(3-4):219-229, 2023.

Gunnarsson LG and Bodin L. Amyotrophic lateral sclerosis and occupational exposures: A systematic literature review and meta-analyses. *Int J Environ Res Public Health* 15(11):2371, 2018.

Gunnarsson LG and Bodin L. Occupational exposures and neurodegenerative diseases: A systematic literature review and meta-analyses. *Int J Environ Res Public Health* 16(3):337, 2019.

Guo H, Kang L, Qin W, Li Y. Electromagnetic Radiation Exposure and Childhood Leukemia: Meta-Analysis and Systematic Review. *Altern Ther Health Med* 29(8):75-81, 2023.

Huang LY, Hu HY, Wang ZT, Ma YH, Dong Q, Tan L, Yu JT. Association of occupational factors and dementia or cognitive impairment: A systematic review and meta-analysis. *J Alzheimers Dis* 78(1):217-227, 2020.

Huss A, Peters S, Vermeulen R. Occupational exposure to extremely low-frequency magnetic fields and the risk of ALS: A systematic review and meta-analysis. *Bioelectromagnetics* 39:156-163, 2018.

Jalilian H, Teshnizi SH, Rööslı M, Neghab M. Occupational exposure to extremely low frequency magnetic fields and risk of Alzheimer disease: A systematic review and meta-analysis. *Neurotoxicology* 69:242-252, 2018.

Jalilian H, Najafi K, Khosravi Y, and Rööslı M. Amyotrophic lateral sclerosis, occupational exposure to extremely low frequency magnetic fields and electric shocks: A systematic review and meta-analysis. *Rev Environ Health* 36(1):129-142, 2021.

Kheifets L, Crespi CM, Hooper C, Cockburn M, Amoon AT, Vergara XP. Residential magnetic fields exposure and childhood leukemia: a population-based case-control study in California. *Cancer Causes Control* 28:1117-1123, 2017.

Koeman T, Schouten LJ, van den Brandt PA, Slottje P, Huss A, Peters S, Kromhout H, Vermeulen R. Occupational exposures and risk of dementia-related mortality in the prospective Netherlands Cohort Study. *Am J Ind Med* 58:625-635, 2015.

Koeman T, Slottje P, Schouten LJ, Peters S, Huss A, Veldink JH, Kromhout H, van den Brandt PA, Vermeulen R. Occupational exposure and amyotrophic lateral sclerosis in a prospective cohort. *Occup Environ Med* 74: 578-585, 2017.

Kyriakopoulou A, Meimeti E, Moisoglou I, Psarrou A, Provatopoulou X, Dounias G. Parental Occupational Exposures and Risk of Childhood Acute Leukemia. *Mater Sociomed* 30: 209-214, 2018.

Malagoli C, Malavolti M, Wise LA, Balboni E, Fabbi S, Teggi S, Palazzi G, Cellini M, Poli M, Zanichelli P, Notari B, Cherubini A, Vinceti M, Filippini T. Residential exposure to magnetic fields from high voltage power lines and risk of childhood leukemia. *Environ Res* 232:116320, 2023.

Malavolti M, Malagoli C, Wise LA, Poli M, Notari B, Taddei I, Fabbi S, Teggi S, Balboni E, Pancaldi A, Palazzi G, Vinceti M, Filippini T. Residential exposure to

magnetic fields from transformer stations and risk of childhood leukemia. *Environ Res* 245:118043, 2024.

Nguyen A, Crespi CM, Vergara X, Kheifets L. Commercial outdoor plant nurseries as a confounder for electromagnetic fields and childhood leukemia risk. *Environ Res* 212(Pt C):113446, 2022.

Nguyen A, Crespi CM, Vergara X, Kheifets L. Pesticides as a potential independent childhood leukemia risk factor and as a potential confounder for electromagnetic fields exposure. *Environ Res* 238(Pt 1):116899, 2023.

Núñez-Enríquez JC, Correa-Correa V, Flores-Lujano J, Pérez-Saldivar ML, Jiménez-Hernández E, Martín-Trejo JA, Espinoza-Hernández LE, Medina-Sanson A, Cárdenas-Cardos R, Flores-Villegas LV, Peñaloza-González JG, Torres-Nava JR, Espinosa-Elizondo RM, Amador-Sánchez R, Rivera-Luna R, Dosta-Herrera JJ, Mondragón-García JA, González-Ulibarri JE, Martínez-Silva SI, Espinoza-Anrubio G, Duarte-Rodríguez DA, García-Cortés LR, Gil-Hernández AE, Mejía-Arangur JM. Extremely low-frequency magnetic fields and the risk of childhood B-lineage acute lymphoblastic leukemia in a city with high incidence of leukemia and elevated exposure to ELF magnetic fields. *Bioelectromagnetics* 41(8):581-597, 2020.

Pedersen C, Johansen C, Schüz J, Olsen JH, Raaschou-Nielsen O. Residential exposure to extremely low-frequency magnetic fields and risk of childhood leukaemia, CNS tumour and lymphoma in Denmark. *Br J Cancer* 113:1370-1374, 2015.

Pedersen C, Poulsen AH, Rod NH, Frei P, Hansen J, Grell K, Raaschou-Nielsen O, Schüz J, Johansen C. Occupational exposure to extremely low-frequency magnetic fields and risk for central nervous system disease: an update of a Danish cohort study among utility workers. *Int Arch Occup Environ Health* 90:619-628, 2017.

Peters S, Visser AE, D'Ovidio F, Beghi E, Chio A, Logroscino G, Hardiman O, Kromhout H, Huss A, Veldink J, Vermeulen R, van den Berg LH. Associations of Electric Shock and Extremely Low-Frequency Magnetic Field Exposure With the Risk of Amyotrophic Lateral Sclerosis. *Am J Epidemiol* 188:796-805, 2019.

Renew DC, Cook RF, Ball MC. A method for assessing occupational exposure to power-frequency magnetic fields for electricity generation and transmission workers. *J Radiol Prot* 23(3):279-303, 2003.

Röösli M and Jalilian H. A meta-analysis on residential exposure to magnetic fields and the risk of amyotrophic lateral sclerosis. *Rev Environ Health* 33:295-299, 2018.

Salvan A, Ranucci A, Lagorio S, Magnani C. Childhood leukemia and 50 Hz magnetic fields: findings from the Italian SETIL case-control study. *Int J Environ*

Res Public Health 12:2184-2204, 2015.

Saucier D, Registe PPW, Bélanger M, O'Connell C. Urbanization, air pollution, and water pollution: Identification of potential environmental risk factors associated with amyotrophic lateral sclerosis using systematic reviews. *Front Neurol* 14:1108383, 2023.

Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR). *Health Effects of Exposure to EMF*. Brussels, Belgium: European Commission, 2009.

Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR). *Opinion on Potential Health Effects of Exposure to Electromagnetic Fields (EMF)*. Brussels, Belgium: European Commission, 2015.

Scientific Committee on Health, Environmental and Emerging Risks (SCHEER). *Preliminary Opinion on Potential Health Effects of Exposure to Electromagnetic Fields (EMF): Update with regard to frequencies between 1Hz and 100 kHz*. Brussels, Belgium: European Commission, 2023.

Seelen M, Vermeulen RC, van Dillen LS, van der Kooi AJ, Huss A, de Visser M, van den Berg LH, Veldink JH. Residential exposure to extremely low frequency electromagnetic fields and the risk of ALS. *Neurology* 83:1767-1769, 2014.

Seomun G, Lee J, Park J. Exposure to extremely low-frequency magnetic fields and childhood cancer: A systematic review and meta-analysis. *PLoS One* 16:e0251628, 2021.

Sorahan T and Mohammed N. Neurodegenerative disease and magnetic field exposure in UK electricity supply workers. *Occup Med (Lond)* 64:454-460, 2014.

Sorahan T and Nichols L. Motor neuron disease risk and magnetic field exposures. *Occup Med (Lond)* 72(3):184-190, 2022.

Swanson J and Bunch KJ. Reanalysis of risks of childhood leukaemia with distance from overhead power lines in the UK. *J Radiol Prot* 38:N30-N35, 2018.

Swanson J, Kheifets L, and Vergara X. Changes over time in the reported risk for childhood leukaemia and magnetic fields. *J Radiol Prot* 39:470-488, 2019.

Swedish Radiation Safety Authority (SSM). *Research 2019:08. Recent Research on EMF and Health Risk – Thirteenth Report from SSM's Scientific Council on Electromagnetic Fields*, 2018. Stockholm, Sweden: Swedish Radiation Safety Authority (SSM), 2019.

Talibov M, Olsson A, Bailey H, Erdmann F, Metayer C, Magnani C, Petridou E, Auvinen A, Spector L, Clavel J, Roman E, Dockerty J, Nikkila A, Lohi O, Kang A, Psaltopoulou T, Miligi L, Vila J, Cardis E, Schüz J. Parental occupational exposure

to low-frequency magnetic fields and risk of leukaemia in the offspring: findings from the Childhood Leukaemia International Consortium (CLIC). *Occup Environ Med* 76:746-753, 2019.

Vasta R, Callegaro S, Grassano M, Canosa A, Cabras S, Di Pede F, Matteoni E, De Mattei F, Casale F, Salamone P, Mazzini L, De Marchi F, Moglia C, Calvo A, Chiò A, Manera U. Exposure to electromagnetic fields does not modify neither the age of onset nor the disease progression in ALS patients. *Amyotroph Lateral Scler Frontotemporal Degener* 24(3-4):343-346, 2023.

Vergara X, Mezei G, Kheifets L. Case-control study of occupational exposure to electric shocks and magnetic fields and mortality from amyotrophic lateral sclerosis in the US, 1991-1999. *J Expo Sci Environ Epidemiol* 25:65-71, 2015.

Vinceti M, Malagoli C, Fabbi S, Kheifets L, Violi F, Poli M, Caldara S, Sesti D, Violanti S, Zanichelli P, Notari B, Fava R, Arena A, Calzolari R, Filippini T, Iacuzio L, Arcolin E, Mandrioli J, Fini N, Odone A, Signorelli C, Patti F, Zappia M, Pietrini V, Oleari P, Teggi S, Ghermandi G, Dimartino A, Ledda C, Mauceri C, Sciacca S, Fiore M, Ferrante M. Magnetic fields exposure from high voltage power lines and risk of amyotrophic lateral sclerosis in two Italian populations. *Amyotroph Lateral Scler Frontotemporal Degener* 18:583-589, 2017.

Vitturi BK, Montecucco A, Rahmani A, Dini G, Durando P. Occupational risk factors for multiple sclerosis: a systematic review with meta-analysis. *Front Public Health* 11:1285103, 2023.

World Health Organization (WHO). *Environmental Health Criteria 238: Extremely Low Frequency (ELF) Fields*. Geneva, Switzerland: World Health Organization, 2007.

Zagar T, Valic B, Kotnik T, Korat S, Tomsic S, Zadnik V, Gajsek P. Estimating exposure to extremely low frequency magnetic fields near high voltage power lines and assessment of possible increased cancer risk among Slovenian children and adolescents. *Radiol Oncol* 57(1):59-69, 2023.

V. NOTICE

- A. Furnish a proposed route description to be used for public notice purposes. Provide a map of suitable scale showing the route of the proposed project. For all routes that the Applicant proposed to be noticed, provide minimum, maximum and average structure heights.**

Response: A map showing the Proposed Route and Alternative Routes 3 and 4 is provided in Attachment V.A. The map also shows the location of the Tributary Station.

Proposed Route

The Proposed Route is approximately 2.4 miles in length and begins at the #2090 Tap, approximately 0.5 mile south of where the existing line crosses Guinea Station Road in Spotsylvania County. From the cut in, the Proposed Route heads west/northwest for about 0.4 mile, passing through forested land before angling southwest through forest for about 0.7 mile, passing through a portion of the KOA Campground and crossing the Ni River. On the south side of the river, the route turns west, crossing agricultural and forested land for about 1.2 miles and crossing Interstate 95. On the west side of Interstate 95 the route turns north for about 0.1 mile and enters the proposed Tributary Station.

The Proposed Route will be constructed on new right-of-way primarily supported by double circuit weathering steel monopoles with a minimum structure height of 100 feet, a maximum structure height of 110 feet, and an average structure height of 109 feet, based on preliminary conceptual design, not including foundation reveal, and subject to change based on final engineering design.

Alternative Route 3

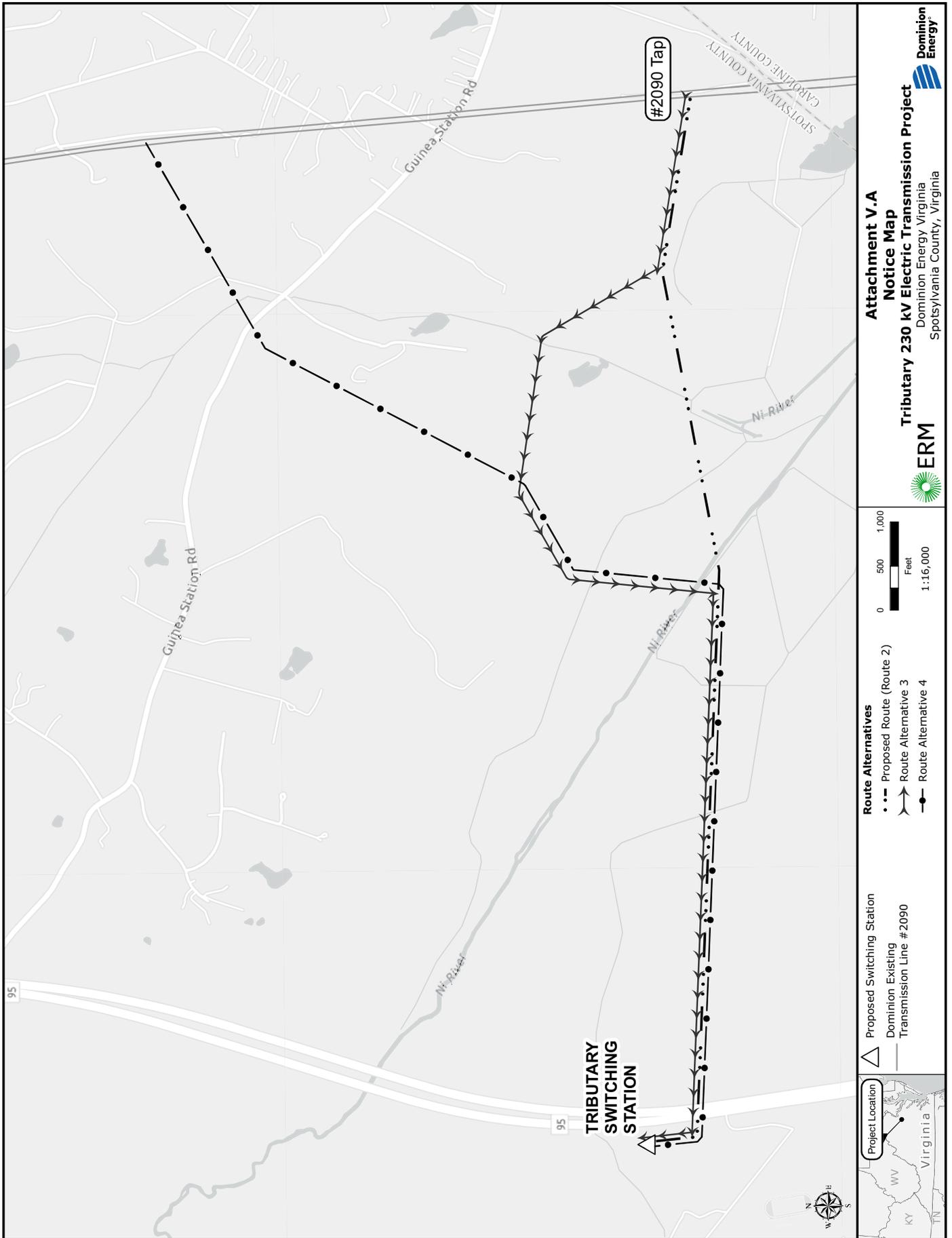
Alternative Route 3 is approximately 2.8 miles in length and begins at the #2090 Tap, approximately 0.5 mile south of where the existing line crosses Guinea Station Road in Spotsylvania County. From the cut in, Alternative Route 3 heads west/northwest for about 0.4 mile before turning north/northwest for about 0.3 mile. At this point the route turns west and crosses the KOA Campground. On the west edge of the campground, the route turns southwest/south for about 0.5 mile, paralleling an undeveloped, forested parcel boundary and crossing the Ni River. On the south side of the river, the route turns west, crossing agricultural and forested land for about 1.2 miles and crossing Interstate 95. On the west side of Interstate 95 the route turns north for about 0.1 mile and enters the Tributary Station.

The Proposed Route will be constructed on new right-of-way primarily supported by double circuit weathering steel monopoles with a minimum structure height of 100 feet, a maximum structure height of 115 feet, and an average structure height of 109 feet, based on preliminary conceptual design, not including foundation reveal, and subject to change based on final engineering design.

Alternative Route 4

Alternative Route 4 is approximately 3.0 miles in length and begins at a cut-in at Structure #2090/82 along the Company's existing Line #2090, approximately 0.7 mile north of the intersection of the existing line and Guinea Station Road. From here, Alternative Route 4 heads southwest/south for about 1.1 mile, passing through forested land and crossing Guinea Station Road. Just west of the KOA Campground, the route turns west/southwest for about 0.5 mile and then west for about 1.2 mile, crossing Interstate 95 and turning north into the Tributary Station.

The Proposed Route will be constructed on new right-of-way primarily supported by double circuit weathering steel monopoles with a minimum structure height of 100 feet, a maximum structure height of 140 feet, and an average structure height of 110 feet, based on preliminary conceptual design, not including foundation reveal, and subject to change based on final engineering design.



V. NOTICE

- B. List Applicant offices where members of the public may inspect the application. If applicable, provide a link to website(s) where the application may be found.**

Response: Shortly after filing, the Application will be made available electronically for public inspection at: www.dominionenergy.com/tributary.

V. NOTICE

- C. List all federal, state, and local agencies and/or officials that may reasonably be expected to have an interest in the proposed construction and to whom the Applicant has furnished or will furnish a copy of the application.

Response:

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

Ms. Michelle Henicheck
Department of Environmental Quality
Office of Wetlands and Streams
1111 East Main Street, Suite 1400
Richmond, Virginia 23219

Ms. Rene Hypes
Virginia Department of Conservation and Recreation
Division of Natural Heritage
600 East Main Street, 24th Floor
Richmond, Virginia 23219

Environmental Reviewer
Virginia Department of Conservation and Recreation
Planning & Recreation Bureau
600 East Main Street, 17th Floor
Richmond, Virginia 23219

Ms. Hannah Schul
Environmental Services Biologist Manager
Virginia Department of Wildlife Resources
P.O. Box 90778
Henrico, Virginia 23228

Mr. Keith Tignor
Endangered Plant and Insect Species Program
Virginia Department of Agriculture and Consumer Affairs
102 Governor Street
Richmond, Virginia 23219

Mr. Clint Folks
Forestland Conservation Coordinator
Virginia Department of Forestry

900 Natural Resources Drive, Suite 800
Charlottesville, Virginia 22903

Scoping at VMRC
Virginia Marine Resources Commission
Habitat Management Division
Building 96, 380 Fenwick Road
Ft. Monroe, Virginia 23651

Mr. Troy Andersen
US Fish and Wildlife Service
Ecological Services Virginia Field Office
6669 Short Lane
Gloucester, Virginia 23061

Ms. Regena Bronson
U.S. Army Corps of Engineers
Fredericksburg Field Office
1420 Central Park Boulevard
Fredericksburg, Virginia 22401

Ms. Arlene Fields Warren
Office of Drinking Water
Virginia Department of Health
109 Governor Street
Richmond, Virginia 23219

Ms. Martha Little
Virginia Outdoors Foundation
P.O. Box 85073, PMB 38979
Richmond, Virginia 23285-5073

Mr. Roger Kirchen
Director, Review and Compliance Division
Department of Historic Resources
2801 Kensington Avenue
Richmond, Virginia 23221

Mr. Scott Denny
Airport Services Division
Virginia Department of Aviation
5702 Gulfstream Road
Richmond, Virginia 23250

Ms. Marcie Parker, P.E.
Fredericksburg District Engineer
Virginia Department of Transportation

87 Deacon Road
Fredericksburg, Virginia 22405

V. NOTICE

- D. If the application is for a transmission line with a voltage of 138 kV or greater, provide a statement and any associated correspondence indicating that prior to the filing of the application with the SCC the Applicant has notified the chief administrative officer of every locality in which it plans to undertake construction of the proposed line of its intention to file such an application, and that the Applicant gave the locality a reasonable opportunity for consultation about the proposed line (similar to the requirements of § 15.2-2202 of the Code for electric transmission lines of 150 kV or more).**

Response: In accordance with Va. Code § 15.2-2202 E, a letter dated August 29, 2024, was sent to Ed Petrovich, County Administrator in Spotsylvania County, where the Project is located. The letter stated the Company's intention to file this Application and invited the County to consult with the Company about the Project. This letter is included as Attachment V.D.1.

Dominion Energy Services, Inc.
5000 Dominion Boulevard, 3rd Floor
Glen Allen, VA 23060
DominionEnergy.com



Ed Petrovitch
County Administrator, Spotsylvania County
9104 Courthouse Road
Spotsylvania, VA 22553

August 29, 2024

RE: Dominion Energy Virginia's Proposed 230 kV Tributary Transmission Project

Notice Pursuant to Va. Code § 15.2-2202 E

Dear Ed Petrovitch,

Dominion Energy Virginia (the "Company") is proposing to construct a new 230 kilovolt ("kV") delivery point ("DP") switching station (the "Tributary Station") and a new approximately 2.3 mile long double circuit overhead 230 kV transmission Line #2404 that connects the proposed Tributary Station to the existing 230 kV transmission system in Spotsylvania County, Virginia. Collectively this work is referred to as the "Project." The Project is needed to provide service requested by a customer, which is prompted by the growing data center development in the area, to maintain reliable service for the overall load growth in the Project area, and to comply with mandatory North American Electric Reliability Corporation ("NERC") Reliability Standards.

The Company is preparing to file an application for a certificate of public convenience and necessity ("CPCN") with the State Corporation Commission (the "Commission"). Pursuant to § 15.2-2202 E of the Code of Virginia, the Company is writing to notify Spotsylvania County of the proposed Project in advance of the CPCN application filing and respectfully requests that you submit any comments or additional information you feel would have bearing on the Project within 30 days of the date of this letter. Once filed, the CPCN application filing will be available for review on the Company's website at www.dominionenergy.com/tributary.

Enclosed is a Project Overview Map depicting the Project's route alternatives, as well as the general Project location. Please note that the Project Overview Map and route description depicted therein are preliminary in nature and subject to final engineering. All final materials, including maps, will be available in the Company's CPCN application filing with the Commission.

Dominion Energy Services, Inc.
5000 Dominion Boulevard, 3rd Floor
Glen Allen, VA 23060
DominionEnergy.com



If you would like to receive a GIS shapefile of the route alternatives to assist in your Project review or if there are any questions, please do not hesitate to contact me directly at (804) 658-7316 or blair.parks@dominionenergy.com. Dominion Energy Virginia appreciates your assistance with this Project review and looks forward to any additional information you may have to offer.

Regards,

Blair Parks

Blair Parks
Senior Siting and Permitting Specialist
Electric Transmission
5000 Dominion Boulevard, 3rd Floor
Glen Allen, VA 23060
804-658-7316

Enclosure: Project Overview Map

COMMONWEALTH OF VIRGINIA
STATE CORPORATION COMMISSION

APPLICATION OF)
)
VIRGINIA ELECTRIC AND POWER) Case No. PUR-2024-000181
COMPANY)
)
For approval and certification of electric)
transmission facilities: 230 kV Line)
#2090 Extension and)
Tributary Switching Station)

**IDENTIFICATION, SUMMARIES AND TESTIMONY OF DIRECT WITNESSES OF
VIRGINIA ELECTRIC AND POWER COMPANY**

Ramtin Khalili

Witness Direct Testimony Summary
Direct Testimony
Appendix A: Background and Qualifications

Blair Parks

Witness Direct Testimony Summary
Direct Testimony
Appendix A: Background and Qualifications

George Brimmer

Witness Direct Testimony Summary
Direct Testimony
Appendix A: Background and Qualifications

Sergio E. De Hoyos Irizarry

Witness Direct Testimony Summary
Direct Testimony
Appendix A: Background and Qualifications

Mariah Weitzenkamp

Witness Direct Testimony Summary
Direct Testimony
Appendix A: Background and Qualifications

WITNESS DIRECT TESTIMONY SUMMARY

Witness: Ramtin Khalili

Title: Engineer III – Electric Transmission Planning

Summary:

Company Witness Ramtin Khalili sponsors those sections of the Appendix describing the Company's electric transmission system and the need for, and benefits of, the Project, as follows:

- Section I.A: This section details the primary justifications for the Project.
- Section I.B: This section details the engineering justifications for the Project.
- Section I.C: This section describes the present system and details how the Project will effectively satisfy present and projected future load demand requirements.
- Section I.D: Although not applicable to the proposed project, this section, when applicable, describes critical contingencies and associated violations due to the inadequacy of the existing system.
- Section I.E: This section explains feasible project alternatives.
- Section I.G: This section provides a system map for the affected area.
- Section I.J: This section provides information about the project if approved by the RTO.
- Section I.K: This section, when applicable, provides outage history and maintenance history for existing transmission lines if the proposed project is a rebuild and is due in part to reliability issues.
- Section I.M: This section, when applicable, contains information for transmission lines interconnecting a non-utility generator.
- Section I.N: This section provides the proposed and existing generating sources, distribution circuits or load centers planned to be served by all new substations, switching stations, and other ground facilities associated with the project.
- Section II.A.3: This section provides color maps of existing or proposed rights-of-way in the vicinity of the Project.
- Section II.A.10: This section provides details of the construction plans for the Project, including requested and approved line outage schedules.

Additionally, Mr. Khalili co-sponsors the following portions of the Appendix:

- Executive Summary (co-sponsored with Company Witness Blair Parks, George Brimmer, Sergio E. De Hoyos Irizarry, and Mariah Weitzenkamp): The Executive Summary provides a brief summary of the Project.
- Section I.H (co-sponsored with Company Witness Blair Parks): This section provides the desired in-service date of the Project and the estimated construction time.
- Section I.L (co-sponsored with Company Witness Sergio E. De Hoyos Irizarry): This section, when applicable, provides details on the deterioration of structures and associated equipment.

A statement of Mr. Khalili's background and qualifications is attached to his testimony as Appendix A.

**DIRECT TESTIMONY
OF
RAMTIN KHALILI
ON BEHALF OF
VIRGINIA ELECTRIC AND POWER COMPANY
BEFORE THE
VIRGINIA STATE CORPORATION COMMISSION
CASE NO. PUR-2024-00181**

1 **Q. Please state your name, business address and position with Virginia Electric and**
2 **Power Company (“Dominion Energy Virginia” or the “Company”).**

3 A. My name is Ramtin Khalili, and I am Engineer III - Electric Transmission Planning for the
4 Company. My business address is 5000 Dominion Boulevard, Glen Allen, Virginia 23060.
5 A statement of my qualifications and background is provided as Appendix A.

6 **Q. Please describe your areas of responsibility with the Company.**

7 A. I am responsible for planning the Company’s Southside electric transmission system
8 for voltages of 69 kilovolts (“kV”) through 500 kV.

9 **Q. What is the purpose of your testimony in this proceeding?**

10 A. In order to provide requested transmission service to Rappahannock Electric Cooperative
11 (“REC”), with the requested service being prompted by the growing data center
12 development in the area; to maintain reliable service for overall load growth in the area;
13 and to comply with mandatory North American Electric Corporation (“NERC”) Reliability
14 Standards, Virginia Electric and Power Company (“Dominion Energy Virginia” or the
15 “Company”) proposes in Spotsylvania County, Virginia to:

16 • Construct a new 230 kilovolt (“kV”) delivery point (“DP”) switching station
17 (“Tributary Station”), which will provide interconnection to REC to serve its
18 customer, the SpotsyTech Campus, a planned mixed-use technology park which
19 includes a data center; and

- Extend the Company’s existing 230 kV Line #2090 (Fredericksburg — Ladysmith CT) by constructing a new double circuit overhead 230 kV line on new approximately 100-foot-wide right-of-way by cutting the Company’s existing 230 kV Line #2090 (Fredericksburg — Ladysmith CT) at the proposed Structure #2090/91A¹ (“#2090 Tap”) (the new double circuit overhead 230 kV line is referred as “230 kV Line #2090 extension”). The cut in will result in (i) new 230 kV Line #2404 from New Post to Tributary Station, and (ii) 230 kV Line #2090 from Ladysmith CT to Tributary Station.² From the cut-in location at the #2090 Tap, the 230 kV Line #2090 extension will extend for approximately 2.4 miles to the Tributary Station.

The Tributary Station and the 230 kV Line #2090 extension are collectively referred to as the “Project.” The purpose of my testimony is to describe the Company’s electric transmission system and the need for, and benefits of, the Project. I am sponsoring Sections I.A., I.B, I.C, I.D, I.E, I.G, I.J, I.K, I.M, I.N, II.A.3, and II.A.10 of the Appendix. Additionally, I co-sponsor the Executive Summary with Company Witnesses Blair Parks, George Brimmer, Sergio E. De Hoyos Irizarry, and Mariah Weitzenkamp; Sections I.H with Company Witness Blair Parks; and lastly, Section I.L with Company Witness Sergio E. De Hoyos Irizarry.

¹ Structure #209091A is a proposed structure to be constructed between existing Structures #2090/91 and #2090/92 of Line #2090.

² Segments of Line #2090 (Fredericksburg – Ladysmith CT) will be renumbered several times as a result of other projects in the Fredericksburg – Ladysmith CT corridor. Line #2090 will be renumbered to 230 kV Line #2301 between Fredericksburg and Lee’s Hill Substations, and to 230 kV Line #2335 between Lee’s Hill and New Post Substations. After this Project is completed, 230 kV Line #2090 will again be renumbered to Line #2404 between New Post and Tributary Stations, with existing 230 kV Line #2090 extending between Tributary Station and Ladysmith CT only. See Attachments I.A.3, I.A.4, and I.A.5 for one-line diagrams of: (i) the existing transmission system in the Project load area, (ii) the Project load area after the New Post and Lee’s Hill Substations are built, and (iii) the Project load area after the Project is energized.

1 Q. Does this conclude your testimony?

2 A. Yes, it does.

**BACKGROUND AND QUALIFICATIONS
OF
RAMTIN KHALILI**

Ramtin Khalili received a Doctor of Philosophy in Electrical and Electronics Engineering from Northeastern University in 2022. He also received Bachelor of Science and Master of Science degrees in electrical engineering from K. N. Toosi University of Technology and Amirkabir University of Technology, respectively. Dr. Khalili been employed by the Company since January of 2023. Prior to joining the Company, he worked as a power systems engineer with Quanta Technology LLC and other consulting companies. His areas of expertise are power system monitoring, modeling, and control. He is an expert in static, dynamic, and transient power system studies.

Mr. Khalili has previously testified before the Virginia State Corporation Commission.

WITNESS DIRECT TESTIMONY SUMMARY

Witness: Blair Parks

Title: Senior Siting and Permitting Specialist

Summary:

Company Witness Blair Parks will sponsor those portions of the Appendix providing an overview of the design of the route for the Project, and related permitting, as follows:

- Section V.B to V.D: These sections provide information related to public notice of the Project.

Additionally, Ms. Parks co-sponsors the following portions of the Appendix:

- Executive Summary (co-sponsored with Company Witnesses Ramtin Khalili, George Brimmer, Sergio E. De Hoyos Irizarry, and Mariah Weitzenkamp): The Executive Summary provides a brief summary of the Project.
- Section I.H (co-sponsored with Company Witness Ramtin Khalili): This section provides the desired in-service date of the Project and the estimated construction time.
- Section II.A.1 (co-sponsored with Company Witness Mariah Weitzenkamp): This section provides the length of the proposed corridor and viable alternatives to the Project.
- Section II.A.2 (co-sponsored with Company Witness Mariah Weitzenkamp): This section provides a map showing the route of the Project in relation to notable points close to the Project.
- Section II.A.4 (co-sponsored with Company Witness Mariah Weitzenkamp): This section explains why the existing right-of-way is not adequate to serve the need.
- Sections II.A.6 to II.A.8 (co-sponsored with Company Witnesses Mariah Weitzenkamp): These sections provide detail regarding the right-of-way for Project.
- Section II.A.9 (co-sponsored with Company Witnesses Mariah Weitzenkamp and Sergio E. De Hoyos Irizarry): This section describes the proposed route selection procedures and details alternative routes considered.
- Section II.A.11 (co-sponsored with Company Witness Mariah Weitzenkamp): This section details how the construction of the Project follows the provisions discussed in Attachment 1 of the Transmission Appendix Guidelines.
- Section II.A.12 (co-sponsored with Company Witness Mariah Weitzenkamp): This section identifies the counties and localities through which the Project will pass.
- Sections II.B.3 to II.B.5 (co-sponsored with Company Witness Sergio E. De Hoyos Irizarry): These sections provide supporting structure details along the proposed and alternative routes.
- Section II.B.6 (co-sponsored with Company Witness Mariah Weitzenkamp): This section provides photographs of existing facilities, representations of proposed facilities, and visual simulations.
- Section III (co-sponsored with Company Witnesses Mariah Weitzenkamp): This section details the impact of the Project on scenic, environmental, and historic features.
- Section V.A (co-sponsored with Company Witnesses Mariah Weitzenkamp and Sergio E. De Hoyos Irizarry): This section provides the proposed route description and structure heights for notice purposes.

Finally, Ms. Parks co-sponsors the DEQ Supplement filed with the Application with Company Witness Mariah Weitzenkamp.

A statement of Ms. Parks' background and qualifications is attached to her testimony as Appendix A.

**DIRECT TESTIMONY
OF
BLAIR PARKS
ON BEHALF OF
VIRGINIA ELECTRIC AND POWER COMPANY
BEFORE THE
STATE CORPORATION COMMISSION OF VIRGINIA
CASE NO. PUR-2024-00181**

1 **Q. Please state your name, business address and position with Virginia Electric and**
2 **Power Company (“Dominion Energy Virginia” or the “Company”).**

3 A. My name is Blair Parks, and I am a Senior Siting and Permitting Specialist for Virginia
4 Electric and Power Company (“Dominion Energy Virginia” or the “Company”) supporting
5 Electric Transmission. My business address is 5000 Dominion Boulevard, Glen Allen,
6 Virginia 23060. A statement of my qualifications and background is provided as Appendix
7 A.

8 **Q. Please describe your areas of responsibility with the Company.**

9 A. I am responsible for identifying appropriate routes for transmission lines and obtaining
10 necessary federal, state, and local approvals and permits for those facilities. In this
11 position, I work closely with government officials, permitting agencies, property owners,
12 and other interested parties, as well as with other Company personnel, to develop and
13 maintain facilities needed by the public so as to reasonably minimize environmental and
14 other impacts on the public in a reliable, cost-effective manner.

15 **Q. What is the purpose of your testimony in this proceeding?**

16 A. In order to provide requested transmission service to Rappahannock Electric Cooperative
17 (“REC”), with the requested service being prompted by the growing data center
18 development in the area; to maintain reliable service for overall load growth in the area;
19 and to comply with mandatory North American Electric Corporation (“NERC”) Reliability

1 Standards, Virginia Electric and Power Company (“Dominion Energy Virginia” or the
2 “Company”) proposes in Spotsylvania County, Virginia to:

- 3 • Construct a new 230 kilovolt (“kV”) delivery point (“DP”) switching station
4 (“Tributary Station”), which will provide interconnection to REC to serve its
5 customer, the SpotsyTech Campus, a planned mixed-use technology park which
6 includes a data center; and
- 7 • Extend the Company’s existing 230 kV Line #2090 (Fredericksburg — Ladysmith
8 CT) by constructing a new double circuit overhead 230 kV line on new
9 approximately 100-foot-wide right-of-way by cutting the Company’s existing 230
10 kV Line #2090 (Fredericksburg — Ladysmith CT) at the proposed Structure
11 #2090/91A¹ (“#2090 Tap”) (the new double circuit overhead 230 kV line is referred
12 as “230 kV Line #2090 extension”). The cut in will result in (i) new 230 kV Line
13 #2404 from New Post to Tributary Station, and (ii) 230 kV Line #2090 from
14 Ladysmith CT to Tributary Station.² From the cut-in location at the #2090 Tap, the
15 230 kV Line #2090 extension will extend for approximately 2.4 miles to the
16 Tributary Station.

¹ Structure #209091A is a proposed structure to be constructed between existing Structures #2090/91 and #2090/92 of Line #2090.

² Segments of Line #2090 (Fredericksburg – Ladysmith CT) will be renumbered several times as a result of other projects in the Fredericksburg – Ladysmith CT corridor. Line #2090 will be renumbered to 230 kV Line #2301 between Fredericksburg and Lee’s Hill Substations, and to 230 kV Line #2335 between Lee’s Hill and New Post Substations. After this Project is completed, 230 kV Line #2090 will again be renumbered to Line #2404 between New Post and Tributary Stations, with existing 230 kV Line #2090 extending between Tributary Station and Ladysmith CT only. See Attachments I.A.3, I.A.4, and I.A.5 for one-line diagrams of: (i) the existing transmission system in the Project load area, (ii) the Project load area after the New Post and Lee’s Hill Substations are built, and (iii) the Project load area after the Project is energized.

1 The Tributary Station and the 230 kV Line #2090 extension are collectively referred to as
2 the “Project.” The purpose of my testimony is to provide an overview of the route and
3 permitting for the Project. As it pertains to routing and permitting, I sponsor Sections V.B
4 to V.D of the Appendix. I co-sponsor the Executive Summary with Company Witnesses
5 Ramtin Khalili, George Brimmer, Sergio E. De Hoyos Irizarry, and Mariah Weitzenkamp;
6 Sections II.A.1, II.A.2, II.A.4, II.A.6 to II.A.8, II.A.11, II.A.12, II.B.6, and III of the
7 Appendix with Company Witness Mariah Weitzenkamp; Section I.H with Company
8 Witness Ramtin Khalili; Sections II.B.3 to II.B.5 with Company Witness Sergio E. De
9 Hoyos Irizarry; Sections II.A.9 and V.A with Company Witness Mariah Weitzenkamp and
10 Sergio E. De Hoyos Irizarry; and lastly, I co-sponsor the DEQ Supplement filed with the
11 Application with Company Witness Mariah Weitzenkamp.

12 **Q. Has the Company complied with Va. Code § 15.2-2202 E?**

13 A. In accordance with Va. Code § 15.2-2202 E, a letter dated August 29, 2024, was sent to Ed
14 Petrovich, County Administrator in Spotsylvania County, where the Project is located. The
15 letter stated the Company’s intention to file this Application and invited the County to
16 consult with the Company about the Project. Copies of this letter are included as appendix
17 Attachment V.D.1.

18 **Q. Does this conclude your pre-filed direct testimony?**

19 A. Yes, it does.

**BACKGROUND AND QUALIFICATIONS
OF
BLAIR PARKS**

Blair Parks graduated from Virginia Commonwealth University in 2017 with a Bachelor of Science in Environmental Studies. She was previously a Regulatory Specialist for Stantec Consulting Services, Inc., where she was responsible for permitting electric distribution and transportation projects. Ms. Parks joined Dominion Energy Virginia's Siting and Permitting Group in 2022, and she was promoted to Senior Siting and Permitting Specialist in July 2024.

Ms. Parks has previously testified before the Virginia State Corporate Commission.

WITNESS DIRECT TESTIMONY SUMMARY

Witness: George Brimmer

Title: Engineer III - Substation Conceptual

Summary:

Company Witness George Brimmer sponsors the following portions of the Appendix describing the substation work to be performed for the proposed Project, as follows:

- Section II.C: This section describes and furnishes a one-line diagram of new substation(s) associated with the Project.

Additionally, Mr. Brimmer co-sponsors the following portion of the Appendix:

- Executive Summary (co-sponsored with Company Witnesses Blair Parks, Ramtin Khalili, Sergio E. De Hoyos Irizarry, and Mariah Weitzenkamp): The Executive Summary provides a brief summary of the Project.
- Section I.I (co-sponsored with Company Witness Sergio E. De Hoyos Irizarry): This section provides the estimated total cost of the Project.

A statement of Mr. Brimmer background and qualifications is attached to his testimony as Appendix A.

**DIRECT TESTIMONY
OF
GEORGE BRIMMER
ON BEHALF OF
VIRGINIA ELECTRIC AND POWER COMPANY
BEFORE THE
VIRGINIA STATE CORPORATION COMMISSION
CASE NO. PUR-2024-00181**

1 **Q. Please state your name, business address and position with Virginia Electric and**
2 **Power Company (“Dominion Energy Virginia” or the Company”).**

3 A. My name is George Brimmer, and I am an Engineer III - Substation Conceptual. My business
4 address is 5000 Dominion Boulevard, Glen Allen, Virginia 23060. A statement of my
5 qualifications and background is provided as Appendix A.

6 **Q. Please describe your areas of responsibility with the Company.**

7 A. I am responsible for the evaluation of substation project requirements, feasibility
8 studies, conceptual physical design, scope development, preliminary engineering and
9 cost estimating for high voltage transmission and distribution substations.

10 **Q. What is the purpose of your testimony in this proceeding?**

11 A. In order to provide requested transmission service to Rappahannock Electric Cooperative
12 (“REC”), with the requested service being prompted by the growing data center
13 development in the area; to maintain reliable service for overall load growth in the area;
14 and to comply with mandatory North American Electric Corporation (“NERC”) Reliability
15 Standards, Virginia Electric and Power Company (“Dominion Energy Virginia” or the
16 “Company”) proposes in Spotsylvania County, Virginia to:

17 • Construct a new 230 kilovolt (“kV”) delivery point (“DP”) switching station
18 (“Tributary Station”), which will provide interconnection to REC to serve its

1 customer, the SpotsyTech Campus, a planned mixed-use technology park which
2 includes a data center; and

- 3 • Extend the Company’s existing 230 kV Line #2090 (Fredericksburg — Ladysmith
4 CT) by constructing a new double circuit overhead 230 kV line on new
5 approximately 100-foot-wide right-of-way by cutting the Company’s existing 230
6 kV Line #2090 (Fredericksburg — Ladysmith CT) at the proposed Structure
7 #2090/91A¹ (“#2090 Tap”) (the new double circuit overhead 230 kV line is referred
8 as “230 kV Line #2090 extension”). The cut in will result in (i) new 230 kV Line
9 #2404 from New Post to Tributary Station, and (ii) 230 kV Line #2090 from
10 Ladysmith CT to Tributary Station.² From the cut-in location at the #2090 Tap, the
11 230 kV Line #2090 extension will extend for approximately 2.4 miles to the
12 Tributary Station.

13 The Tributary Station and the 230 kV Line #2090 extension are collectively referred to as
14 the “Project.” The purpose of my testimony is to describe the substation work to be
15 performed as a part of the proposed Project, including work at Tributary Station, and
16 related cost. I sponsor Section II.C of the Appendix. Additionally, I co-sponsor the
17 Executive Summary with Company Witnesses Ramtin Khalili, Blair Parks, Sergio E. De

¹ Structure #209091A is a proposed structure to be constructed between existing Structures #2090/91 and #2090/92 of Line #2090.

² Segments of Line #2090 (Fredericksburg – Ladysmith CT) will be renumbered several times as a result of other projects in the Fredericksburg – Ladysmith CT corridor. Line #2090 will be renumbered to 230 kV Line #2301 between Fredericksburg and Lee’s Hill Substations, and to 230 kV Line #2335 between Lee’s Hill and New Post Substations. After this Project is completed, 230 kV Line #2090 will again be renumbered to Line #2404 between New Post and Tributary Stations, with existing 230 kV Line #2090 extending between Tributary Station and Ladysmith CT only. See Attachments I.A.3, I.A.4, and I.A.5 for one-line diagrams of: (i) the existing transmission system in the Project load area, (ii) the Project load area after the New Post and Lee’s Hill Substations are built, and (iii) the Project load area after the Project is energized.

1 Hoyos Irizarry, and Mariah Weitzenkamp; and lastly, Section I.I with Company Witness
2 Sergio E. De Hoyos Irizarry.

3 **Q. Does this conclude your testimony?**

4 **A. Yes, it does.**

**BACKGROUND AND QUALIFICATIONS
OF
GEORGE BRIMMER**

George Brimmer received a Bachelor of Science degree in Electrical Engineering from Virginia Commonwealth University in 2014. Mr. Brimmer also received a Bachelor of Science degree in Psychology in 2008. Mr. Brimmer has been employed by the Company since 2013. Prior to joining the Company, he worked as Cable Technician for American Systems Corporation from 2010 to 2011. His areas of expertise are substation and grounding design.

Mr. Brimmer has previously testified before the Virginia State Corporation Commission.

WITNESS DIRECT TESTIMONY SUMMARY

Witness: Sergio E. De Hoyos Irizarry

Title: Engineer— Electric Transmission Line Engineering

Summary:

Company Witness Sergio E. De Hoyos Irizarry sponsors those portions of the Appendix providing an overview of the design characteristics of the transmission facilities for the proposed Project, and discussing electric and magnetic field levels, as follows:

- Section I.F: This section, when applicable, describes any lines or facilities that will be removed, replaced, or taken out of service upon completion of the proposed project.
- Section II.A.5: This section provides drawings of the right-of-way cross section showing typical transmission lines structure placements.
- Section II.B.1 to II.B.2: These sections provide the line design and operational features of the proposed project, as applicable.
- Section IV: This section provides analysis on the health aspects of electric and magnetic field levels.

Additionally, Mr. De Hoyos Irizarry co-sponsors the following portion of the Appendix:

- Executive Summary (co-sponsored with Company Witnesses Blair Parks, Ramtin Khalili, Geroge Brimmer, and Mariah Weitzenkamp): The Executive Summary provides a brief summary of the Project.
- Section I.I (co-sponsored with George Brimmer): This section provides the estimated total cost of the Project.
- Section I.L (co-sponsored with Company Witness Ramtin Khalili): This section, when applicable, provides details on the deterioration of structures and associated equipment.
- Section II.A.9 (co-sponsored with Company Witnesses Mariah Weitzenkamp and Blair Parks): This section describes the proposed route selection procedures and details alternative routes considered.
- Sections II.B.3 to II.B.5 (co-sponsored with Company Witness Blair Parks): These sections, when applicable, provide supporting structure details along the proposed and alternative routes.
- Section V.A (co-sponsored with Company Witnesses Mariah Weitzenkamp and Blair Parks): This section provides the proposed route description and structure heights for notice purposes.

A statement of Mr. De Hoyos Irizarry background and qualifications is attached to his testimony as Appendix A.