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

Before the State Corporation Commission of Virginia

500 kV and 230 kV Golden-Mars Lines, Lockridge 230 kV Loop, Sojourner 230 kV Loop, and Related Projects

Application No. 350

Case No. PUR-2025-00056

Filed: March 28, 2025

Volume 3 of 5

Application of Virginia Electric and Power Company
for approval and certification of electric transmission facilities:
500 kV and 230 kV Golden-Mars Lines, Lockridge 230 kV Loop, Sojourner 230 kV Loop, and Related Projects
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PREPARED FOR

Dominion Energy Virginia

Environmental Routing Study

Golden to Mars 500-230 kV Electric Transmission Project

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Environmental Routing Study
Golden to Mars 500-230 kV Electric Transmission Project

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ACRONYMS AND ABBREVIATIONS

Acronyms	Description
AGL	above ground level
AIOD	Airport Impact Overlay District
AMSL	above mean sea level
BMP	best management practice
BOS	Loudoun County Board of Supervisors
CBG	Census Block Group
CCB	Center for Conservation Biology
CDP	Census Designated Place
Company	Virginia Electric and Power Company
CFR	Code of Federal Regulations
CTP	Loudoun County Countywide Transportation Plan
CWA	Clean Water Act
dB	decibel
EJ	environmental justice
EMF	electromagnetic field
ERM	Environmental Resources Management, Inc.
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FCV	Forest Conservation Value
FOD	Floodplain Overlay District
GI	General Industry Zoning District

Acronyms	Description
GIS	geographic information system
HOA	homeowners' association
HUC	hydrologic unit code
ID	Identification
IP	Industrial Park Zoning District
IPaC	Information for Planning and Consultation
IVMP	Integrated Vegetation Management Plan
LCSB or School Board	Loudoun County School Board
KOP	key observation point
kV	kilovolt(s)
MWAA	The Metropolitan Washington Airports Authority
NA	not applicable
NHD	National Hydrography Dataset
NHL	National Historic Landmark
NHP	Natural Heritage Program
NHR	natural heritage resource
NOVA Parks	Northern Virginia Regional Park Authority
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
PEM	palustrine emergent
PFO	palustrine forested
Project	Apollo-Twin Creeks 230 kV Electric Transmission Project
PSS	palustrine scrub-shrub
PUB	palustrine unconsolidated bottom
ROW	right-of-way
RSCR	River and Stream Corridor Resource
Rt.	Virginia State Route
Rt. 7	Virginia State Route 7 (Leesburg Pike)
SCC	State Corporation Commission
SCS	Stream Conservation Site
TERPs	Terminal instrument procedures

Acronyms	Description
TOYR	Time-of-year restriction
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
USPS	United States Postal Service
Va. Code	Code of Virginia
VaFWIS	Virginia Fish and Wildlife Information Service
VCRIS	Virginia Cultural Resource Information System
VDCR	Virginia Department of Conservation and Recreation
VDEQ	Virginia Department of Environmental Quality
VDHR	Virginia Department of Historic Resources
VDHR Guidelines	*Guidelines for Assessing Impacts of Proposed Electric Transmission Lines and Associated Facilities on Historic Resources in the Commonwealth of Virginia*
VDOT	Virginia Department of Transportation
VDWR	Virginia Department of Wildlife Resources
VEJA	Virginia Environmental Justice Act
VOF	Virginia Outdoors Foundation
VSR	visually sensitive resource
W&OD	Washington and Old Dominion
WERMS	Wildlife Environmental Review Map Service

1 INTRODUCTION AND BACKGROUND

This report presents an environmental constraint identification and routing study prepared by Environmental Resources Management, Inc. (ERM) on behalf of Virginia Electric and Power Company (Dominion Energy Virginia, Dominion, or the Company) for the third and final component of the Data Center Alley local solution: the new 500-230 kilovolt (kV) Golden–Mars Lines located in Loudoun County, Virginia (Project).

1.1 PROJECT DESCRIPTION

The proposed Project, along with the Mars–Wishing Star and the Aspen–Golden 500-230 kV Projects, will complete the 500 kV transmission loop in the Northern Virginia area surrounding Data Center Alley, which generally includes areas near Washington Dulles International Airport (Dulles Airport) in Ashburn, Virginia. These projects are needed to provide electrical capacity to the Eastern Loudoun Load Area, while also mitigating identified North American Electric Reliability Corporation Reliability Standards violations and maintaining reliable service for overall load growth in the Project area and region. The Project consists of four individual components:

- New double circuit 500-230 kV lines from the future Golden Substation—located between Pacific Boulevard and Virginia State Route (Rt.) 28, north of the Washington & Old Dominion (W&OD) Trail—to the future Mars Substation—located on Carver School Road, approximately 0.6 mile south of Old Ox Road—in a 5-2 configuration (Golden–Mars 5-2 Lines or Golden–Mars Lines); [1] [2]
- A new double circuit 230 kV Loop from the existing Lockridge Substation to the Golden–Mars 500-230 kV Lines (Lockridge 230 kV Loop);
- Two new double circuit 230 kV Lines from the existing Sojourner Substation to the future Mars Substation (Sojourner 230 kV Loop); and
- Improvements to the future Golden and Mars Substations.

These facilities are collectively referred to as the Project. Figure 1-1 depicts the proposed Project, as well as the Mars–Wishing Star Project, and the Aspen–Golden Project in the Eastern Loudoun Load Area. All figures referred to in this document are provided in Appendix A, Figures.

1.2 ROUTE LENGTH AND CONSTRUCTION FOOTPRINT

Table 1.2-1 shows the length, footprint acreage, and number of structures for the route alternatives associated with the Golden–Mars Lines, Lockridge 230 kV Loop, and the Sojourner 230 kV Loop.

[1] A "5/2 configuration" means that the supporting structures will be aligned such that one position of the structure will have a 500 kV circuit and one position will have a 230 kV circuit.

[2] The Golden and Mars Substations are authorized for construction and operation as part of the approved Mars–Wishing Star and the Aspen–Golden 500-230 kV Projects and are not part of this Project.

TABLE 1.2-1 ROUTE LENGTH, CONSTRUCTION FOOTPRINT, STRUCTURE COUNT, AND STRUCTURE HEIGHTS

	Golden–Mars Route 1	Golden–Mars Route 2	Golden–Mars Route 3	Golden–Mars Route 4	Golden-Mars Route 5	Lockridge 230 kV Loop	Sojourner 230 kV Loop
Centerline Length (miles)	9.4	9.3	8.3	8.3	9.8	0.6	1.9
New Right-of-Way (acres)	123.5	121.7	108.6	109.3	129.3	5.0	29.1
Collocation with Existing Dominion Rights-of-Way (acres)	22.0	23.0	23.0	23.0	22.0	1.9	0.8
Structures (number)	92	90	83	83	97	7	21
Minimum Structure Height[a] (feet)	110	110	110	110	110	100	95
Maximum Structure Height[a] (feet)	185	180	180	180	185	120	120
Average Structure Height[a] (feet)	156	154	154	155	157	112	106

kV = kilovolt(s).

[a] Structure minimum, maximum, and average heights are exclusive of substation backbones, and of one 55 foot tall Lockridge 230 kV structure and one 50 foot tall Sojourner 230 kV structure used to cross under the 500 kV lines which disproportionately lower the average structure height.

1.3 STRUCTURE TYPES AND RIGHT-OF-WAY WIDTHS

Dominion proposes to construct the Golden–Mars Lines within almost entirely new right-of-way varying between 100 and 150 feet wide in a 5-2 configuration. The Golden–Mars Lines will use a combination of dulled galvanized steel double circuit monopole or two-pole structures (100-foot-wide right-of-way) or three-pole or two-pole H-frame structures (150-foot-wide right-of-way). The Golden–Mars Lines generally use a H-frame configuration in areas with fewer constraints and a monopole configuration in areas where the right-of-way needs to narrow as much as possible.

Dominion will construct the Lockridge 230 kV Loop and Sojourner 230 kV Loop within new 100-foot-wide rights-of-way, using primarily dulled galvanized steel double circuit monopoles.

Appendix B, Structure Drawings, provides section views depicting typical right-of-way widths and structure configurations.

The distance (span) between transmission structures depends on the type of structure used (monopole or H-frame), as well as topography, ground elevation, and nearby constraints such as bridge or highway on-ramp crossings. For the Golden–Mars Lines, the average span distance for both the monopole and H-frame configuration will be 600 feet, with structure heights ranging from 110 to 185 feet (average of 155 feet).

The average span distance for the Lockridge 230 kV Loop would be 440 feet with structure heights ranging from 55 to 120 feet (average of 104 feet). The average span distance for the Sojourner 230 kV Loop would be 520 feet with structure heights ranging from 50 to 120 feet (average of 104 feet).

1.4 CONSTRUCTION, OPERATION, AND MAINTENANCE PROCESS

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

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

All required materials for the Project's 5-2 structures would be delivered and assembled at each structure location within the proposed (or existing) right-of-way. Detailed foundation design would be completed prior to construction. The foundation design could include poured concrete requiring excavation or steel piles or caissons that might be vibrated, drilled, or driven into place depending on soil conditions and final design. Dominion would erect structures with a crane and anchor them to the foundation during final assembly. Dominion would distribute excess soil from foundation construction (if any) evenly at each structure, would replant vegetation, and would stabilize exposed soils. In wetland areas, excess soil would be removed and evenly distributed on an upland site within Dominion's proposed right-of-way. Typical construction equipment may include hole diggers or drilling equipment, cranes, wire stringing rigs, tensioners, backhoes, and trucks.

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

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

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

Based on a discussion between the Company and representatives of the Virginia Department of Conservation and Recreation (VDCR) Division of Natural Heritage (DNH), the Company reviewed its Integrated Vegetation Management Plan (IVMP) for application to both woody and herbaceous species based on the species list available on the VDCR website. The Company continues to coordinate with DNH on an addendum to the IVMP to further explain how the Company's operations and maintenance forestry program addresses invasive species. In November 2023, the Company submitted the addendum draft to VDCR for review and continued discussions. VDCR provided an initial response to the addendum in January 2024. The Company is in the process of ongoing coordination with VDCR-DNH pertaining to the Company's IVMP with a meeting held on November 11, 2024. The Company is continuing to coordinate with VDCR with the commitment to schedule additional meetings to discuss VDCR's concern. Once the addendum is finalized, the Company will report on the results of its communications with VDCR in future proceedings.

1.5 OBJECTIVES OF THE STUDY

The Company requested ERM's services to define a study area for routing of the Project, collect information on routing constraints and opportunities within the study area, identify and compare alternative transmission line routes, and document the routing efforts in this report. More specifically, ERM's scope of work consisted of:

- Defining and describing a study area for routing the transmission lines proposed for the Project;
- Gathering and assessing information about routing constraints and opportunities to be considered as part of the study;

- Identifying and mapping routing constraints and opportunities within the study area;
- Participating in public outreach efforts for the Project (e.g., public open house and agency meetings) to gather information from stakeholders, agency staff, and the public regarding constraints in the study area;
- Identifying buildable route alternative for the proposed transmission lines meeting the siting criteria provided in the Code of Virginia (Va. Code) and included in the State Corporation Commission's (SCC's) minimum filing guidelines (the Guidelines for Transmission Line Application Filed Under Title 56 of the Code of Virginia, referred to as "SCC Guidelines") for transmission projects;
- Comparing the route alternatives based on an analysis of environmental impacts and use of routing opportunities; and
- Recommending preferred routes.

2 ROUTING PROCESS

The process of routing new electric transmission lines follows a sequence whereby potential route corridors are developed into potential routes that are further refined into viable route alternatives. Although details may differ, the fundamental objectives of the process are the same regardless of project or location: maximize collocation with compatible linear features or land uses; avoid, minimize, or mitigate impacts on the human and natural environment; and provide regulators with viable route alternatives meeting the purpose and need of the project that are both efficient and equitable. Route viability is assessed through consideration of permitting risk, constructability, right-of-way acquisition, and cost after the least impactful alternatives are identified.

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

2.1 DEFINING THE STUDY AREA

The first step in the routing process is to define a geographic study area based on the Company's electric transmission needs and service obligations specific to a project. ERM defined the study area for the Project to encompass its beginning and ending points—Golden Substation and Mars Substation—and an area broad enough in between the substations to allow for the identification of reasonable alternatives. Additionally, and to the extent practicable, the limits of the study area are defined by reference to easily distinguished landmarks, such as roads or other features. Doing so helps Dominion and ERM describe the boundaries to stakeholders, such as potentially affected landowners or county and agency staff. Section 3 of this document describes the characteristics of the Project study area in detail.

2.2 INVENTORY OF ROUTING CONSTRAINTS AND OPPORTUNITIES

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

- Locations of delivery point substations;
- Electric transmission and other utility rights-of-way;
- Residences and residential areas;
- Planned developments;
- Commonwealth, county, and private road rights-of-way;
- Public lands;
- Conservation and open space easements;
- Parks and trails;
- Wetlands and waterbodies;
- Forested land;
- Hospitals, schools, cemeteries, and convalescent centers;
- Natural heritage resources (NHRs; e.g., conservation sites and habitat for rare, threatened, and endangered [T&E] species);

- Visually sensitive resources (VSRs)—locations where views are protected by regulation, or where higher quality views are an expected condition, regardless of regulatory status; and
- Archaeological and historic sites and other nationally or locally significant cultural resources.

2.3 IDENTIFYING AND ASSESSING ROUTE VARIATIONS

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

2.4 FIELD RECONNAISSANCE AND STAKEHOLDER ENGAGEMENT

Field reconnaissance and stakeholder/public engagement activities (e.g., a project website, open houses, targeted mailings, and virtual and in-person meetings) are used to gather information, identify resources, and help inform routing and route selection. Section 3.3 describes public engagement activities for the Project.

2.5 ROUTE ALTERNATIVE ANALYSIS AND ROUTE RECOMMENDATION

Using data and stakeholder outreach feedback gathered during the routing process, route alternatives are analyzed and compared quantitatively and qualitatively based on constraint data and community/stakeholder input. After completing this analysis, a preferred route is selected through comparison of the advantages and disadvantages of each alternative relative to SCC Guidelines. A Proposed Route and Alternative Routes, if applicable, are then presented for notice in the SCC Application for the Project. Conversely, routes deemed too impactful and/or infeasible or impracticable are not carried forward for notice.

3 STUDY AREA

3.1 STUDY AREA DESCRIPTION

The Project study area encompasses more than 22 square miles in eastern Loudoun County and includes the area around the future Golden Substation, the future Mars Substation, Lockridge Substation, and Sojourner Substation. The study area is generally bounded by the following features as depicted on Figure 3.1-1:

- Gloucester Parkway to the north;
- Sully Road (Rt. 28) to the east;
- Dulles Airport to the south; and
- Belmont Ridge Road to the west.

The study area encompasses portions of several census-designated places and unincorporated areas within eastern Loudoun County, including Ashburn, Dulles, Moorefield, Brambleton, and Sterling. Notable places within the study area include parts of Data Center Alley (the world's largest agglomeration of data center campuses), Washington Dulles International Airport (Dulles Airport), the Metrorail Silver Line terminus at Ashburn Station, and suburban residential neighborhoods. The study area was predominately farmland prior to 2002 but has developed rapidly over the past 25 years.

Land use in the study area consists primarily of data center campuses, flex industrial warehouses, and low to medium density single-family housing. Broad Run, a tributary of the Potomac River, bisects the study area from northeast to southwest. The stream is surrounded a forested riparian corridor. The Dulles Greenway (Rt. 267) bisects the study area from northwest to southeast and forms a partial divide between data centers and industrial areas to the north (within Data Center Alley) and residential areas to the south and west of Broad Run. Loudoun County Parkway (Rt. 607) also bisects the study area from northeast to southwest as it passes through Data Center Alley, crosses the Dulles Greenway, and passes residential areas before reaching Old Ox Road (Rt. 606). Old Ox Road is located in southern portion of the study area and separates Dulles Airport from adjacent industrial and residential areas to the north and west.

3.2 MAJOR ROUTING CONSTRAINTS AND OPPORTUNITIES

This section summarizes the major constraints and opportunities in the study area affecting transmission line routing. In accordance with the Guidelines for Transmission Line Applications Filed Under Title 56 of the Va. Code (SCC 2024), ERM assessed opportunities for routing the Project. Sources used to identify constraints and opportunities within the study area include:

- Loudoun County Geohub GIS datasets (Loudoun County 2024a);
- VDOT Projects and Studies Database (VDOT 2025);
- VDCR Conservation Lands Database (VDCR 2024a);
- U.S. Census Bureau American Community Survey, 5-Year Estimates (2019–2023) (U.S. Census Bureau 2023a,2023b, 2023c, 2023d, 2023e);
- U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) mapping (USFWS 2024a);

- Virginia Department of Historic Resources (VDHR) Virginia Cultural Resources Information System (VCRIS) (VDHR 2025);
- National Conservation Easement Database (NCED 2025);
- Existing utility transmission and distribution lines (Rextag 2025); and
- Current aerial imagery (ESRI et al. 2024; Loudoun County 2024a).

The remainder of this section summarizes the major constraints and opportunities in the study area that affect transmission line routing. Routing opportunities include existing transmission lines, utility rights-of-way, and major roadways. Routing constraints include existing and planned developments, public lands, and sensitive natural resources such as streams, floodplains, and wetlands. Often, features in the study area are both constraints and opportunities. For example, paralleling or collocating along highways and roads could offer space for new rights-of-way, but transmission lines may not be compatible with adjacent land uses. ERM also identified routing constraints and opportunities through review of local land use plans and stakeholder engagement (Section 3.3). Figure 3.2-1 depicts major routing constraints and opportunities in the study area.

- **Residential Areas:** The most significant routing constraints in the study area are existing homes and neighborhoods, including the viewsheds of (areas potentially visible from) residential areas. Several large homeowners' associations (HOAs) representing thousands of homes and residents make up most of the study area south of the Dulles Greenway.
- **Loudoun County Parkway:** Loudoun County Parkway generally runs northeast to southwest through the study area between the future Golden and Mars substations. Although the Loudoun County Parkway right-of-way provides a collocation opportunity for the Golden–Mars Lines, adjacent land uses vary greatly along its length. South of the Dulles Greenway, Loudoun County Parkway leaves Data Center Alley and passes through mostly residential areas that are less compatible with new transmission lines. Planned residential developments (see below) further limit routing opportunities.
- **Existing Utilities:** The Company operates and maintains an extensive network of 230 kV lines the study area, concentrated within Data Center Alley and extending southwest along Broad Run. Existing transmission rights-of-way provide the best opportunities to collocate new transmission infrastructure; however, existing and planned developments and other sensitive environmental features like Broad Run may limit the potential to expand existing rights-of-way. Buried utilities, such as Loudoun Water's Broad Run Interceptor, also provide collocation opportunities in areas of previous tree clearing/disturbance that minimize habitat fragmentation and conflict with surrounding land uses.
- **Planned Development:** Planned development in the study area includes several residential, commercial, and industrial developments in various stages of approval and construction. There are several major mixed-use developments in the study area, including the Moorefield Station and Silver District West, near the intersection of the Loudoun County Parkway and the Dulles Greenway. Multiple data centers are also under development throughout the study area. ERM and Dominion solicited input from and coordinated with the developers to identify and avoid potential conflicts wherever practicable.
- **Existing Commercial and Industrial Development:** Existing commercial and industrial development is found throughout the study area, including data centers, distribution centers

and warehouses, office buildings, business parks, and retail centers. These industrial and commercial areas are concentrated in Data Center Alley and the industrial parks between Broad Run and Old Ox Road Corridor. While transmission lines are generally compatible with industrial land uses, routing opportunities are often limited by existing building, utilities, and non-linear development patterns, such as curvilinear streets and irregularly shaped lots.

- **Federal Lands:** Federal lands in the study area include the National Weather Service's facilities in Sterling (adjacent to Dulles Airport), operated by the National Oceanic and Atmospheric Administration (NOAA) and Dulles Airport itself, operated by The Metropolitan Washington Airports Authority (MWAA), which is also a federal agency. Crossing all federal land (including the NOAA and MWAA lands in the study area) requires agency approval and is often subject to revokable license agreements.
- **Height Limitations:** Development regulations severely limit structure heights south of Broad Run and along Old Ox Road to protect the line of sight for the National Weather Service's doppler radar at the NOAA Sterling property. Federal Aviation Administration (FAA) regulations also limit structure heights near Dulles Airport (see Section 5.1.11). Both constraints prevent collocation of overhead routes along existing transmission right-of-way and new routing opportunities along portions of Old Ox Road.
- **Loudoun County Lands and Open Space Easements:** The Loudoun County Board of Supervisors (BOS) owns land along Broad Run that is part of the Broad Run Stream Valley Park (see Section 5.1.8). The BOS is also the grantee of dozens of open space easements within the study area. Crossing of BOS land requires BOS approval and often includes deed restrictions that limit future development.
- **Loudoun County School Board Lands:** The Loudoun County School Board (LCSB or School Board) owns a large property along Broad Run and Loudoun Reserve Drive that contains the Rock Ridge High School and Rosa Lee Carter Elementary School campuses. Crossing land owned by Loudoun County Public Schools requires LCSB approval.
- **Sensitive Environmental Areas:** Sensitive environmental areas in the study area are primarily associated with Broad Run. Crossing wetlands, forests, a VDCR Stream Conservation Site (SCS), and floodplains along Broad Run and other sensitive environmental areas (see Section 5.2) involves additional environmental permitting and constructability considerations, even when collocation along existing transmission rights-of-way is possible. Furthermore, Loudoun County has designated Scenic Creek Valley Buffers along Broad Run and many of its tributaries to protect the remaining natural areas along Broad Run. The Broad Run corridor also contains parklands, as well as an expanding trail network where potential visual impacts and tree removal must be considered (see Section 5.1.8).

3.3 STAKEHOLDER ENGAGEMENT

ERM conducted field reviews of the Project and supported Dominion's outreach to agencies and stakeholders as part of route development and evaluation. As of February 2025, the Company has held dozens of individual meetings seeking stakeholder input, including with landowners, businesses, and agencies, such as Loudoun County, HOA managers, LCSB Staff, BOS members and staff, and MWAA. Dominion also engaged the Loudoun Reliability Engagement Group (LREG)—a stakeholder group with an interest in electric transmission line projects throughout Loudoun

County—to provide information and solicit feedback on projects, including this Project. The Company held one virtual and two in-person community meetings in July 2024, as well as one virtual and one in-person community meeting in January 2025 to present information on the Project and gather feedback. The Company's application describes the stakeholder engagement process in further detail.

4 ROUTE ALTERNATIVES

Through extensive public outreach, agency consultation, desktop study, and field investigation, ERM identified the following route alternatives for the Project:

- Five route alternatives for the Golden–Mars Lines;
- One route for the Lockridge 230 kV Loop Lines; and
- One route for the Sojourner 230 kV Loop Lines.

Project routes are shown on aerial and topographic maps in Figures 4.1-1 and 4.1-2, respectively.

4.1 GOLDEN–MARS LINES

Development of the Golden–Mars Lines route alternatives was an iterative process that involved ongoing resource identification, stakeholder outreach, and engineering considerations. Throughout the route development process, ERM and Dominion adjusted and refined route alternatives, which remained largely similar to the routes presented in this report. While no complete route alternatives were rejected, one variation was eliminated from further consideration: the Dulles Center Variation shown in Figure 4.1-3.

Starting at Golden Substation, the Dulles Center Variation followed Rt. 28 south, crossing several surface parking lots in the Dulles Center shopping center before rejoining the preferred route alignment for Golden–Mars Routes 1 through 5 along Pacific Boulevard. The Dulles Center Variation was rejected early in the assessment phase, because it lacked collocation with existing linear features, was not supported by Loudoun County staff, and would have bisected an existing commercial center in a way that could have affected the center's operations.

The Golden–Mars Lines route alternatives are identical in the northern portion of the study area, where they mostly follow existing 230 kV transmission line rights-of-way between Golden Substation and the Dulles Greenway. South of the Greenway the routes diverge, generally following either Loudoun County Parkway or Broad Run (and existing Lines #2218 and #2095).

The portion of Routes 1–5 north of the Greenway would generally use three-pole or two-pole H-frame structures in a 150-foot-wide right-of-way. The portion of these routes south of the Greenway would generally use monopole or two-pole H-frame structures in a 100-foot right-of-way. In addition, the portion of the Golden–Mars Lines north of the Greenway (described in Section 4.1.1 for Route 1) would be identical for all Golden–Mars Lines route alternatives.

4.1.1 ROUTE 1

Route 1 is approximately 9.4 miles long. The route originates at Golden Substation, exits the substation to the south, crosses the W&OD Trail, then turns west to cross Pacific Boulevard. The route then turns south and parallels Pacific Boulevard before crossing Waxpool Road where it turns west to parallel existing transmission lines on the south side of Waxpool Road. The route continues across Broad Run before turning southwest, where it parallels existing transmission lines and crosses Broad Run twice before crossing the Dulles Greenway.

South of the Greenway, the route turns northwest, paralleling the south side of the Greenway before turning west to parallel the south side of Loudoun County Parkway. The route briefly crosses to the north side of Loudoun County Parkway, then back to the south side and parallels

the south and west side of the parkway (as the road turns south) from Gleedsville Manor Drive south to Evergreen Ridge Drive. After crossing Evergreen Ridge Drive, the route turns southeast, crosses Broad Run, and turns east to parallel the north side of Old Ox Road. The route then turns south along Carters School Road before terminating at Mars Substation.

4.1.2 ROUTE 2

Route 2 is approximately 9.3 miles long. South of the Dulles Greenway, the route continues southwest, parallel to existing transmission lines adjacent to Broad Run. North of Rock Ridge High School, the route turns west and crosses Broad Run three times before reaching Loudoun County Parkway. The route continues south and parallels the west side of Loudoun County Parkway past Evergreen Ridge Drive. After crossing Evergreen Ridge Drive, the route turns southeast, crosses Broad Run, and turns east to parallel the north side of Old Ox Road. The route then turns south along Carters School Road before terminating at Mars Substation.

4.1.3 ROUTE 3

Route 3 is approximately 8.3 miles long. South of the Dulles Greenway, the route continues southwest, parallel to existing transmission lines adjacent to Broad Run. North of Rock Ridge High School, the route turns west, crosses Broad Run three times before turning south and crossing Loudoun Reserve Drive. The route continues south through Broad Run Stream Valley Park and across Overland Road. The route then turns east and parallels the north side of Old Ox Road then turns south along Carters School Road before terminating at Mars Substation.

4.1.4 ROUTE 4

Route 4 is approximately 8.3 miles long. South of the Dulles Greenway, the route continues southwest, parallel to existing transmission lines adjacent to Broad Run. North of Rock Ridge High School, the route turns south and continues to parallel existing transmission lines before turning west along Loudoun Reserve Drive. The route then turns south through Broad Run Stream Valley Park and across Overland Road. The route turns east and parallels the north side of Old Ox Road then turns south along Carters School Road before terminating at Mars Substation.

4.1.5 ROUTE 5

Route 5 is approximately 9.8 miles long. South of the Dulles Greenway, the route turns northwest and follows the south side of the Dulles Greenway before turning west to parallel the south side of Loudoun County Parkway. The route briefly crosses to the north side of Loudoun County Parkway, then back to the south side, and parallels the south and west side of Loudoun County Parkway (as the road turns south) past Gleedsville Manor Drive, then turns west to parallel the north side of Ryan Road. Near Claiborne Parkway, the route turns south to rejoin Loudoun County Parkway and continues south to Evergreen Ridge Drive. After crossing Evergreen Ridge Drive, the route turns southeast, crosses Broad Run, and turns east to parallel the north side of Old Ox Road. The route then turns south along Carters School Road before terminating at Mars Substation.

4.2 LOCKRIDGE 230 KV LOOP

The Lockridge 230 kV Loop is approximately 0.6 mile long. The route originates approximately 0.3 mile north of the Dulles Greenway and 0.2 mile east of Shellhorn Road, where it ties into the

Golden–Mars Lines (within the segment shared by Routes 1–5). The route travels east from the Golden–Mars Lines and crosses Broad Run and Lockridge Road before terminating at Lockridge Substation. Because the route is entirely on property owned by SDC Ashburn I LLC and was developed in coordination with the landowner, ERM and Dominion did not consider any alternative routes between the Lockridge Substation and the Golden–Mars Lines.

4.3 SOJOURNER 230 KV LOOP

The Sojourner Loop is approximately 1.9 miles long. The route originates at Sojourner Substation between Beaver Meadow Road and Digital Dulles Drive. The route travels east before turning south to parallel the western perimeter of Dulles Airport. The route then turns west, terminating at the future Golden Substation. Because the route is entirely on Digital Dulles property and was developed in coordination with the developers of Digital Dulles, ERM and Dominion did not consider any route alternatives between the Sojourner and Mars Substations.

4.4 UNDERGROUND ROUTING

ERM supported Burns & McDonnell Engineering Company, Inc. (BMcD) in conducting a feasibility study for underground installation of the Golden–Mars Lines. The *Underground Feasibility Study* examines underground design criteria, route alternatives, transition station siting, engineering cost analysis, for the Golden–Mars Lines. The *Underground Feasibility Study* is included as Appendix C.

ERM identified potential underground routes and transition station locations (each of which would require approximately 7 acres, excluding stormwater management facilities, buffer areas, and setback requirements) for BMcD to evaluate against the Project's design parameters and system requirements. The underground routing process, like overhead routing, involved analyzing constraints and opportunities, conducting stakeholder outreach, and evaluating multiple route iterations.

ERM’s objective was to identify constructable underground alternatives, based on the lack of useable existing Company-owned right-of-way and the overhead routing constraints described in Section 3.2. BMcD analyzed these candidate underground routes from an engineering perspective, collaborating with ERM to assess feasibility of the proposed underground routes and transition station locations.

ERM identified potential underground routes based on three key parameters, as described below.

- Identification of underground routes only for areas south of the Dulles Greenway. The portion of the Project area within Data Center Alley already has existing overhead 230 kV lines suitable for collocation with overhead lines. Underground installation north of the Dulles Greenway would be impractical and would also unnecessarily add several miles to the overall route length.
- Avoidance of crossing Broad Run or other features using trenchless construction methods such as horizontal directional drilling. Each trenchless crossing for the Project would require nine separate bores and substantial right-of-way to accommodate those bores. Each bore also introduces construction risks and increased construction timelines beyond those associated with trenched installation.

- Prioritization of short, minimally constrained routes that avoid existing utilities and environmentally sensitive feature such as jurisdictional wetlands.

After thorough evaluation, BMcD and ERM concluded that none of the underground alternatives were constructable. Key factors in this decision included:

- Extensive existing underground utilities and easements that cannot be relocated;
- NOAA concerns about equipment interference, security, and groundwater management (September 17, 2024 meeting);
- VDOT concerns about construction methods, right-of-way limitations, and roadway integrity (September 16, 2024 meeting);
- No suitable locations for 7-acre transition stations due to floodplain restrictions, public land constraints, and residential proximity;
- Challenges with trenchless crossings requiring wider rights-of-way in spatially constrained areas;
- Extended National Environmental Policy Act review requirements for routes on federal lands, particularly MWAA property; and
- Schedule risks affecting the June 1, 2028 in-service target date, including material acquisition delays and construction complexities.

Based on these conclusions, ERM and Dominion did not identify any permittable or feasible underground route alternatives for the Golden–Mars Lines. The SCC filing for this Project will only include overhead route alternatives.

4.5 COLLOCATION OPPORTUNITIES

The foremost priority in developing route alternatives is the identification of collocation opportunities along existing and planned linear facilities. ERM identified linear facilities within the study area through review of:

- Current aerial imagery (ESRI et al. 2024; Loudoun County 2024a);
- Data from Dominion about its existing transmission system;
- The 2019 Loudoun County General Plan (General Plan) (Loudoun County 2023b);
- The Loudoun County Countywide Transportation Plan (CTP) (Loudoun County 2023a);
- Meetings with Loudoun County Planning and Zoning officials;
- Mapping and GIS for the energy industry (Rextag 2024); and
- Various publicly available data layers (Loudoun County 2024e).

Existing linear facilities within the study area include electric transmission and distribution lines, pipelines (e.g., natural gas, water, sewer), other utility easements, and several major road corridors, each of which was assessed as a potential routing opportunity for the Golden–Mars Lines, Lockridge 230 kV Loop, and Sojourner 230 kV Loop. These existing corridors are described below. There are no railroads, crude oil, or refined petroleum products pipelines in the study area.

4.5.1 ELECTRIC TRANSMISSION

Several existing Dominion-owned overhead transmission lines cross the study area, many of which are concentrated in the northern portion of the study area within Data Center Alley. Basic routing principles, Company preference, and Loudoun County land use policies prioritize collocation of new transmission infrastructure with existing lines in almost all circumstances.

Table 4.5-1 provides the collocation lengths for each route alternative. Figure 4.5-1 depicts existing overhead transmission lines identified as potential collocation opportunities. Those transmission lines are described below.

- Existing Lines #2150/#2081 are south of the future Golden Substation, running parallel to W&OD Trail and perpendicular to Rt. 28 and Pacific Boulevard.
- Existing Lines #2165/#2170 run parallel to Waxpool Road from Rt. 28 to existing Lines #2152/#2170 Lines west of Broad Run, which lead to the existing Buttermilk Substation.
- Existing Lines #2152/#2170 extend southwest from Waxpool Road, generally following Broad Run to the existing Buttermilk Substation, then transition into existing Lines #2203/#2214 and #2149/#2214 after exiting Buttermilk Substation to the southwest. Existing lines #2149/#2214 continue southwest and west along Broad Run to the existing Roundtable Substation.
- Existing Lines #2031/#2223 extend south from Roundtable Substation following Broad Run. Approximately 0.4 mile south of Roundtable Substation, these lines split into existing Lines #2223/#2188 and #2031/#2188.
- Existing Lines #2223/#2188 extend south from the split of existing Lines #2031/#2223, then continue east to cross Broad Run. This alignment follows along the northern property boundary of the proposed Prentice Drive Substation, then enter the existing Lockridge Substation.
- Existing Lines #2031/#2188 extend west from the split of existing Lines #2031/#2223 to the existing Shellhorn Road Substation, then northeast to cross Loudoun County Parkway and enter the existing Greenway Substation.
- Existing Lines #2095/#2218 extend south from the existing Shellhorn Substation to cross and then run parallel to Dulles Greenway for approximately 0.2 mile. From Dulles Greenway, Lines #2095/#2218 extend southwest and west, generally following and crossing Broad Run for approximately 1.8 miles. North of Rock Ridge High School, Lines #2095/#2218 extend south to follow the school's eastern property boundary. From the school's southeast corner, the line extends east to the existing NOVEC Substation, then south, parallel to Old Ox Road. Lines #2095/#2218 enter the existing Sojourner Substation along Old Ox Road, then continue south and southwest as existing Lines #2095/2137 along Old Ox Road to the existing Cabin Run Substation.
- The future Mars 230 kV Loop lines will extend south from Lines #2095/#2137 at Old Ox Road, parallel to Carters School Road to West Perimeter Road.

No existing underground transmission or distribution lines were identified as suitable collocation opportunities within the study area.

TABLE 4.5-1 COLLOCATION OF GOLDEN–MARS PROJECT ROUTE ALTERNATIVES (MILES)

Existing Facility	Golden–Mars Route 1	Golden–Mars Route 2	Golden–Mars Route 3	Golden–Mars Route 4	Golden–Mars Route 5	Lockridge 230 kV Loop	Sojourner 230 kV Loop
Dominion Infrastructure (Total)	2.9	4.1	4.1	4.5	3.1	0.3	0.1
Dominion Transmission Lines [a]	**2.8**	**4.0**	**4.0**	**4.4**	**2.8**	**0.3**	**0.1**
Dominion Distribution Lines [b]	0.1	0.1	0.1	0.1	0.3	0.0	0.0
Roadways (Total) [c]	**5.3**	**2.9**	**1.4**	**1.4**	**5.5**	**0.0**	**0.1**
Carters School Road	0.4	0.4	0.4	0.4	0.4	0.0	0.0
Claiborne Parkway	0.0	0.0	0.0	0.0	0.4	0.0	0.0
Digital Dulles Drive	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Dulles Greenway	0.5	0.0	0.0	0.0	0.5	0.0	0.0
Loudoun County Parkway	3.4	1.5	0.0	0.0	2.6	0.0	0.0
Old Ox Road	0.3	0.3	0.3	0.3	0.3	0.0	0.0
Pacific Boulevard	0.6	0.6	0.6	0.6	0.6	0.0	0.0
Ryan Road	0.0	0.0	0.0	0.0	0.6	0.0	0.0
Sully Road (Rt. 28)	0.1	0.1	0.1	0.1	0.1	0.0	0.0
Other Utility Infrastructure Corridors (Total) [c, d]	**1.5**	**1.6**	**1.7**	**1.5**	**1.5**	**0.0**	**0.0**
Broad Run Interceptor	0.6	0.8	1.3	1.1	0.6	0.0	0.0
Other Loudoun Water Utility Infrastructure	0.9	0.9	0.4	0.4	0.9	0.0	0.0

kV = kilovolt(s).

[a] Transmission lines include existing and approved overhead transmission line corridors and future/existing substations and switching stations.

[b] Distribution lines include existing overhead power lines only. Distance does not account for collocation with distribution lines in transmission line corridors (accounted for in transmission line totals) or underground distribution lines.

[c] Totals may not match the sum of the addends due to rounding.

[d] Other Utility Infrastructure Corridors excludes all road-shoulder utility distribution rights-of-way.

4.5.2 EXISTING ROAD CORRIDORS

The study area includes a variety of road types, ranging from freeways to major arterials to local residential streets. Major roadway corridors offering collocation opportunities include Rt. 28, Pacific Boulevard, Waxpool Road, Loudoun County Parkway, the Dulles Greenway, and Old Ox Road. Both the Company and Loudoun County generally prefer that new transmission lines collocate along major roadways rather than creating new utility corridors through developed areas or undeveloped areas with sensitive environmental features. Section 5.1.10 describes the existing road network in the study area in more detail.

4.5.3 UTILITY EASEMENT CORRIDORS

Most of the existing electric utility infrastructure in the study area is owned by Dominion, except for a NOVEC transmission line in the southern portion of the study area, which is located along Creighton Road and extends southwest across Broad Run Park to Old Ox Road, then north along Old Ox Road to an existing NOVEC substation.

The study area also contains an extensive network of underground water and sewer infrastructure, including drinking water; reclaimed water; and wastewater branch, main, and interceptor lines. Most of the water and sewer network is within road rights-of-way, in densely developed areas, and/or are already collocated with existing Company-owned transmission lines outside of roadway corridors. One major feature, the Broad Run Interceptor, owned and operated by Loudoun Water, crosses the study area southwest to northeast along a cleared right-of-way corridor next Broad Run. This corridor offers collocation opportunities where it crosses Broad Run Stream Valley Park.

A Columbia Gas natural gas transmission pipeline runs east to west through the middle of the study area and parallels segments of Dominion's existing Lines #2095/#2218 and #2223/#2188. The pipeline corridor offers minimal collocation opportunities, due to its east-west orientation. There are no other major pipelines within the study area.

A Columbia Gas natural gas distribution line is proposed parallel to segments of Dominion's existing Lines #2095/#2218. The proposed gas line would be located on an existing 30-foot-wide easement parallel to Dominion's existing right-of-way along Broad Run, continue south along Old Ox Road, and cross right-of-way of the proposed Sojourner Loop within the Digital Dulles data center campus (see Section 5.1.6.1). As of March 2025, Columbia Gas has not acquired right-of-way for the full length of the proposed gas line. The planned construction and in-service dates for the project are not known. Dominion and Columbia Gas are coordinating in an attempt to overlap portions of the gas line easement and the Routes 2, 3, and 4 rights-of-way adjacent to Broad Run and overlap portions of Route 4 between Rock Ridge High School and the adjacent Northwoods Data Center Property.

4.5.4 COLLOCATION ASSESSMENT

4.5.4.1 GOLDEN–MARS LINES

The Golden-Mars route alternatives share an identical alignment from Golden Substation to the Dulles Greenway. This segment of the routes collocates with existing Dominion infrastructure,

roads, and Loudoun Water infrastructure by running parallel to or partially overlapping the following existing rights-of-way:

- Dominion Infrastructure: Existing Lines #2150/#2081, #2165/#2170, #2152/#2170, #2203/#2214, #2149/#2214, and #2031/#2188, and the existing Buttermilk substation.
- Roads: Rt. 28, Pacific Boulevard, and Waxpool Road.
- Loudoun Water infrastructure: Various water and sewer infrastructure along road rights-of-way and Broad Run, including the Broad Run Interceptor.

All Golden–Mars route alternatives also share an identical alignment from Overland Drive to Mars Substation. This segment of the routes collocates with Old Ox Road, Carters School Road, and the Mars 230 kV Loop lines that parallel Carters School Road south of Old Ox Road and existing Lines #2095/#2137. South of the Dulles Greenway, the Golden–Mars route alternatives diverge. The remainder of this section describes the collocation for each route alternative between the Dulles Greenway and Overland Drive.

Route 1

Route 1 (along with Route 5) provides the least collocation with existing Dominion-owned overhead transmission lines (2.8 miles, or 30% of the total route) and the second most road collocation among the Golden-Mars routes, because it parallels Loudoun County Parkway for approximately 3.4 miles. In the context of the study area, collocation along Loudoun County Parkway is considered a negative attribute, due to the heavily residential character of nearly all the land adjacent to the parkway. Excluding Loudoun County Parkway, approximately 6.3 miles (67%) of Route 1 is collocated with other features.

Route 2

Route 2 is collocated with existing Dominion infrastructure for 4.1 miles (44% of the route length), which is more than Routes 1 and 5 and the same length as Route 3. Route 2 also avoids Loudoun County Parkway between Dulles Greenway and Mountville Woods Drive.

Route 3

Route 3 is collocated with existing Dominion infrastructure for 4.1 miles (49% of the route length), which is more than Routes 1 and 5, and the same length as Route 2. Route 3 also avoids Loudoun County Parkway entirely.

Route 4

Route 4 provides the most collocation along existing Dominion infrastructure among the Golden-Mars route alternatives (4.5 miles, 54% of the route length). Like Route 3, avoids Loudoun County Parkway entirely.

Route 5

Route 5 provides the least collocation with existing Dominion-owned overhead transmission lines (2.8 miles, 29% of the route length) and the most collocation with roads, including substantial portions of Loudoun County Parkway through residential areas.

4.5.4.2 LOCKRIDGE 230 KV LOOP

The Lockridge 230 KV Loop crosses property owned by a data center developer and was routed in coordination with the landowner. Collocation measurements provided in Table 4.5-1, and depicted in Figure 4.5-1, include collocation with the Lockridge Substation and the future Prentice Drive Substation.

4.5.4.3 SOJOURNER 230 KV LOOP ROUTE

The Sojourner 230 KV Loop is located entirely on property under development as a data center campus. The Sojourner Loop route was routed in coordination with the landowner and in anticipation of several future delivery point substations. The collocation summary provided in Table 4.5-1, and depicted in Figure 4.5-1, includes collocation with the Sojourner Substation and Digital Dulles Drive.

5 RESOURCES AND IMPACTS

After defining the study area and identifying collocation opportunities, ERM collected information on features within the study area to provide a basis for route development and analysis (Table 5-1). These include routing constraints such as existing and future land uses, planned developments, residential areas and sensitive environmental features and routing opportunities such as existing transmission lines. ERM inventoried existing conditions, constraints, and opportunities using information from publicly available GIS and other databases; agency websites; published documents such as county or municipal land use plans; communication with agency and county staff, stakeholders, and elected officials; and field reconnaissance. In cases where GIS data were not available for a particular environmental resource or other feature, ERM obtained the best available hard-copy or online version, and hand digitized the information needed to complete the study. In addition to the identification and discussion of the resources in the Project area, a Feature Crossing Table of the resources discussed throughout Section 5 is included as Appendix D.

TABLE 5-1 FEATURES CONSIDERED FOR ROUTING

Feature Type	Description
Linear Facilities	
Existing electric facilities	Transmission or distribution lines and substations
Other utilities	Water, sewer, or other pipelines
Transportation infrastructure	Highways, roads, railroads, and related corridors
Land Uses	
Land ownership	• Federal, state, and local lands • Private lands
Land uses and cover types	• Cover types (e.g., forested, agricultural, developed, open) • Commercial and industrial areas, neighborhoods, cemeteries, schools, and places of worship
Recreational areas	• Federal, state, county, or municipal parks and other managed recreation areas • Private recreation facilities • Interpreted historic sites • Trails
Land use planning and zoning	• Zoning districts • Place types • Future land use designations • Loudoun County Comprehensive Plan and related planning documents
Planned developments	• Planned or proposed residential, commercial, and industrial developments
Conservation lands and easements	• VDCR conservation lands and easements • VOF easements • Loudoun County open space easements • Wetland mitigation banks • Other conservation lands

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

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

5.1 LAND USE

5.1.1 LAND OWNERSHIP AND PUBLIC LANDS

5.1.1.1 EXISTING CONDITIONS

ERM reviewed information about land ownership in in the study area using digital parcel data obtained from Loudoun County (Loudoun County 2024a). These data indicate that most land within the study area is privately owned, although federal and county-owned lands were also identified. As discussed in Section 3.2, public lands are a routing constraint, because they can only be crossed with permission from the applicable land managing or controlling agency.

This section identifies and discusses impacts on public lands within 0.25 mile of the route alternatives by route. Golden–Mars Routes 1 through 5 each cross public (County-owned or School Board-owned) lands; therefore, these route alternatives are only viable if the applicable agency grants crossing rights. Of note, Routes 1 and 5 only cross a small segment of county-owned land that would require permission, but Dominion has received an indication from county staff that crossing this land would be preferred over a route adjustment avoiding this land. The Lockridge and Sojourner loops do not cross public lands. No state-owned lands were identified within the study area.

Figure 5.1.1-1 depicts public lands within 0.25 mile of the Project routes.

Federal Lands

ERM identified four federal properties within 0.25 mile of a route alternative: a United States Postal Service (USPS) Facility, a United States Department of State Vital Records Passport facility, the NOAA Sterling site, and Dulles Airport.

United States Postal Service

The USPS facility, which includes a processing and distribution center and a post office, is located southeast of the intersection of Prentice Drive and Lockridge Road, directly north of the existing Lockridge Substation. The site is within data center alley and is surrounded by existing and planned data center campuses and other industrial buildings. The USPS property is less than 100 feet north of the Lockridge Loop at the Lockridge Substation and is not crossed by any routes; therefore, an easement across the parcel would not be required.

United States Department of State

The United States Department of State maintains a passport vital records office on Mercure Circle, northwest of Dulles Airport and south of Broad Run. This warehouse-type facility is the mailing address of the National Passport Center. An existing Dominion transmission line right-of-way crosses approximately 0.8 acre along the facility's northern property boundary, adjacent to Broad Run. Routes 2, 3, and 4 are approximately 100 feet north of the parcel, north of the Company's existing Lines #2095/2218 and Broad Run. The Department of State parcel is not crossed by any route alternatives; therefore, an easement across the parcel would not be required.

Metropolitan Washington Airports Authority

Since 1987, MWAA has operated the approximately 11,200-acre, federally owned Dulles Airport under a lease (MWAA n.d.). In addition to developed land associated with aviation facilities (e.g., runways, taxiways, terminals, hangars, and support infrastructure), the airport property includes forested land around the airport perimeter. None of the Project route alternatives cross MWAA property. Approximately 1.1 miles of the Sojourner Loop from the Mars Substation north to near Beaverdam Road is directly adjacent to MWAA property line. Each Golden-Mars route is approximately 300 feet from the nearest MWAA property line where they terminate at the future Mars Substation. Section 5.1.11 discusses the Project's potential impacts on aviation at Dulles Airport.

Dominion held multiple meetings with MWAA staff throughout 2024 to discuss a potential crossing of MWAA lands however no viable overhead or underground route alternatives across MWAA property were identified.

National Oceanic and Atmospheric Administration

The NOAA Sterling site is an approximately 230-acre facility located between Dulles Airport and Old Ox Road. Buildings at the site house the National Weather Service Forecast Office, Center Weather Service Unit, and NOAA Global Monitoring Laboratory. Most notably, the site houses a 30-meter-tall doppler radar (NOAA 2025). The doppler radar tower is in the northwestern quadrant of the parcel, approximately 300 feet south of Old Ox Road. Dominion's overhead existing Line #2095/#2218 crosses the western portion of the property along Old Ox Road. During a meeting with Dominion in September 2024, NOAA staff stated that any structure installed within 1,100 feet of the doppler radar can be no more than 80 feet tall.

The Sojourner Loop, the nearest Project route to the NOAA parcel, is approximately 0.2 mile south. Because no route alternatives cross the parcel, an easement would not be required. Additionally, none of the routes pass within 1,100 feet of the doppler radar; therefore, the Project would not impact the NOAA site.

Local Lands

Loudoun County Board of Supervisors

ERM identified several parcels owned by the BOS within 0.25 mile of the Project route alternatives. Table 5.1-1 provides descriptions of the BOS properties (ordered from north to south), identifies the crossing distance for each applicable route, and the provides the crossing length and acreage as applicable. Section 5.1.7 discusses land that is privately owned but held under easement by the BOS, while Section 5.1.8 discusses recreational facilities.

No easement would be required for the five parcels in Table 5.1-1 that are not crossed by any route alternative. Routes 1 and 5 cross the Moorefield Station Eastern Regional Pond parcel, while Routes 2, 3, and 4 cross Broad Run Stream Valley Park.

TABLE 5.1-1 LOUDOUN COUNTY BOARD OF SUPERVISORS PARCELS

Facility	Description	Approximate Distance and Direction from Route Alternatives	Crossing Length (Acreage)
Moorefield Station Eastern Regional Pond	Open space and stormwater facilities	• Crossed by Routes 1 and 5 north of Loudoun County Parkway near Westwind Drive	15 feet (<0.1 acre)
Evermoore Neighborhood Park	Open space and stormwater facilities	• Adjacent to Routes 1 and 5 north of Loudoun County Parkway and Claude Moore Drive	NA
Moorefield Station Community Park	Open space and stormwater facilities	• 0.1 mile north of Routes 1 and 5 near Loudoun County Parkway and Mooreview Parkway.	NA
Unnamed	Open space and stormwater facilities	• 0.1 mile north of Route 5 near Ryan Road and Claiborne Parkway	NA
Lyndora Park	Sports fields and forested land	• Less than 0.1 mile north of Routes 2, 3, and 4 near Luckett's Bridge Circle	NA
Unnamed	Open space and stormwater facilities	• 0.1 mile east of Routes 1 and 5 near Loudoun County Parkway and Evergreen Ridge Drive	NA
Broad Run Stream Valley Park	Forested land	• Adjacent to Routes 1 and 5 north of Old Ox Road • Crossed by Route 2 north of Rosa Lee Carter Elementary School • Crossed by Route 3 near Rosa Lee Carter Elementary • Crossed by Route 4 south of Loudoun Reserve Drive	• Routes 1 and 5: NA • Route 2: 0.1 mile (0.9 acre) • Route 3: 0.7 mile (8.6 acres) • Route 4: 0.4 mile (4.9 acres)

NA = not applicable.

Moorefield Station Eastern Regional Pond is an approximately 7-acre parcel within the Moorefield Station Planned Development area (see Section 5.1.6). The parcel is almost entirely comprised of Lake Verlin, a manmade stormwater facility. Most the parcel is approximately 200 feet north of Loudoun County Parkway, and this area is not crossed by the Project. A 15-foot-wide segment of this parcel, which is used as an access drive, connects the stormwater facility to Loudoun County Parkway. This 15-foot-wide segment of the BOS-owned parcel is aligned with the future Moorefield Boulevard and will eventually become a public roadway (see Section 5.1.6). Routes 1 and 5 cross the 15-foot-wide segment of the parcel, which would require permission from the BOS. In meetings with Dominion, Loudoun County staff indicated to Dominion that crossing the 15-foot-wide segment of county land would be preferable to crossing to the south side of Loudoun County Parkway to avoid it and, furthermore, would not conflict with the future road.

Broad Run Stream Valley Park is an approximately 1.8-mile-long linear park consisting of forested riparian areas and natural trails along Broad Run, extending from the north side of Rosa Lee Carter Elementary School south to an area approximately 0.2 mile north of Old Ox Road. In addition to Broad Run and the existing natural trails, a large existing gravity sewer easement extends the length of the park from north to south. The park is adjacent to Rosa Lee Carter

Elementary School and existing residential development to the north, and existing residential and commercial/industrial developments to the south. Routes 2, 3, and 4 all cross a portion of the park, which would require permission from the BOS. In discussions with Dominion, the BOS and Loudoun County staff indicated that a crossing of the park could be allowed.

On January 22, 2025, the BOS voted in favor of a resolution supporting Routes 3 and 4 as their preferred alternatives for Golden-Mars Lines (BOS 2025).

Loudoun County School Board

ERM identified two parcels owned or administered by the Loudoun County School Board within 0.25 mile of the Project alternative routes: Stone Hill Middle School and a parcel containing Rosa Lee Carter Elementary and Rock Ridge High School. The former is not crossed by a route; therefore, an easement for this parcel is not required; the latter is crossed by Routes 2, 3, and 4, as indicated in Table 5.1-2.

TABLE 5.1-2 LOUDOUN COUNTY SCHOOL BOARD PARCELS

Facility	Approximate Distance and Direction from Route Alternatives	Crossing Length and Acreage
Stone Hill Middle School	• 0.1 mile east of Routes 1 and 5 near Loudoun County Parkway and Evergreen Ridge Drive	NA
Rock Ridge High School and Rosa Lee Carter Elementary (shared parcel)	• 0.2 mile east of Route 1 • Crossed by Routes 2, 3, and 4 • Greater than 0.25 mile east of Route 5	• Routes 1 and 5 = NA • Route 2 = 0.3 mile (3.2 acres) • Route 3 = 0.2 mile (3.0 acres) • Route 4 = 0.7 mile (7.1 acres)

NA = not applicable.

Rosa Lee Carter Elementary School and Rock Ridge High School share an approximately 113-acre campus, bordered by forested areas and Broad Run to the north and west, existing residential areas to the south, and an existing 230 kV transmission line and data centers to the east. Both schools are owned by Loudoun County Public Schools. During the 2024–2025 school year, the elementary and high schools had enrollments of 790 and 1,580 students, respectively (LCPS 2025). The elementary school building is in the southwest corner of the parcel, and the high school building is in the south-central part of the parcel, with surface parking, sports fields, and open space surrounding the buildings. The site is accessed from the west via Loudoun Reserve Drive, the only access to the school parcel.

Because Routes 2, 3, and 4 each cross the parcel, they would require approval from the School Board. Dominion continues to coordinate with the School Board on a potential crossing of the property, as discussed in more detail below.

Northern Virginia Regional Park Authority Parks

Northern Virginia Regional Park Authority (NOVA) Parks is an inter-jurisdictional organization representing Arlington, Fairfax, and Loudoun counties and the cities of Alexandria, Falls Church, and Fairfax. It manages the W&OD Railroad Regional Park, a 45-mile paved trail along a former railbed. The trail extends northwest-southeast along the northern boundary of the study area. The

trail is lined trees, crossing through highly developed residential and commercial areas (NOVA Parks 2024). Dominion holds an existing transmission line easement along the W&OD Trail where it crosses the study area.

The common alignment of Routes 1 through 5 would cross the NOVA Parks trail in two places near the Golden Substation site, including one crossing each for the 500 kV and 230 kV circuits before they merge into a 500-230 configuration south of the resource. The crossings occur within existing Dominion right-of-way; therefore, no easement would be required.

5.1.1.2 IMPACT ASSESSMENT

This section discusses the Project's potential impacts on the four public lands crossed by the Golden-Mars route alternatives. Section 5.3 discusses the potential impacts on viewsheds from public lands identified as VSRs. Project construction could result in temporary noise and traffic impacts on public lands crossed by or near the routes. Construction could require temporary closures or detours of trails within the affected parks. These construction impacts would be short term and temporary and would not affect the continued ownership or operation of the lands by the managing agency or the use of these lands by the public. The remainder of this section discusses other impacts on publicly owned land.

Moorefield Station Eastern Regional Pond

Construction of Routes 1 or 5 would span the 15-foot-wide section of BOS land in the Moorfield Station Eastern Regional Pond parcel. No structures would be placed within this parcel. The routes would not cross the existing stormwater pond itself, and the future road expansion would be compatible with the transmission line. Moreover, as noted above, the BOS informed Dominion that a crossing of the parcel is feasible; therefore, the Project would have no significant impact on the parcel.

Broad Run Stream Valley Park

Golden-Mars Routes 2, 3, and 4 each cross Broad Run Stream Valley Park, with about 0.9 acre, 8.6 acres, and 4.9 acres, respectively, within the right-of-way of each alternative. Routes 1 and 5 do not cross the park, although a 0.2-mile segment of the common alignment of the routes is adjacent to the southern boundary of the resource.

The Route 2 crossing along the northern edge of the park would require only minimal tree clearing, because the crossing primarily is within existing cleared underground utility rights-of-way and open space bordering adjacent residential areas. Route 2 crosses one existing trail within this park.

The Route 3 crossing along the northern and western edges of the resource would have the greatest impact on the park among the route alternatives. The area within the right-of-way for Route 3 is mostly forested but also includes two crossings of an existing natural-surface trail and two crossings of a cleared underground utility right-of-way. The forested land within the right-of-way would be cleared and permanently converted to open space.

Route 4 crosses the eastern side of the park, south of Loudoun Reserve Drive. The area crossed consists of forested land adjacent to an existing underground utility right-of-way. The forested

land would be cleared and permanently converted to open space, but Route 4 does not cross any existing trails or utility right-of-way.

Rosa Lee Carter Elementary School and Rock Ridge High School

Golden-Mars Routes 2, 3, and 4 each cross the parcel containing Rosa Lee Carter Elementary School and Rock Ridge High School, with about 3.2 acres, 3.0 acres, and 7.1 acres within the right-of-way for each route, respectively. Each of these routes require consent from the Loudoun County School Board to be a viable alternative for the Project. Routes 1 and 5 do not cross the school parcel.

Routes 2 and 3 each cross a forested area in similar alignments across the northern part of the parcel, north of athletic fields. No developed school facilities are within the right-of-way of either route. While the Project would convert the forest to open space, transmission infrastructure installed in the right-of-way along the routes would not impact use of the parcel for school functions. Some outdoor school activities could be impacted by noise during construction, but this would be short term, temporary, and dependent on time of year.

The Route 4 alignment would follow the southern and eastern boundaries of the school parcel. This route would have the longest crossing of the school parcel and thus the largest impact on the parcel. The Route 4 right-of-way overlaps the existing road that provides accesses to both schools from Loudoun Reserve Drive. Construction of Route 4 could result in temporary closures or delays on the school access road; however, operation of Route 4 would not permanently impact access. Route 4 would pass near athletic fields in the southeast corner of the parcel and would be approximately 0.1 mile south of the elementary and high school buildings. While the Project would have visual impacts on school users as discussed in Section 5.3.3, a transmission line installed along Route 4 would not permanently affect the use of either school.

Dominion met with Loudoun County Public School staff and School Board members on multiple occasions since October 2024 and provided detailed maps, crossing data, and visual simulations as requested by the board and staff. Dominion continues to coordinate with School Board on a potential crossing of the property.

If the Loudoun County School Board consents to a crossing, and if any of Routes 2, 3, or 4 are selected for the Project by the SCC, Dominion would coordinate the timing of construction activities with Loudoun County School Board staff to minimize noise and traffic impacts at the schools.

NOVA Parks

As previously stated, the Golden-Mars Lines would cross the W&OD Trail within Dominion right-of-way for existing 230 kV overhead transmission lines. The Project would not require transmission structures within NOVA Parks land; therefore, the Project would not require property rights from NOVA Parks. Dominion will coordinate with NOVA Parks regarding construction across the parcel, including temporary closures and detours.

5.1.2 LAND USE AND LAND COVER

5.1.2.1 EXISTING CONDITIONS

ERM identified land use and land cover within the study area using a combination of local and statewide datasets, along with aerial photo interpretation to identify the most current uses for a given area (NAIP 2023, VGIN 2024, Loudoun County 2024a). Figure 5.1.2-1 depicts land use/land cover within 0.25 mile of the Project. Table 5.1-3 summarizes the acreage of each land use/land cover type present within the right-of-way for each route.

Land use and land cover in the study area are broken down into the four main categories described below.[3]

- Developed lands: Land characterized by medium to high density constructed buildings, such as certain residential subdivisions, industrial areas, commercial areas, and impervious surfaces.
- Open space: Land primarily covered by planted grasses and ornamental vegetation, vegetation planted in developed settings for erosion control or aesthetic purposes, as well as natural herbaceous vegetation and undeveloped land, parks, and open space recreational facilities.
- Forested lands: Land cover consisting of natural or semi-natural woody vegetation.
- Open water: Open-water features, including rivers, streams, and natural and artificial ponds.

The predominant land use and land cover types in the study area are forested, developed, and open space lands. Developed lands are generally associated with industrial/commercial uses and the residential neighborhoods within the study area. These areas exist primarily along Loudoun County Parkway, Old Ox Road, and Rt. 28. Forested and open space lands exist primarily around the Broad Run riparian corridor. The Project would not cross any agricultural lands.

5.1.2.2 IMPACT ASSESSMENT

Golden-Mars Routes

The primary impact of the Golden–Mars Lines on land use and cover would be the conversion of forested land to an herbaceous cover within new right-of-way. Except for land directly beneath transmission structures, operation of the Project would not impact current uses of open space, developed land, and open water. Routes 1 and 5 would have the least impact on forested land at 50.3 and 49.1 acres, respectively, compared with Routes 2 through 4, which would impact a range of 64.7 to 67.0 acres. Section 5.2.4 discusses impacts on forested land in more detail.

Lockridge and Sojourner 230 kV Loops

The Lockridge and Sojourner Loops require new right-of-way predominantly within forested land, which would be converted to an herbaceous cover within the new right-of-way.

[3] For purposes of land use/land cover, wetland areas have been classified as open space, forested land, or open water depending on wetland type. Wetlands near the routes are discussed separately in Section 5.2.1.

TABLE 5.1-3 LAND USE/LAND COVER CROSSED BY THE ROUTES (ACRES)

Land Use/ Land Cover [a]	Unit	Golden-Mars Route 1	Golden-Mars Route 2	Golden-Mars Route 3	Golden-Mars Route 4	Golden-Mars Route 5	Lockridge 230 kV Loop	Sojourner 230 kV Loop
Total right-of-way [b]	acres	123.5	121.7	108.6	109.3	129.3	5.0	29.1
Forested	acres	50.3	64.7	66.5	67.0	49.1	4.4	23.2
Developed	acres	28.7	23.0	19.8	21.2	31.2	0.1	1.6
Open Space	acres	42.4	31.6	20.2	19.2	46.8	0.3	4.3
Open Water	acres	2.2	2.4	2.0	1.9	2.2	0.1	<0.1

kV = kilovolt(s).

[a] Based on local and state-wide data sets and aerial photo interpretation by ERM. Acreage includes the proposed new rights-of-way.

[b] Land use/land cover acreage the totals may not match the sum of the addends due to rounding.

5.1.3 LAND USE PLANNING AND ZONING

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

The Loudoun County 2019 Comprehensive Plan, which includes the Loudoun County 2019 General Plan and the Loudoun County 2019 Countywide Transportation Plan, guide Loudoun County's land use and transportation policies. The Loudoun County Zoning Ordinance regulates land use throughout the county and serves as the primary tool for implementing Comprehensive Plan policies. Further discussion of the plans and ordinance in relation to the Project is provided in the following sections.

Loudoun County General Plan

The 2019 Loudoun County General Plan (the General Plan; Loudoun County 2023b) guides the County's land use policy and legislative actions, including objectives for natural resource management, accessible housing, cultural heritage protection, and economic development. The General Plan was adopted in 2019 and most recently amended in February 2023. In June 2024, the County authorized a review of the General Plan that is expected to be completed in 2025. The General Plan provides future land use recommendations that guide zoning decisions and direct capital projects.

Loudoun County implements the General Plan goals and objectives through the designation of "Policy Areas," which are further divided into "Place Types." Policy Areas, which define broad land planning objectives for a specific geographic region, based on the size and configuration of buildings, land uses, availability and purpose of open spaces, and special amenities (Loudoun County 2023b). The Project would cross or would be within 0.25 mile of two Policy Areas, as described below.

- The Suburban Policy Area consists of commercial areas and neighborhoods. Commercial areas include traditional offices, industrial parks, mixed-use centers, and neighborhood-serving commercial centers. The Golden–Mars Lines and Sojourner 230 kV Loop cross or are within 0.25 mile of this Policy Area.
- The Urban Policy Area is specifically targeted for future growth, including adapting walkable mixed-use and transit-oriented development intended to create urban communities close to Metrorail. The Golden–Mars Lines and Lockridge 230 kV Loop cross or are within 0.25 mile of this Policy Area.

North of the Dulles Greenway, the Project routes cross portions of the Suburban Policy Area identified as the Suburban Employment and Suburban Industrial/Mineral Extraction Place Types. These areas are characterized by and intended for office and industrial parks, data center campuses, flex space and warehousing, and other business uses. South of Dulles Greenway, the Golden-Mars routes cross Suburban and Urban Policy Areas near existing residential land uses. In

accordance with the General Plan, Loudoun County prefers for new transmission lines to be in more the compatible Suburban Policy Areas as opposed the less compatible Urban Policy Areas (BOS 2025).

Place Types identify existing and intended uses in a specific portion of each Policy Area in terms of the size and density (Loudoun County 2023b). Each Place Type has corresponding core, complementary, and conditional uses and a preferred mix of residential, non-residential, and public/civic uses. In general, Place Types intended exclusively for non-residential uses are more compatible with new transmission infrastructure, especially compared to Place Types intended for residential uses. Table 5.1-4 lists the Place Types within 0.25 mile of the routes, provides a brief description of each, and describes the preferred mix of uses for each type. Place Types in the Project vicinity are shown on Figure 5.1.3-1.

TABLE 5.1-4 PLACE TYPES WITHIN 0.25 MILE OF PROJECT FACILITIES

Place Type	Description	Preferred Mix of Uses
Suburban Mixed Use	Commercial, entertainment, and retail centers that are pedestrian-oriented, as well as accessory residential units.	Non-Residential: 35% Residential: 60% Public/Civic: 5%
Suburban Employment	Production, office, warehousing, and flex space uses that do not require outdoor storage or generate excessive noise or air pollutants.	Non-Residential: 100%
Urban Employment	Prime area for office and flex space uses that do not require outdoor storage or generate excessive noise or air pollutants.	Non-Residential: 100%
Suburban Neighborhood	Residential areas on medium to large lots. Includes accessory retail and services to the neighborhood, integrated along major roads.	Non-Residential: 10% Residential: 80% Public/Civic: 10%
Suburban Industrial/ Mineral Extraction	Large manufacturing and outdoor storage uses designed to accommodate freight traffic. Includes residential buffers to minimize interruptions. Public utilities are a core use.	Non-Residential: 100%
Urban Transit Center	Takes advantage of proximity to transit for dense urban development. Development within 0.25 mile of a Metrorail Station has smaller units and a more equal mix of non-residential and residential.	Within 0.25 Mile: • Non-Residential: 45% • Residential: 50% • Public/Civic: 5% Outside 0.25 Mile: • Non-Residential: 25% • Residential: 70% • Public/Civic: 5%
Urban Mixed Use	Primarily high-density, walkable, and mixed housing types. Some small office, retail, and services are integrated into residential areas.	Non-Residential: 15% Residential: 80% Public/Civic: 5%

Loudoun County generally supports routing of new transmission corridors in the Suburban Employment and Suburban Industrial/Mineral Extraction Place Types, where office and industrial parks, data center campuses, flex space and warehousing, and other business uses exist and/or

are planned to develop. In contrast, the county generally does not support new transmission corridors in Suburban Mixed Use and Suburban Neighborhood Place Types south of the Dulles Greenway. In these areas, which include existing residential uses and existing and planned mixed-use residential and commercial centers, new overhead high voltage transmission lines could impact the visual characteristics of the community and surrounding area (see Section 5.3). Loudoun County and the 2019 General Plan also identify the area around the Ashburn Metro Station as not preferred for new transmission lines. This area contains Urban Transit Center, Urban Mixed Use, and Urban Employment Place Types and is planned for dense, walkable, mixed-use urban development (BOS 2025).

Loudoun County 2019 Countywide Transportation Plan

The CTP was adopted in June 2019 along with the General Plan and was most recently amended in February 2023. The land use planning policies and objectives in the General Plan are closely coordinated with the CTP, whose purpose is to anticipate and plan land use development and transportation improvement needs through 2040. Specifically, the CTP supports the Comprehensive Plan by identifying the standards that new roadway and streetscape design in each Policy Area must conform to. The CTP does not specifically outline the land use relationship between transportation infrastructure and electric transmission lines. Section 5.1.10 discusses existing and planned transportation infrastructure in more detail.

Loudoun County Zoning Ordinance

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

Under Virginia law, public utilities planning to construct a transmission line of 138 kV or higher are required to obtain a Certificate of Public Convenience and Necessity from the SCC which, if granted, preempts local zoning ordinances (Va. Code § 56-265.2) and makes the transmission line components of a project meeting this criterion exempt from local zoning regulations. Substations and other facilities may be subject to local land use approvals and screening standards, including buffers and landscaping.

The 2023 update to the Loudoun County Zoning Ordinance (originally adopted in 1993) included changes related to data center and industrial uses and redefined which zoning districts allow data centers as a by-right (entitled) use, versus zoning districts where data centers require BOS approval (Loudoun County 2023c). Zoning districts with by-right data center use and other by-right industrial uses, are indicative of areas where new transmission lines are generally compatible with intended development patterns. Table 5.1-5 lists zoning districts within 0.25 mile of the Project routes. Because Dominion intends to obtain a Certificate of Public Convenience and Necessity from the SCC, the Project would be exempt from zoning requirements. Nonetheless, this section provides information on zoning districts to assess general land use compatibility with the Project. Zoning is not further analyzed further in this report.

TABLE 5.1-5 ZONING DISTRICTS WITHIN 0.25 MILE OF PROJECT FACILITIES

Zoning District	Description and Allowed Uses
Industrial Park	District for office, light production, flex space, and warehousing uses. Support limited first floor retail or other accessory uses that serve predominate uses.
Planned Development-Commercial Highway	Highway-related commercial districts defined under a 1972 ordinance within the Route 28 Tax District.
Office Park	District for administrative, business, and professional offices; research and development; and supporting commercial and institutional uses and facilities. Support limited first floor retail.
Transit Related Center	Established to provide for a compatible mixture of commercial, cultural, institutional, governmental, recreational, and high-density housing uses in compact, pedestrian oriented, transit-oriented developments and transit-designed supportive areas.
General Industry	District for industrial uses that are incompatible with residential uses, due to the prevalence of outdoor storage and emissions of noise and odor.
Townhouse/Multifamily Residential-16	Single family attached/detached and multifamily residences at a maximum density of 16 units per acre. Served by public water and sewer.
Planned Development Housing-3	Mixed use residential communities including single family and multifamily housing with supportive non-residential uses. Maximum overall residential density of 3 units per acre.
Single Family Residential-1	Low-density single family detached development with a maximum density of 1 unit per 40,000 square feet. Served by public water and sewer. Cluster and compact cluster options.
Planned Development Housing-4	Mixed use residential communities including single family and multifamily housing with supportive non-residential uses. Maximum overall residential density of 4 units per acre.
Commercial Center—Community Center	Serves retail shopping needs of surrounding community within a 10-minute drive. Minimum of 4 acres, maximum of 22 acres.
Planned Development-Active Adult/Age Restricted	Planned residential communities restricted to residents 55 years or older. Maximum of 30 dwelling units per. Served by public sewer and water, and one or more major arterial or collector roads.

5.1.3.1 IMPACT ASSESSMENT

Consistent with the Loudoun County staff's January 22, 2025, Business Meeting Action Item #11 *Assessment of the Golden-Mars Route Alternatives*, the analysis of the Project's potential impacts on land use planning and zoning focuses on Place Types, which provide the most useful measures of Project compatibility with Loudoun County's land use policies. Table 5.1-6 lists crossings of Place Types by route.

TABLE 5.1-6 LENGTH OF PLACE TYPE CROSSINGS

Place Type	Unit	Golden-Mars Route 1	Golden-Mars Route 2	Golden-Mars Route 3	Golden-Mars Route 4	Golden-Mars Route 5	Lockridge 230 kV Loop	Sojourner 230 kV Loop
Suburban Employment	miles	1.4	1.4	1.4	1.4	1.4	0.0	0.0
Suburban Industrial/ Mineral Extraction	miles	1.6	2.8	3.2	3.4	1.6	0.0	1.9
Suburban Mixed Use	miles	1.0	1.0	1.0	1.0	1.0	0.0	0.0
Suburban Neighborhood	miles	3.0	3.0	1.6	1.5	3.0	0.0	0.0
Urban Employment	miles	0.7	0.7	0.7	0.7	0.7	0.6	0.0
Urban Mixed Use	miles	0.1	0.0	0.0	0.0	0.6	0.0	0.0
Urban Transit Center	miles	1.5	0.3	0.3	0.3	1.5	0.0	0.0

kV = kilovolt(s).

Golden–Mars Routes

North of Dulles Greenway, the Golden–Mars Lines are within the Suburban Mixed Use, Suburban Employment, and Urban Employment Place Types. Because this area consists mostly of data center campuses and business and industrial parks, the Project would be consistent with the intended uses and design characteristics of the area. South of the Dulles Greenway, the routes briefly cross the Urban Transit Center Place Type near the Ashburn Metro Station. New transmission lines are less compatible with the dense, walkable, mixed-use urban environments intended and planned for this area. Within the Urban Transit Center area, the Golden–Mars collocate with major roadways or existing transmission lines to mitigate impacts on planned land uses.

Suburban Neighborhood is the most prevalent Place Type south of the Dulles Greenway. Where they run along the Loudoun County Parkway, Golden–Mars Routes 1, 2, and 5 are immediately adjacent to residential areas. Loudoun County does not consider a transmission line compatible with the design characteristics expected of the Suburban Neighborhood Place Type. Routes 3 and 4 also cross the Suburban Neighborhood Place Type, but the routes are mostly collocated with existing Lines #2095/#2218 along Broad Run in wooded areas, which would mitigate some visual impacts.

Suburban Industrial/Mineral Extraction is the only Place Type that lists public utilities as a core use. Routes 2, 3, and 4 each parallel existing Dominion transmission lines within the Suburban Industrial/Mineral Extraction Place Type.

Based on the Place Types discussed above, Routes 3 and 4 are more compatible with the overall objectives of county land planning and management. This finding is consistent with the BOS motion from January 22, 2025 (in response to Business Meeting Action Item #11) wherein the BOS "affirm(ed) the County's position identifying Route 4 of the Golden-Mars Transmission Line alignment as the County's preferred route and Route 3 of the Golden-Mars Transmission Line alignment as the County's secondary route preference". The county preference is based, in part, on assessments by county staff and the BOS regarding compatibility of the routes with the General Plan Place Types.

Lockridge 230 kV Loop

The entire Lockridge Loop is within the Urban Employment Place Type. While transmission lines are not considered a core, complementary, or conditional use for this type, the Lockridge Loop conforms with the intended and actual land uses of the area, which include ongoing development of multiple data center campuses and other commercial and industrial uses.

Sojourner 230 kV Loop

The entire Sojourner Loop is within the Suburban Industrial/Mineral Extraction Place Type. Because public utilities are listed as a core use of this Place Type, the Sojourner Loop is compatible with and conforms to the intended land uses in this area.

5.1.4 NEIGHBORHOODS AND DWELLINGS

ERM identified dwellings (including single-family dwellings and individual dwelling units within multi-family buildings) within 100 feet, 250 feet, and 500 feet of the centerline of the Golden–Mars Lines and the Lockridge and Sojourner Loops through review of various digital datasets, maps, and recent (2024) digital aerial photography. Table 5.1-7 lists the number of dwellings within these tiers for each route. Figure 5.1.4-1 shows the locations of homes and neighborhoods along the routes. The subsections below provide additional information about the neighborhoods along each route.

All dwellings within 500 feet of the route alternatives are located south of the Dulles Greenway. Dwellings within the distance tiers are primarily single-family detached and single-family attached dwellings, with a few clusters of multi-family apartment buildings.

TABLE 5.1-7 DWELLINGS NEAR PROJECT ROUTE ALTERNATIVES

Route Alternative	Dwellings within 100 Feet of Centerline	Dwellings within 250 Feet of Centerline	Dwellings within 500 Feet of Centerline
Golden–Mars Route 1	116	275	984
Golden–Mars Route 2	110	231	697
Golden–Mars Route 3	4	28	133
Golden–Mars Route 4	1	10	69
Golden–Mars Route 5	125	312	1,163
Lockridge 230 kV Loop	0	0	0

Route Alternative	Dwellings within 100 Feet of Centerline	Dwellings within 250 Feet of Centerline	Dwellings within 500 Feet of Centerline
Sojourner 230 kV Loop	0	0	0

kV = kilovolt(s).

5.1.4.1 EXISTING NEIGHBORHOODS

ERM identified neighborhoods crossed by or within 0.25 mile of route alternatives using Loudoun County GIS, the Loudoun County Land Management, Applications, Research, and Coordination website, and the county's Existing and Approved Development Mapping Tool (Loudoun County 2023d, 2024a, 2024b, 2024c). Table 5.1-8 and the remainder of this section provide information about communities crossed by a route alternative. These areas are depicted on Figure 5.1.4-1. Proximity to neighborhoods is measured from the nearest parcel line of the neighborhood, rather than from individual dwellings therein. The routes typically cross neighborhoods through HOA-owned open space parcels, except where Route 5 encroaches on several residential lots in the Reserve at Belle Terra neighborhood. The Lockridge and Sojourner 230 kV Loops do not cross any neighborhoods and are omitted from Table 5.1-8.

TABLE 5.1-8 NEIGHBORHOODS CROSSED BY THE GOLDEN–MARS LINES

Neighborhood	Unit	Golden–Mars Route 1	Golden–Mars Route 2	Golden–Mars Route 3	Golden–Mars Route 4	Golden–Mars Route 5
Birchwood at Brambleton	acres miles	1.9 0.2	1.9 0.2	NA	NA	1.9 0.2
Dulles Parkway Center	acres miles	0.3 <0.1	NA	NA	NA	0.3 <0.1
Loudoun Parkway Center	acres miles	1.4 0.1	2.3 0.2	2.3 0.2	2.3 0.2	1.4 0.1
Loudoun Valley Estates I	acres miles	9.3 0.8	0.8 0.1	0.8 0.1	NA	5.3 0.5
Loudoun Valley Estates II	acres miles	25.3 2.0	27.2 2.2	10.1 0.8	4.3 0.4	26.2 2.1
Loudoun Valley Estates III	acres miles	NA	NA	1.5 0.1	2.7 0.1	NA
Moorefield Station	miles acres	7.6 0.7	NA	NA	NA	12.0 1.1
Park at Belle Terra	acres miles	NA	NA	NA	NA	<0.1 0.0
Reserve at Belle Terra	acres miles	NA	NA	NA	NA	0.8 0.1

NA = not applicable; route does not cross the neighborhood.

Brambleton

Brambleton is a 2,488-acre mixed-use community that includes residential, open space, public, commercial and industrial uses. As of July 1, 2023, 6,379 dwellings had been built or permitted, with an additional 1,143 dwellings were planned but not yet permitted. Portions of Birchwood at Brambleton, a subsection of Brambleton, are currently under construction and are addressed in more detail in Section 5.1.6.

Approximately 0.2 mile of a common alignment of Routes 1, 2, and 5 cross a section of Birchwood at Brambleton. Two segments of Routes 1 and 2, and 5 are also within 0.25 mile of fully developed parts of the Brambleton neighborhood west of Loudoun County Parkway.

Dulles Parkway Center

Dulles Parkway Center is a 35-acre mixed-use development consisting of 124 attached dwellings and commercial uses. Routes 1 and 5 share a common alignment across the commercially zoned portion of the development for approximately 100 feet where the routes cross Loudoun County Parkway near Barrister Street.

Loudoun Parkway Center

Loudoun Parkway Center is a 121-acre mixed-use development consisting of 845 single-family attached and multi-family dwellings as well as a healthcare facility.

- Routes 1 and 5 share a common alignment across Loudoun Parkway Center's healthcare facility as described in Section 5.1.5.2. Routes 1 and 5 are 100 feet north of the residential portion of Loudoun Parkway Center, where the routes parallel the north side of Loudoun County Parkway.
- Routes 2, 3, and 4 share a common alignment for approximately 0.2 mile across open space along Broad Run, near the neighborhood's southern boundary and collocated with existing Lines #2095/#2218.

Loudoun Valley Estates I, II, and III

The Loudoun Valley Estates neighborhoods are divided into three HOAs—Loudoun Valley Estates I, II, and III—totaling 1,556 acres and consisting of 3,697 single-family detached and single-family attached dwellings, HOA recreation amenities, and open space. All Golden-Mars route alternatives cross land owned by these HOAs. Routes 1, 2, 3, and 4 also cross HOA-owned parcels dedicated to Loudoun County as Open Space Easements, as discussed in Section 5.1.7.1.

- Routes 1 and 5 cross portions of Loudoun Valley Estates I and II, parallel to and collocated with Loudoun County Parkway.
- Route 2 crosses Loudoun Valley Estates I adjacent to School Board land near Broad Run before crossing portions of Loudoun Valley Estates II and continuing south along Loudoun County Parkway.
- Route 3 crosses portions of Loudoun Valley Estates I along the same alignment as Route 2 but turns south to follow Broad Run, crossing portions of Loudoun Valley Estates II and III.
- Route 4 crosses Loudoun Valley Estates II and III south of the school campus.

Moorefield Station

Moorefield Station (also called Moorefield) is a 606.2-acre mixed-use development consisting of existing and planned single-family and multi-family dwellings, schools, commercial and office uses. As of July 1, 2023, a total of 2,078 dwellings were existing or permitted out of a planned total of 6,005 dwellings. Impacts on planned developments within Moorefield Station are described in more detail in Section 5.1.6.2.

- A segment of both Routes 1 and 5 parallel to and collocated with Loudoun County Parkway crosses Moorefield Station open space, including a regional trail, and Moorefield Station land planned for future commercial development.
- A segment of Route 5 collocated with Ryan Road crosses open space parcels next to existing Moorefield residential areas.

Reserve at Belle Terra

The Reserve at Belle Terra is a 13-acre residential development with 43 single-family detached dwellings. The Route 5 centerline is about 40 feet from the closest residential lot and 60 feet from the nearest home. The Route 5 right-of-way encroaches onto nine residential lots and crosses HOA land parallel to Ryan Road. The encroachment of Route 5 right-of-way onto residential lots would limit tree plantings or placement of residential outbuildings on the rear portion of the lots and would require the removal of two existing sheds within the Route 5 right-of-way. Route 5 would also require removal of trees within the HOA open space. The trees currently provide landscaping along Ryan Road and shade a multi-use trail parallel to Ryan Road.

Park at Belle Terra

The Park at Belle Terra is a completed, 112-acre residential development with 109 single family detached homes. Route 5 crosses an open space parcel of this neighborhood before crossing Ryan Road south of the entrance road into this development.

5.1.4.2 PLANNED NEIGHBORHOODS

Planned neighborhood and future dwellings within 500 feet of the route include Silver District West, Moorefield Station, Birchwood at Brambleton, and Stone Hill Residential. These planned developments are discussed in Section 5.1.6.

5.1.4.3 IMPACT ASSESSMENT

Right-of-Way Encroachment onto Residential Lots

Golden-Mars Routes 1 through 4 as well as the Lockridge and Sojourner loops avoid encroachment onto residential lots. The Route 5 right-of-way encroaches onto nine residential lots in the Reserve at Belle Terra neighborhood, would require the relocation or removal of two residential sheds, both located on Capri Lane near Ryan Road, and would prohibit new structures or trees on the affected portions of these lots. Acquisition of right-of-way on the residential property (if this were to occur) would impact use of the property by limiting or prohibiting the placement of structures within the right-of-way. Fences within the right-of-way are permissible on a case-by-case basis.

Proximity to Dwellings

As indicated in Table 5.1-8, the Golden-Mars Routes 1, 2, and 5 would cross and would potentially impact a significantly larger number of neighborhoods and dwellings than Routes 3 and 4. Routes 3 and 4 avoid homes along Loudoun County Parkway by crossing public lands (BOS and School Board-owned) and collocating with existing Lines #2095 and #2218 along Broad Run. The dwelling counts within the distance tiers (100, 250, and 500 feet) for Route 5 are an order of magnitude greater than Routes 3 and 4.

Visual impacts (discussed in detail in Section 5.3) are the primary impact on neighborhoods and dwellings near new transmission lines. Visual impacts on homes can be influenced by proximity, as well as proper siting and use of collocation opportunities. Routes 3 and 4, and to a lesser degree, Route 2, use collocation with existing transmission lines and utility rights-of-way to maintain forested buffers between the transmission structures and nearby neighborhoods. These routes further reduce the visibility of the Golden-Mars Lines by avoiding major arterial roads through residential areas such as Loudoun County Parkway.

5.1.5 COMMERCIAL/INDUSTRIAL AREAS AND BUILDINGS

5.1.5.1 EXISTING COMMERCIAL AND INDUSTRIAL DEVELOPMENT

Commercial and industrial areas and buildings are present throughout the study area, including but not limited to data centers; automobile dealerships; retail centers; commercial services such as hotels, self-storage facilities, and banks; medical centers; utility infrastructure; and warehouses and distribution centers. The General Industry, Industrial Park, Office Park, Commercial Center-Community Center and Planned Development-Commercial Highway zoning districts (see Section 5.1.3) allow commercial or industrial land use by-right. Commercial uses are also allowed within the mixed-use districts in the study area, including the Transit-Related Center, which is applied to portions of the Silver District West and Moorefield Station developments, and the Planned Development Housing 4 district, used for the Brambleton community.

The portion of the study area north of Dulles Greenway is devoted to industrial and industrial uses and is dominated by existing and proposed data centers. Industrial uses, including long-established flex-industrial uses and a planned data center development, are also concentrated in the Mercure Business Park, Northwoods, and Dulles Trade Center developments on the north side of Old Ox Road. Retail commercial and automotive uses are concentrated south of the proposed Golden Substation along Pacific Boulevard and north of Waxpool Road. Smaller clusters of commercial uses are located on the northwest side of Loudoun County Parkway and the west side of Old Ox Road at the Overland Drive intersection.

In accordance with SCC Guidelines, crossing these commercial and industrial areas is preferred to crossing residential areas, because it minimizes potential conflicts with less compatible existing and planned land uses. As discussed in Sections 3.2, 5.1.1, and 5.1.11 the Dulles Airport FAA approach surfaces and the National Weather Service’s doppler radar on NOAA property prescribe offsite height limitations that preclude routing through adjacent industrial areas.

Non-residential buildings within 500 feet of the Golden-Mars route alternatives and loops are depicted on Figure 5.1.5-1.

5.1.5.2 IMPACT ASSESSMENT

Project construction could result in temporary noise, dust, and traffic impacts on commercial and industrial uses within 500 feet of Project facilities. Project operation would also affect visual conditions in commercial and industrial areas due to the addition of transmission infrastructure to the landscape, although such visual impacts would be less substantial than in residential areas, due to the general compatibility of transmission lines with commercial and especially industrial uses. Section 5.3 discusses the Project's visual impacts in detail.

Four outbuilding or sheds were identified within proposed Project rights-of-way. These structures would need to be removed for the Project. Multiple commercial and industrial buildings are within 500 feet of the route centerlines. Additionally, the centerlines or rights-of-way of the routes cross parking, display, storage, driveway, and landscaped areas. Existing commercial and industrial sites crossed by a route centerline or right-of-way would experience more direct disruption during construction, greater change in viewshed, and possible loss of land area available for future use or expansion.

The Lockridge Loop and Sojourner Loop both cross future data center developments. Dominion coordinated with the landowners and developers of those properties and routed the lines to avoid impacts to the developments. As a result, these Project components would have no impact on commercial and industrial areas.

The remainder of this section discusses the potential impacts of the Golden–Mars Routes on commercial and industrial uses, as depicted on Figure 5.1.5-1.

Utility Enclosure

An allowable utility enclosure within the existing Dominion right-of-way for Lines #2150/#2081 is within the right-of-way of the shared alignment of Golden-Mars Routes 1 through 5. The utility enclosure is south of the W&OD Trail and north of the Carmax site at 45210 Towlern Place, approximately 20 feet from the centerline of Golden-Mars Routes 1 through 5. The enclosure will remain within the existing right-of-way.

Auto World Circle

The common alignment of Golden-Mars Routes 1 through 5 crosses five parcels occupied by automotive sales and service facilities along and around Pacific Boulevard and Auto World Circle, as described below.

- 45210 Towlern Place (Carmax): The routes cross this parcel for approximately 700 feet in areas used for vehicle parking, display, and storage. The routes would also cross a perimeter landscaped area adjacent to the W&OD Trail. A 240 square foot storage shed within the right-of-way of each route just south of the trail would need to be removed for the Project.
- 21826 Pacific Boulevard (Washington Rolls-Royce/Lamborghini): The routes cross this parcel for approximately 500 feet through areas used for vehicle parking, display, and landscaping.
- 21715 Auto World Circle (AutoNation Honda Dulles): The routes cross this parcel for approximately 300 feet through a parking lot and landscaping area adjacent to Auto World Circle and Pacific Boulevard. A plan for a building addition with a footprint of 7,271 square feet is under review by Loudoun County (EPLAN-2024-0007). The proposed addition is on the

north side of the existing auto sales and service building, approximately 300 feet north of the centerline of the routes; therefore, transmission infrastructure installed on the parcel would not impact the planned addition.

- 21710 Auto World Circle (BMW of Sterling): The routes intersect this parcel for approximately 400 feet along Pacific Boulevard in areas used for vehicle parking, display, and landscaping.
- 21900 Auto World Circle (Safford Brown CDJR Sterling): The routes intersect this parcel for approximately 300 feet along Pacific Boulevard across areas used for vehicle parking, display, and landscaping.

In addition to removal of the shed on the Carmax property, the Project would require installation of transmission structures in parking areas at these facilities, which could eliminate a few parking places in at least two locations. This would not substantively change the parking capacities of the lots or the overall ability to use the properties.

Digital Loudoun IV

Digital Loudoun IV is a development south of Waxpool Road and west of Broderick Drive comprised of two data center buildings, one of which—Digital Loudoun IV Broderick Drive—is built, and the other, Digital Loudoun IV Prentice Road, is under construction. The routes cross approximately 0.3 mile along the northern end of the parcel containing the development, with the right-of-way of the routes passing less than 100 feet north of the constructed building in an area of the site designated for open space and tree conservation. The new transmission line would not impact use of the new or under-construction buildings but would require removal of trees within the right-of-way in the planned conservation area associated with the property.

SDC Ashburn

SDC Ashburn is an existing two-building data center development on the north side of the Dulles Greenway east of its intersection with Loudoun County Parkway. The parcel containing the development is divided by the right-of-way for a future public road—an extension of Barrister Street from Dulles Greenway to a planned extension of Shellhorn Road. The data center buildings are on the west side of the future road, while the routes cross about 0.3 mile of the parcel on the east side of the road, within the Broad Run floodplain (which is subject to a Virginia Runoff Reduction Method easement and thus not developable). The new transmission line would not impact land uses within the data center complex.

Columbia Gas Point of Delivery Facility

The right-of-way for Routes 1 and 5 passes approximately 20 feet north of an existing meter station associated with a gas pipeline in the Silver District West planned development southeast of the intersection of Loudoun County Parkway and Dulles Greenway (see Section 5.1.6). The county conducted a pre-submission review of the meter station in 2022 for equipment and pipeline modifications within its existing boundaries (PSUB-2022-0063). ERM was unable to find a follow-up development application. The new transmission line, if installed along Routes 1 or 5, would not impact use of the meter station or the pipeline it supports.

Inova Health Care Services

The common alignment of Routes 1 and 5 crosses about 600 feet of a parcel containing an existing health care facility on the south side of Loudoun County Parkway east of its intersection with Barrister Street. The right-of-way for the routes passes about 35 feet north of the Inova building, through a parking lot and landscaping area, although no structure would be located within the parking lot. The new transmission line, if installed along Routes 1 or 5, would not impact use of the health care facility.

Freedom Station Plaza

The common alignment of Routes 1 and 5 crosses about 100 feet of an improved parcel consisting of a parking area surrounding a concrete pad. The routes cross the southwest corner of the lot. In April 2023, the county conducted a pre-application review for possible rezoning to allow mixed-use development on four parcels bordered by Loudoun County Parkway to the south, Centergate Drive to the east, and Freedom Station Plaza to the north—the Freedom Station Plaza parcel, plus three other parcels, including a site currently containing a bank. The pre-application review included no drawings or site plans for the parcels and no subsequent zoning map amendment application was submitted.

The Shops at Moorefield

Route 5 crosses approximately 1,000 feet of a commercial parcel north of the intersection of Loudoun County Parkway and Ryan Road. The parcel contains a currently vacant building built as a grocery store and its associated parking lot. Route 5 crosses an unimproved portion of the parcel, which contains a walking path. Installation of transmission infrastructure along Route 5 would not impact current uses of the parcel. The parcel is proposed to be redeveloped with a gas station, convenience store, retail building, and multifamily residential structures, as described in Section 5.1.6.2, Planned Developments (The Shops at Moorefield/Moorefield Gas Station).

Birchwood at Brambleton Clubhouse (Birch House)

The common alignment of Routes 1, 2, and 5 crosses about 800 feet of a parcel containing Birchwood at Brambleton, a residential development (restricted to residents aged 55 and older) that is under-construction, as described in Section 5.1.6. The parcel contains a clubhouse with fitness and recreational facilities and athletic courts in the outdoor area around the building. Residences have been or are being built in the area west of the clubhouse. The right-of-way for Routes 1, 2, and 5 passes more than 100 feet east of the clubhouse in a forested area. If selected for the Project, transmission line structures installed along Routes 1, 2, or 5 would be visible from within the community but would not impact use of the clubhouse. Section 5.3 discusses the Project's visual impacts in detail.

Mercure Business Park

Routes 2, 3, and 4 follow a shared alignment crossing about 0.3 mile of undeveloped woodland in four discontinuous segments south of Broad Run owned by the Mercure Business Park Association. These routes also cross about 500 feet of a stormwater management pond on the back side of an industrial parcel in the Mercure Business Park (44258 Mercure Circle). Routes 2, 3, and 4 cross

the lot parallel and adjacent to existing Lines #2095 and #2218. Installation of the transmission line for the Project would not impact current land uses in these areas.

Dulles Trade Center

The common alignment of Routes 3 and 4 crosses the following eleven industrial properties within the Dulles Trade Center. Installation of the transmission line along Routes 3 or 4 would not impact the existing uses of any of these properties, except as noted below:

- Lot 21, 23540 Pebble Run Place (Supermax Enterprise): The common alignment of Routes 3 and 4 crosses approximately 600 feet of Lot 21 within the Dulles Trade Center. Land in this area is unimproved, although Lot 21 has been used as a contractor storage yard. The County approved a vegetative waste management facility for the site in 2020, but the facility was not built (SPAM-2020-0085). Paved outdoor storage areas are present but vacant. The property is now owned by Microsoft, which has inquired (via verification letters sent to Loudoun County) if current zoning allows data centers (ZCOR-2023-0107, ZCOR-2023-0272). Installation of a transmission line along Routes 3 or 4 would not impact the current use of the land but could impact a future data center use, if such a use is formally proposed.
- 23541 Pebble Run Place (Champions Autonation): The common alignment of Routes 3 and 4 crosses approximately 500 feet of unimproved land and parking areas at the rear of this parcel. A flex industrial building was constructed on the site following the approval of a site plan in April 2022 (STPL-2018-0030). The right-of-way for the routes passes about 15 feet east of this building.
- 23551 Pebble Run Place (Sterling Sports Cars and Trucks): The common alignment of Routes 3 and 4 crosses approximately 300 feet of a parking area at the rear of this parcel. The right-of-way passes about 35 feet west of a commercial structure.
- 23571 Pebble Run Place (Divine Automotive Group): The common alignment of Routes 3 and 4 crosses approximately 800 feet of unimproved land, a parking area, and a stormwater management pond on the parcel. The right-of-way passes about 35 feet west of a building on the parcel.
- 23651 Overland Drive (ABC Supply Co. Inc.): The common alignment of Routes 3 and 4 crosses less than 100 feet of unimproved land at the rear of the parcel, with the right-of-way for the routes passing more than 100 feet west of a building on the parcel.
- 23675 Overland Drive (BG Outdoor Services): The common alignment of Routes 3 and 4 crosses approximately 300 feet of the parcel, within the right-of-way passing immediately adjacent to an existing building.
- 23691 Overland Drive (Arthur Construction): The common alignment of Routes 3 and 4 crosses approximately 200 feet of a paved storage lot at the rear of the parcel. The area within the right-of-way includes a shed, paved storage area, and unimproved land. The right-of-way for the routes passes about 40 feet west of the primary building on the parcel. The roofed, pole-supported, storage shelter within the right-of-way has an area of approximately 3,600 square feet. Installation of the transmission line along Routes 3 or 4 would require removal or relocation of the storage shed to another location.

- 23711 Overland Drive (River Construction): The common alignment of Routes 3 and 4 crosses approximately 300 feet of a paved storage lot at the rear of the parcel. The right-of-way for the routes passes about 25 feet northwest of the building. The area within the right-of-way includes a storage building, paved storage area, and unimproved land. The storage shed within the right-of-way has an area of approximately 500 square feet. Installation of the transmission line along Routes 3 or 4 would require removal or relocation of the storage shed to another location.
- 23725 Overland Drive (Heritage Landscape Services): The common alignment of Routes 3 and 4 crosses approximately 600 feet of paved storage areas and unimproved land to the side and rear of the building on the property. The area within the right-of-way for the routes includes a shed and aboveground storage tanks. The shed has an area of approximately 600 square feet. Installation of the transmission line along Routes 3 or 4 would require removal or relocation of the storage shed and storage tanks to another location.

The common alignment of Routes 1 through 5 crosses the Old Ox Road frontage of two lots within the Dulles Trade Center. The Project would not impact the existing uses of these properties, except as described below:

- 23765 Pebble Run Place (Midas/Hya Auto/Champs Auto): The centerline of Routes 1 through 5 crosses approximately 500 feet of parking area, with the right-of-way passing immediately southeast of and adjacent to the building on the property. The Project would require one transmission structure within the parking area, which would eliminate a few spaces but would not substantively change the capacity of the lot.
- 23750 Pebble Run Place (Keystone Automotive Sterling): The common alignment of Routes 1 through 5 crosses approximately 900 feet of this parcel with the right-of-way passing immediately south of and adjacent to two of the three industrial buildings on the site. The right-of-way for the routes crosses areas used for truck parking, loading, and perimeter landscaping. While the Project would not impact existing land uses, the parcel is proposed for rezoning from General Industrial (GI) to Industrial Park (IP), with the intent of replacing the three existing buildings with a data center on the site (LEGI-2024-0042, submitted August 2024). For more information, see the description of the Dulles Commerce Center and West Dulles planned developments in Section 5.3.6.2.

Dulles Market Square Retail Center

The common centerline of Golden-Mars Routes 1 through 5 crosses less than 100 feet of landscaping within the southernmost corner of the Dulles Market Square retail site at the northeast corner of the intersection of Old Ox Road and Carters School Road. The Project would require one transmission structure on the parcel, which would not interfere with retail uses.

Digital Dulles

Digital Dulles is a multi-building data center complex currently under development, described in more detail in Section 5.1.6. One of 13 planned data center buildings has been built to date. The common alignment of Golden-Mars Routes 1 through 5 crosses approximately 0.4 mile of an unimproved portion of the parcel containing the completed data center, building. In addition, two

segments of the Sojourner Loop cross unimproved land within the same parcel as the completed data center.

The completed structure is approximately 900 feet east of the right-of-way for the Golden–Mars Lines and approximately 0.2 mile from Sojourner Loop. Installation of transmission lines along these routes would not impact use of the existing building or proposed buildings, as discussed in Section 5.1.6.2.

Impact Summary

The Project's route alternatives cross commercial and industrial areas used for parking, loading, display, storage, access, stormwater management, and landscaping. Regardless of which Golden–Mars route is selected for the Project, Dominion would install transmission structures for the Project in locations that would avoid or minimize disturbance to existing land to the degree practicable. While overhead transmission lines would not hinder continued uses of commercial areas, trees and new buildings would be prohibited within the right-of-way.

The routes do not cross any existing primary buildings, but several sheds or outbuildings would require relocation or removal:

- Shed located on Towlern Place—Routes 1 through 5
- Shed located on Overland Drive—Routes 3 and 4
- Shed located on Overland Drive—Routes 3 and 4
- Shed and storage tank located on Overland Drive—Routes 3 and 4

Other than removal of the storage structures from within the rights-of-way, installation of transmission infrastructure along the routes would not impact existing commercial uses of the properties crossed.

Installation of transmission infrastructure along the Lockridge and Sojourner loops would not impact existing commercial uses of the properties crossed.

5.1.6 PLANNED DEVELOPMENTS

ERM obtained information about planned developments through publicly available data on Loudoun County websites and through consultation with County planning officials and other stakeholders.[4] In most cases, ERM obtained information on planned developments from the Loudoun County Land Management, Applications, Research, and Coordination website or provided by Loudoun County Planning Department staff (Loudoun County 2024b). ERM obtained information on parcel acreage, ownership, and usage on the Loudoun County Property Search website (Loudoun County 2024d), the Loudoun Existing and Approved Development Tool (Loudoun County 2023d) or the Residential Communities of Loudoun County interactive map (Loudoun County 2024g).

[4] "Planned developments" refers to publicly known projects that have been submitted to or are intended to be submitted to the Loudoun County Planning Department for approval, but construction is not yet complete as of January 2025.

5.1.6.1 PLANNED DEVELOPMENTS WITHIN 0.25 MILE OF PROJECT FACILITIES

Table 5.1-9 lists planned developments within 0.25 mile of the route alternatives and documents type of development, status, and location relative to the Project facilities. Figures 5.1.6-1 and 5.1.6-2 depict the planned development parcels and proposed building footprints within 0.25 mile of the route alternatives. Section 5.1.6.2 provides additional information about planned developments crossed by the Project. Section 5.1.10 provides information on future road expansion projects.

TABLE 5.1-9 PLANNED DEVELOPMENTS WITHIN 0.25 MILE OF PROJECT FACILITIES

Development Name	Development Type	Status	Approximate Distance to Project Facilities
Atlantic Boulevard Residential	Multifamily residential	Site plan in review	Centerline of the Golden–Mars Lines is 0.2 mile from site boundary.
Autoworld Substation	Electric substation	Legislative application under review for a zoning map amendment, commission permit, and special exception	Centerline of the Golden–Mars Lines is 700 feet from site boundary.
Barrister Substation	Electric substation	Legislative land development premeeting occurred on January 27, 2025, to discuss application for substation	Substation site is 300 feet from the Golden–Mars Lines.
Birchwood at Brambleton Active Adult Community Landbay B	Single-family detached, single-family attached, and multifamily residential development (restricted to ages 55 and older)	Subdivision plans recorded for detached and attached dwellings; construction is in process. Site plan was reviewed for multifamily Phase 2 but is currently inactive.	Centerline of the Golden–Mars Lines crosses open space within the development.
Claude Moore Convenience Store and Gas Station	Convenience store and gas station	Legislative land development premeeting held December 2023	The centerline of the Golden–Mars Lines is less than 100 feet from the site boundary.
CyrusOne Sterling 11 Data Center Phase 2	Data center	Site plan approved	Centerline of the Golden–Mars Lines crosses the site.
Digital Dulles and Western Lands Substations	Data center	Site plan approved for buildings 7 and 9. Site plans in review for Buildings 1-6, 8, and 10-13; Legislative application for commission permit and special exception under review for substations.	Centerline of the Golden–Mars Lines and Sojourner Loop cross the site.
Dulles Berry	Data center	LC 4 Data Center: Site plan approved; under construction LC 8 Data Center: revised site plan in review Other planned data centers in this development are more than 0.25 mile from Project facilities.	Centerline of the Golden–Mars Lines is approximately 0.2 mile from LC 4 and 0.1 mile from LC 8.

Development Name	Development Type	Status	Approximate Distance to Project Facilities
Dulles Commerce Center and West Dulles; Prologis Erin's Run	Data center	Rezoning application (from General Industry to Industrial Park) in review to allow redevelopment of site as data centers and to increase floor area ratio. In addition to the rezoning application for the entire site, a site plan is under review for 3 data center buildings on the southern portion of the rezoning site (Prologis Erin's Run).	Centerline of the Golden–Mars Lines crosses the site.
Dulles 28 Technology Park	Data center and warehouses	Site plan received conditional approval on June 25, 2024	Centerline of the Golden–Mars Lines crosses the site.
Guilford Station	Retail development	Site plan amendment approved; under construction	Centerline of the Golden–Mars Lines is approximately 700 feet from proposed structure.
Moorefield Gas Station	Gas station with convenience store and car wash	Site plan in review	Route 1 centerline is 200 feet from site; Route 5 crosses the site.
Moorefield Station	Mixed use	Legislative approval received. No site plans have been approved or in review for buildings within 0.25 mile of routes.	Routes 1 and 5 cross the Moorefield Station frontage along Loudoun County Parkway in a common alignment.
Oslo Moorefield Residential	Residential development	Legislative application under review to rezone from commercial to residential to allow multifamily residential	On same parcel as Moorefield Gas Station. Route 1 centerline is 200 feet from site; Route 5 is 200 feet south of proposed residential buildings.
Pacific Corporate Park	Data center and substation	Site plan in review	Centerline of the Golden–Mars Lines crosses the site.
Paragon Park III Technology Park	Data center	Site plan in review	All Golden–Mars Lines cross the portion of the site proposed for the Golden Substation.
Prentice Drive Substation	Substation	Site plan approved	The Lockridge Loop right-of-way crosses the site.

Development Name	Development Type	Status	Approximate Distance to Project Facilities
Project NOVA—Broad Run	Data center	Site plan approved; one of three buildings under construction	Centerline of the Golden–Mars Lines crosses the site.
Project NOVA—Southeast	Data center	Site plan has received conditional approval	Lockridge Loop crosses the site.
Silver District West	Mixed Use	• Legislative approval granted • Preliminary subdivision plan approved and site plans or construction plans and profiles in review for single-family attached and multifamily areas	Centerline of the Golden–Mars Lines crosses the site.
Stratus Substation	Substation	Legislative application under review; includes zoning concept plan, commission permit, and special exception	Substation site is approximately 800 feet from the centerline of the Golden–Mars Lines.
Stone Hill Residential	Residential development	Legislative land development application in review; includes rezoning, zoning concept plan and special exception	Routes 1,2, and 5 cross the site in a shared alignment.

5.1.6.2 IMPACT ASSESSMENT

Depending on when they are built, planned developments within 0.25 mile of Project facilities could experience temporary construction impacts including noise, dust, and traffic. Operation of the Project could result in permanent visual or land use impacts, depending on location and whether a development is crossed. The severity of visual impacts would depend on factors such as surrounding tree cover, landscaping, orientation of development towards/away from transmission infrastructure, and topography. Visual impacts also depend on the development type and the visual sensitivity of the development and its occupants or users. Section 5.3 discusses visual impacts in more detail.

The following discussion, organized generally from north to south and west to east, addresses potential impacts by route on those planned developments that would be crossed by the route rights-of-way.

Paragon Park III Technology Park

An engineering plan for two data center buildings and site infrastructure was submitted on December 11, 2024, and is under review (EPLAN-2024-0200). This plan supersedes an engineering plan for a single data-center building that was conditionally approved by Loudoun County on May 24, 2024 (STMP-2022-0024).

The Golden Substation is planned within the Paragon Park III parcel. The Company has coordinated with the Paragon Park III developer for the Golden substation placement south of the proposed data center buildings shown on EPLAN-2024-0200. Routes 1 through 5 begin within the proposed Golden Substation, cross the site frontage to the south and east of the substation and avoid the proposed data centers and associated infrastructure north of the substation.

Dulles 28 Technology Park

The engineering plan for Dulles 28 Technology Park (STMP-2022-0013) was conditionally approved on June 25, 2024, and the site has active grading and performance bonds. The plan shows four buildings: two 2-story (68-foot-tall) data centers, each with a building footprint of 138,364 square feet and two warehouses, both up to 65 feet tall with building footprint areas of 51,134 and 20,837 square feet. The site plan also shows a guardhouse, as well as road improvements, parking lots, and loading areas.

Approximately 0.3 mile of the Golden–Mars Lines cross the Dulles 28 Technology Park site in a common alignment along the property frontage, parallel to Pacific Boulevard. Areas of Dulles 28 within the right-of-way are proposed for landscaped setback areas, a 10-foot-wide asphalt pathway, two landscaped public seating areas, internal driveways, and stormwater facilities.

Pacific Corporate Park

The Pacific Corporate Park has three planned data center buildings and a 2.3-acre substation site. Each planned data center building is each 100 feet tall and has a building footprint of approximately 124,780 square feet. An office development on the site was demolished. The engineering plan for Pacific Corporate Park is in review by Loudoun County (EPLAN-2023-0116).

The Golden–Mars Lines cross approximately 0.2 mile of the Pacific Corporate Park site in a shared alignment. The right-of-way crosses the proposed substation area, an existing stormwater management pond that will be retained for the data center development, and landscaped setback areas.

Project NOVA Broad Run

The engineering plan for Project NOVA Broad Run, approved by Loudoun County in December 2023, has three data center buildings; each planned building is 93 feet tall and has 371,941 square feet of gross floor area (STMP-2023-0002). The project is under construction. The buildings and associated infrastructure are on the eastern portion of the site. The western site area is floodplain associated with Broad Run and tributaries.

The Golden–Mars Lines cross approximately 0.5 mile of primarily forested land associated with floodplain and stream buffers in a shared alignment, less than 300 feet from the closest planned data center building.

Project NOVA Southeast

The county conditionally approved the site plan for Project NOVA Southeast on July 17, 2024 (STMP-2022-0020). The approved plan shows three data center buildings and three small guard buildings. Each planned data center building is four stories (99 feet) in height and has 561,538 square feet of gross floor area. The proposed Prentice Drive Substation is also on this parcel. The site is bounded to the south by Dulles Airport. Broad Run bisects the site from north to south; all proposed improvements are east of Broad Run.

Approximately 0.4 mile of the Lockridge Loop crosses the Project NOVA Southeast site, crossing Broad Run and the associated 300-foot-wide River and Stream Corridor Resource area (see Section 5.1.7.2). The Lockridge Loop is less than 200 feet from the closest proposed data center building and the right-of-way would cross portions of a proposed access road within the property.

Prentice Drive Substation

The County conditionally approved the site plan for the Prentice Drive Substation, located on the Project NOVA Southeast site, on April 2, 2024 (STPL-2023-0017). The Lockridge Loop right-of-way crosses this Dominion substation, including the substation fence, areas within the substation fence line, and a portion of a future access road.

Silver District West

Silver District West is a 160.2-acre planned mixed-use development, approved by the BOS on July 27, 2014 (ZMAP-2013-0006). A detailed Final Development Plan approved in 2021 provides for 3,706 multifamily dwellings, as well as 979,500 square feet of retail and office space (FIDP-2019-0001). The project will also include open space and a public school site. The site was not under construction as of February 3, 2025.

Approximately 0.5 mile of Routes 1 and 5 cross a proposed mixed-use area of Silver District West in a shared alignment, south of Dulles Greenway. The centerline is approximately 40 feet from two commercial buildings that are shown conceptually on the 2014 zoning approval (ZMAP-2013-0006). The centerline is also less than 10 feet from a proposed retail/office with attached

structured parking that is shown on the Final Development Plan approved in 2021. Because portions of these planned structures are within the right-of-way of Routes 1 and 5, changes to the planned development would be necessary to accommodate these route alternatives. Routes 1 and 5 are 90 or more feet from three planned mixed-use buildings (residential and commercial with structured parking) south of Dulles Greenway. Other planned features that would fall within the Routes 1 and 5 rights-of-way include fire lanes, driveways, parking and turnaround areas, and landscaped setback areas. A proffered future shared use trail and bike lane along the south side of Dulles Greenway is also within the Routes 1 and 5 rights-of-way.

Routes 2, 3, and 4 cross 0.3 mile of the eastern portion of Silver District West, within Landbays K and L (FIDP-2019-0001), which includes a future development area and open space. The concept development plan approved with ZMAP-2013-0006 identifies two conceptual building envelopes within Landbay K, including one building envelope approximately 90 feet from the centerline of the routes. The right-of-way crosses the future planned open space, collocated with existing Lines #2095/#2218. The open space includes land identified as future parkland (part of Broad Run Linear Park) to be dedicated to Loudoun County.

Silver District West Multifamily

Routes 1 and 5 also cross approximately 400 feet of a multifamily residential section of Silver District West, east of Loudoun County Parkway. A site plan for the multifamily development was conditionally approved on March 30, 2021; after becoming inactive, it was reactivated in 2023 and is in review as of February 3, 2025 (STPL-2020-0015). The shared centerline of Routes 1 and 5 are less than 60 feet from three proposed multifamily residential buildings; the right-of-way crosses a portion of one structure, as well as parking areas, driveways, and landscaped areas. Redesign of the site to move the closest multifamily building out of the right-of-way would be necessary to implement these route alternatives.

The Silver District West development will also include an extension of Barrister Street. This road extension project begins at the intersection of Barrister Street and State Street/Landmark Court and extends to the future extension of Shellhorn Road north of the Dulles Greenway. This project crosses Silver District West planned development parcels and will be constructed in conjunction with Silver District West's planned mixed-use development. The road extension project includes the construction of a north/south bridge over the Dulles Greenway. Construction start and completion dates are not available and the project is not currently listed as an active project on Loudoun County's website. The road extension project has been in review since May 2024.

Moorefield Station

Moorefield Station (also called Moorefield) is a 606.2-acre, mixed-use development approved by the BOS in 2002 (ZMAP-2001-0003). As of July 1, 2024, 2,613 dwellings were complete or permitted and an additional 3,392 dwellings were planned. Section 5.1.4.1 discusses the developed residential areas in the community.

Golden–Mars Routes 1 and 5 run along Loudoun County Parkway in a common alignment through currently undeveloped land in the Moorefield Station development. Final development plans approved by Loudoun County in 2018 and 2022 provide for office and retail uses with structured parking adjacent to Loudoun County Parkway (FIDP-2018-0001, FIDP-2022-0002). Two existing

stormwater ponds adjacent to the parkway, called Lake Wilson and Lake Verlin, are incorporated into the development plans as open space features. A 10-foot-wide walking trail, part of the Moorefield Regional Trail, is within a planned landscaped perimeter along the Loudoun County Parkway frontage. Four public roads within this portion of Moorefield Station will intersect Loudoun County Parkway: construction of Claude Moore Drive is complete, while the other three roads (Charitable Street, Moorefield Boulevard, Midmoore Drive) have not yet been installed. Landbays north of the retail, office, and open space uses adjacent to Loudoun County Parkway would include multifamily residential buildings with ground floor retail and structured parking.

Routes 1 and 5 cross approximately 0.6 mile of the Moorefield Station development, primarily within the 100-foot landscaped setback area along Loudoun County Parkway shown on the approved plans, including the Moorefield Regional Trail (see Section 5.1.8). Routes 1 and 5 cross the conceptual building envelope of the two eastmost office buildings closest to Loudoun County Parkway (located on either side of Lake Verlin). If Route 1 or 5 is selected, these buildings would need to be redesigned to avoid conflict with the transmission lines. The Route 1 and 5 centerline is approximately 60 to 80 feet from other planned office and parking structures. The routes would cross the four existing and planned public roads connecting Moorefield Station to Loudoun County Parkway.

The Shops at Moorefield/Moorefield Gas Station

Loudoun County granted zoning appeals on April 7, 2020, to allow a gas station, car wash and retail buildings at the intersection of Loudoun County Parkway and Ryan Road (ZCPA-2018-0014, ZMAP-2028-0013, SPEX-2018-0036). Based on the zoning approvals, the county is currently reviewing an engineering plan for the Moorefield Gas Station (EPLAN-2023-0212). The plan includes a 5,992 square foot building with a convenience store and interior dining, a car wash, gasoline pump canopy, and underground gasoline storage tanks.

In addition to the gas station and convenience story, the 2020 zoning approvals also provide for a 10,000 square foot retail building. No engineering plan has been submitted for the retail building.

The County conditionally approved construction plans for access driveways to the site on December 27, 2022 (CPAP-2021-0014). The plans show two one-way access driveways (a “right-in only” driveway from Loudoun County Parkway and a “right-out only” driveway to the parkway) that would connect to an extension of Amendola Terrace to the north of the Shops at Moorefield site.

Route 5 crosses approximately 800 feet of the Shops at Moorefield site, crossing directly over the location of the proposed gasoline pump canopy, the convenience store building, and the right-in and right-out driveways. The Route 5 centerline is also 50 feet south of the proposed retail building shown on the 2020 concept development plan. If Route 5 is selected, the convenience store and gas pump canopy structures could not be constructed in their current proposed locations, which would be within the Route 5 right-of-way. Relocation of the planned structures on the site is likely not feasible due to the limited size of the parcel and existing surrounding development.

Stone Hill Residential

As of February 2025, the County was reviewing a June 2023 rezoning request to allow 119 multi-family dwellings on 16.6 acres on a parcel in the southeast quadrant of the Loudoun County Parkway/Evergreen Ridge Drive intersection (LEGI-2023-0076). Routes 1, 2, and 5 cross approximately 0.2 mile of the Stone Hill site in a shared alignment more than 100 feet south of the nearest proposed residential structure and north of a perennial tributary to Broad Run. The right-of-way would include portions of the 150-foot River and Stream Corridor Resource area (see Section 5.1.7.2) and a proposed tree conservation area but would not directly impact any planned buildings.

Birchwood at Brambleton Active Adult Community

The County approved the Birchwood at Brambleton Active Adult development in 2015 (Case ZMAP-2013-0002). The approved concept development plan includes land on both sides of Loudoun County Parkway between Lake Birchwood and Evergreen Mills Road. The development is restricted to residents aged 55 and older.

Routes 1, 2, and 5 cross the development's Landbay B in a shared alignment on the east side of Loudoun County Parkway. Landbay B includes multi-family and single-family dwellings and a clubhouse (which is complete) with associated multi-purpose athletic courts. Construction of single-family attached and detached dwellings is underway. One section of multifamily dwellings is complete, and the county is reviewing an engineering plan for a second section (STPL-2022-0047).

Routes 1, 2, and 5 cross approximately 800 feet of open space near the eastern boundary of Landbay B. The routes are more than 100 feet from the nearest unbuilt residential lot and nearly 300 feet from the nearest existing dwelling. The clubhouse structure is more than 100 feet from the right-of-way. The shared right-of-way for Routes 1,2, and 5 crosses forested areas within the River and Stream Corridor Resource area along Broad Creek (see Section 5.1.7.2).

Northwoods Property

In November 2023, the County conditionally approved a site plan for the Northwoods Property—between Ladbrook Drive and Rock Ridge High School—that includes five data center buildings with a combined gross floor area of 1.3 million square feet (STMP-2021-0008). The county is currently reviewing two revisions to this site that would modify the building footprints and height and reduce the number of data center buildings to four (EPLAN-2023-105 and EPLAN-2023-0129). Site grading was underway as of February 2025.

The shared alignment of Routes 2, 3, and 4 crosses approximately 0.1 mile of the parcel being developed with data center buildings and improvements. The alignment also crosses 0.2 mile of an open space parcel owned by the data center developer. The crossings are in forested areas within the River and Stream Corridor Resource area along Broad Run (see Section 5.1.7.2). This alignment is collocated with existing Lines #2095/#2218, approximately 500 feet north of the nearest proposed building.

Route 4 also crosses the western edge of the associated open space parcel, collocated with existing Lines #2095/#2218 for an additional 0.4 mile. The route is approximately 200 feet from

the closest data center building in this area. Existing Lines #2095/#2218 would be closer to the data center buildings than Routes 2, 3, and 4.

CyrusOne Sterling 11 Data Center Phase II

Phase II of the CyrusOne Sterling 11 Data Center consists of a proposed data center on the north side of Old Ox Road, west of Pebble Run Place. The data center building would be 56 feet tall, with gross floor area of 158,696 square feet. The County provided final approval of the site plan in December 2024 (STMP-2022-0017). Routes 1, 2, and 5 cross approximately 0.2 mile and Routes 3 and 4 cross approximately 0.1 mile along the site's northeastern property line.

The northern corner of the proposed data center is approximately 45 feet from the centerline of the Golden–Mars Lines 1 through 5 (i.e., within the right-of-way). The Golden–Mars Lines cross areas that are proposed for the data center generator yard, driveways, parking areas, landscaped areas, and security fencing. The Company has coordinated with the property owner and reached an agreement that the final Golden-Mars Lines alignment will accommodate the Project while meeting the developer's site design goals.

Dulles Commerce Center and West Dulles Redevelopment; Prologis Erin's Run

The County is reviewing rezoning and special exception applications that would rezone 94 acres along Carters School Road and north of Old Ox Road from GI to IP to allow data center development with greater building height and floor area ratio than permitted under the current zoning (LEGI-2024-0042, submitted July 16, 2024). A sketch plan provided by the applicant at a pre-submission meeting prior to the rezoning application showed eight potential data center buildings replacing three existing industrial flex buildings (the Dulles Commerce Center), three existing data center buildings, and extensive surface parking (PMTG-2024-0064). The sketch plan includes one data center north of Old Ox Road and seven south of Old Ox Road.

The southern portion of the site proposed for rezoning is currently a paved parking lot. The County is reviewing a site plan (Prologis Erin's Run Drive) for four data center buildings on this portion of the site (EPLAN-2024-0036). No route alternatives cross the land within the Prologis Erin's Run site plan or the portion of Dulles Commerce Center and West Dulles south of Old Ox Road.

The Golden–Mars Lines cross approximately 900 feet of the site north of Old Ox Road and would be more than 100 feet from the potential data center location shown on the sketch plan. The sketch plan shows only a conceptual building location and is not sufficiently detailed to show planned improvements such as parking or driveways.

Digital Dulles and Western Lands Substations

Digital Dulles is a planned data center development that would ultimately have 13 data center buildings. As of September 2024, the County had approved a site plan for Buildings 7 and 9, which are 54 feet tall and have a combined gross floor area of 794,000 square feet (SPAM-2022-0057). Building 7 has been built. The County provided conditional approval for the site plan for Buildings 5, 6, and 8 on July 25, 2024 (STMP-2023-0003) and is reviewing site plans for seven additional buildings as well as substation pads (EPLAN-2024-0060, Buildings 1–4, 10, 12, and 13).

The buildings in review would have heights up to 54 feet and would range from 158,700 to 386,300 gross square feet each. The Mars Substation is adjacent to Digital Dulles.

The Golden–Mars Lines cross approximately 0.4 mile of the Digital Dulles development in a common alignment parallel to Carters School Road, north of the Mars Substation. The centerline is approximately 200 feet from the closest planned data center building. The routes cross a planned access driveway, a landscaped setback area along Carters School Road, and a portion of one of the planned substation sites.

The Digital Dulles development includes five new substations. The County is reviewing a legislative application for commission permits and special exception approval for all five substations that was submitted in December 2024 (Western Lands Substations, LEGI-2024-0071). The Golden–Mars Lines cross approximately 600 feet of one substation site. The Company has coordinated with the Digital Dulles developer in the location of the Golden–Mars Lines in relation to this proposed substation.

The 1.9-mile-long Sojourner Loop is almost entirely within the Digital Dulles site, connecting the existing Sojourner Substation to the future Mars Substation. Sojourner Loop follows an alignment close to the development's southern and eastern boundaries and passes between proposed data center Buildings 12 and 13 in the northern portion of the site. The Sojourner Loop is approximately 200 feet from the closest proposed data center buildings. The Company coordinated the Sojourner Loop location directly with the land developer.

Impact Summary

Golden-Mars Routes 1 through 5 follow a shared alignment and have the same impacts on developments north of Dulles Greenway, including the Paragon Park III Technology Park, Dulles 28 Technology Park, Pacific Corporate Park and Project NOVA Broad Run. The Company has worked with the developers to cross these sites using alignments that accommodate the planned data center developments. Similarly, Routes 1 through 5 follow a common alignment across the planned CyrusOne Sterling 11, Dulles Commerce Center/West Dulles, and Digital Dulles and Western Lands Substation data center developments at the southern end of the routes and the Company has minimized impacts on these developments. The CyrusOne Sterling 11 site plan layout will be avoided during minor transmission line adjustments in final engineering design, which accommodate the Project while meeting the developer's goals. The site has sufficient space to accommodate these modifications.

Routes 1 and 5 impact the planned Silver District West and Moorefield Station mixed-use developments as summarized below.

- The routes would require modification of the conceptual locations (shown on final, approved development plans) for three commercial buildings in Silver District West along Dulles Greenway. Even with modification, the Routes 1 and 5 would have visual impacts on the planned commercial and mixed-use residential/commercial buildings along Dulles Greenway.
- The routes would require modification of the engineered site plan for multifamily residential buildings in Silver District West south of Loudoun County Parkway, which the county is currently reviewing. One planned building location would need to be shifted out of the right-

of-way. Three multifamily buildings would be approximately 50 feet from the route centerline, resulting in visual impacts.

- The conceptual location of two planned Moorefield Station office buildings would need to be revised to move the southern edge of these buildings out of the shared right-of-way of Routes 1 and 5.
- Within Moorefield Station, Routes 1 and 5 overlay a 100-foot-wide open space area with a regional pedestrian trail along Loudoun County Parkway.

The common alignment of Routes 1, 2, and 5 would cross open space within the planned Stone Hill and Birchwood at Brambleton Active Adult residential developments, resulting in visual impacts on the planned residences and affecting the usability of the open space.

Route 5 would conflict with structure locations on the proposed site plan for the Moorefield Gas Station, effectively preventing development of that site as planned.

Routes 3 and 4 have significantly less impact on planned developments. These routes cross primarily industrial/data center planned developments. Routes 3 and 4 would cross the Silver District West mixed-use area primarily within planned open space, collocated with an existing electric line. They also cross the Northwoods data center development on planned open space land collocated with existing Lines #2095/2218 and would not affect the planned location of buildings and infrastructure.

5.1.7 CONSERVATION EASEMENTS AND LANDS

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

Using the VDCR's Managed Conservation Lands Database, ERM identified easement types, individual easements, and conservation lands within the study area (VDCR 2024a). No easements held by the Virginia Outdoors Foundation, Agricultural and Forestal Districts, or Virginia Natural Area Preserves are present within the study area. The subsections below provide descriptions of local conservation easements and lands in the study area and their proximity to the Project facilities. These resources are shown on Figure 5.1.7-1 and Figure 5.1.7-2.

5.1.7.1 BOARD OF SUPERVISOR CONSERVATION EASEMENTS

Over 75,000 acres of land are protected by easements managed under the Loudoun County Conservation Easement Stewardship Program (Loudoun County n.d.). These lands are protected through various easement instruments for various purposes such as:

- Retaining or protecting natural or open-space values of the property;
- Assuring the availability of property for agricultural, forestal, recreational, or open-space use;
- Protecting natural resources;
- Maintaining or enhancing air and/or water quality; and

- Preserving historical, architectural, or archaeological aspects of the property.

Easements negotiated with private landowners allow the lands to remain in private ownership with protections imposed to limit or restrict land uses on the property.

All of the conservation easements within the study area classified by Loudoun County as "Development Easements" under the Conservation Easement Stewardship Program. Development easements are created as a part of Loudoun County's land development zoning process, often to preserve open space alongside low-density residential development. The Development Easements within the study area consisted almost entirely of BOS "Open Space Easements" that were proffered during the development of residential subdivisions. The purpose of these BOS Open Space Easements is generally to maintain the natural character of the property and allow passive recreational uses.

Golden-Mars Routes 1 through 4 cross BOS Open Space Easements listed in Table 5.1-10. Golden–Mars Route 5, Lockridge 230 kV Loop, and Sojourner 230 kV Loop do not cross BOS Open Space Easements.

TABLE 5.1-10 BOS OPEN SPACE EASEMENTS CROSSED BY THE ROUTE ALTERNATIVES

Easement Type	Description	Acres	Route Alternatives
Loudoun County BOS Open Space Easement—Instrument #200205090475388	Loudoun Valley Estates II HOA Open Space Parcel	3.1	Golden–Mars Route 1
Loudoun County BOS Open Space Easement—Instrument #201606300040798	Broad Run Stream Valley Park Parcel	0.9 3.7	Golden–Mars Route 2 Golden–Mars Route 3
Loudoun County BOS Open Space Easement—Instrument #200405250051928	Loudoun Valley Estates III HOA Open Space Parcel	1.4 2.5	Golden–Mars Route 3 Golden–Mars Route 4

BOS = Board of Supervisors; HOA = homeowners' association.

5.1.7.2 RIVER AND STREAM CORRIDOR RESOURCES

Chapter 6.01 of the Loudoun County Zoning Ordinance requires a buffer on either side of a waterway's Floodplain Overlay District (FOD) to restrict activities surrounding River and Stream Corridor Resources (RSCRs). The FOD is a mapped zoning area that includes a Major Floodplain and Minor Floodplain (Loudoun County 2023e). For scenic rivers, the Potomac River, Bull Run, and Broad Run, regardless of the Resource Area Width (which is composed of the FOD and adjacent Steep Slope Areas), the minimum width of a buffer is 300 feet (Loudoun County 2023e). For all other rivers and streams, regardless of the Resource Area Width, the minimum buffer width is 100 feet (Loudoun County 2023e). Loudoun County's Natural and Environmental Resource Standards allows construction of transmission lines within RSCR buffer areas (Loudoun County 2023c).

RSCRs have been designated along Broad Run, Stallion Branch, and unnamed tributaries, all of which are crossed by Project route alternatives, as shown in Table 5.1-11. RSCR 300- and 100-foot buffers are depicted in Figure 5.1.7-2.

TABLE 5.1-11 RIVER AND STREAM CORRIDOR ACRES CROSSED BY ROUTE ALTERNATIVES

Golden–Mars Route 1	Golden–Mars Route 2	Golden–Mars Route 3	Golden–Mars Route 4	Golden–Mars Route 5	Lockridge 230 kV Loop	Sojourner 230 kV Loop
30.9	50.1	48.6	41.3	34.7	1.7	0.9

kV = kilovolt(s).

5.1.7.3 IMPACT ASSESSMENT

As discussed in Section 5.1.1, BOS dedicated Open Space Easements, like public lands, can only be crossed with the consent of the Loudoun County Board of Supervisors. Golden–Mars Route 5, the Sojourner 230 kV Loop, and the Lockridge 230 kV Loop do not cross any BOS Open Space Easements and would therefore have no impact on those resources. The impacts of the remaining route alternatives are described below.

- Golden–Mars Route 1 crosses 3.1 acres adjacent to Loudoun County Parkway. The easements crossed by Route 1 are owned by The Loudoun Valley Estates II HOA and contain shared use trails that would require the clearing of trees along an approximately 0.4 mile trail segment adjacent to Loudoun County Parkway.
- Golden–Mars Route 2 would impact approximately 0.9 acres in a portion of the Broad Run Stream Valley Park and trail. The crossing of the easement and trail is perpendicular and bisects a portion of the easement that is already encumbered with buried infrastructure and has limited vegetation.
- Golden–Mars Route 3 impacts the most BOS Open Space Easement land (approximately 5.1 acres). This includes 3.7 acres within Broad Run Stream Valley Park that overlaps portions of the Broad Run Trail system. This route would require tree clearing along a 0.3-mile segment of the trail. Route 3 (along with Route 4) also crosses a portion of a BOS Open Space Easement within the Loudoun Valley Estates III. Although this area would be cleared of trees, the portion of the easement adjacent to the nearest residential lot would not be impacted, thus maintaining a forested buffer between homes on Meadowvale Glen Court and the Golden-Mars Lines. Furthermore, the crossing of the Loudoun Valley Estates III Open Space Easement is parallel and immediately adjacent to an existing cleared right-of-way for the Broad Run Interceptor, resulting in incremental impacts rather than new impacts in an area where tree clearing has not previously occurred.
- Golden-Mars Route 4 would impact a BOS Open Space Easement within the Loudoun Valley Estates III HOA between the Rosa Lee Carter Elementary School and Rock Ridge High School campus and residences to the south. The route would require tree clearing in an approximately 0.4-mile long, 20-foot-wide corridor. Route 4 would significantly reduce the forested area between Loudoun Valley Estates III and the schools. Route 4 would also impact this easement where the routes parallel the Broad Run Interceptor.

Because Open Space Easements are routinely dedicated to Loudoun County wherever development occurs, easements could be dedicated during or after the Project filing. Dominion will continue to consult with Loudoun County on potential new easements along the routes.

As shown in Table 5.1-11, the Golden-Mars Routes that cross a larger extent of residential areas and avoid additional crossings of Broad Run (Routes 1 and 5) cross the least amount of RSCR land. Routes 2, 3, and 4 cross a smaller extent of residential area and a greater extent of RSCR land, due to their alignments along Broad Run where the routes are collocated with existing Dominion transmission lines. Although transmission lines are exempt from activity restrictions within RSCRs, the Company will work the County to minimize any impacts to the extent practicable.

5.1.8 RECREATIONAL RESOURCES

5.1.8.1 EXISTING CONDITIONS

ERM collected information on recreational resources through digital data sets and maps, recent (2024) digital aerial photography, publicly available information on county websites, and through consultation with county officials and other stakeholders. Unless otherwise noted, information on existing recreational resources were found on the Loudoun County Parks, Recreation, and Community Service website (Loudoun County 2024f) and planned recreational resources were found on the Loudoun County Land Management, Application, Research, and Coordination website (Loudoun County 2024b).

Table 5.1-12 lists and describes recreational resources crossed by or within 0.25 mile of the Project facilities and describes the location of each resource relative to Project facilities. Figure 5.1.8-1 depicts recreational resources within 0.25 mile of the Project facilities.

TABLE 5.1-12 RECREATIONAL RESOURCES

Recreational Resource	Recreation Type	Status	Approximate Distance to Project Facilities
1757 Golf Club	Golf Course	Active; operated by Heritage Golf Group (1757 Golf Club 2024)	500 feet north of all Golden–Mars routes
Broad Run Stream Valley Park	Park and shared use natural surface trails	Active; owned and maintained by Loudoun County	Crossed by Golden–Mars Routes 2, 3, and 4
Creekside Park	Playground, tennis court, and basketball court	Active; owned and maintained by Loudoun Valley Estates II	0.2 mile west of Golden–Mars Routes 3 and 4
DGIF Birding and Wildlife Trail: Foothill to Falls Loop	Designation for roads and trails connecting parks, natural areas, and cultural sites	Active; managed by VDWR	Crossed by all Golden-Mars routes
Evermoore Neighborhood Park	Amphitheater, pavilions, picnic areas, and playground	Active; owned and maintained by Loudoun County	0.3 mile north of Golden–Mars Routes 1 and 4
Glenside Park	Playground	Active; owned and maintained by Loudoun Valley Estates II	600 feet west of Golden–Mars Routes 1 and 2; 500 feet west of Route 5

Recreational Resource	Recreation Type	Status	Approximate Distance to Project Facilities
Highland Park	Walking paths and playground	Active; owned and maintained by Loudoun Valley II	0.2 mile north of Golden–Mars Routes 1 and 2; 0.1 mile west of Route 3
Loudoun County Linear Parks and Trails System	Interconnected multi-use trail system	Countywide Plan Linear Parks and Trails System adopted by Loudoun County in July 2021; owned and maintained through public-private partnership (Loudoun County 2021)	Crossed multiple times by all Golden–Mars routes
Loudoun Valley Estates II Playground	Playground and fields	Active; owned and maintained by Loudoun Valley Estates II	600 feet west of Golden–Mars Route 5
Lyndora Park	Multipurpose trail, fields, picnic areas, playground	Active; owned and maintained by Loudoun County	200 feet north of Golden–Mars Routes 2, 3, and 4
Moorefield Green Community Park	Walking paths and playground	Active; owned and maintained by Moorefield Station West	0.2 mile north of Golden–Mars Route 5
Moorefield Station Regional Trail and Neighborhood Trail	Multipurpose trails	Proposed; owned and maintained by Loudoun County	Crossed by Golden–Mars Routes 1 and 5
Southview Park	Playground, tennis court, and basketball court	Active; owned and maintained by Loudoun Valley Estates II	800 feet west of Golden–Mars Routes 1, 2, and 5
Stone Hill Residential	Active recreational space	Proposed; owned by Toll Brothers, Inc.	600 feet north of Golden–Mars Routes 1, 2, and 5
Valley Falls Community Park	Natural area	Active; owned and maintained by Loudoun Valley II	Crossed by Golden–Mars Routes 1, 2, and 5
Washington & Old Dominion Trail	Shared-use asphalt trail (adjacent gravel equestrian trail)	Active: owned and maintained by NOVA Parks (NOVA Parks 2024)	Crossed by all Golden–Mars routes
Woodside Park	Natural area	Active; owned and maintained by Loudoun Valley Estates II	0.2 mile east of Golden–Mars Routes 1, 2, and 5

DGIF = Virginia Department of Game and Inland Fisheries; VDWR = Virginia Department of Wildlife Resources.

5.1.8.2 IMPACT ASSESSMENT

This section describes the Project's impacts on the recreational resources listed in Table 5.1-12. Construction impacts would include potential noise and traffic. These impacts would be temporary, limited to the period of active construction, and would typically only affect recreational resources crossed by or adjacent to Project facilities. The discussions below focus on the impacts of Project operations. Section 5.3 discusses the Project's visual impacts on recreational facilities.

There are no parks or other recreational resources within 0.25 mile of the Lockridge Loop or Sojourner Loop; therefore, this section discusses only the impacts of the Golden–Mars Lines on recreation resources.

1757 Golf Club

The 1757 Golf Club is a private golf club and venue owned by the Beaumeade Dulles 28 Golf Association LLC and operated by the Heritage Golf Group. The 1757 Golf Club is approximately 500 feet north of the shared alignment of the Golden–Mars Routes, across Waxpool Road. Due to the absence of a physical crossing and the presence of Waxpool Road between the Project and the resource, the Project will have limited visual impacts on the golf club. To the west, the planned Dulles 28 Technology Park, which would construct four data centers adjacent to the routes, would screen portions of the routes from view, further minimize the potential impacts on the golf course.

Broad Run Stream Valley Park

Broad Run Stream Valley Park is a public park that encompasses forested riparian areas along Broad Run between Loudoun Valley Estates II and III. The park contains the Broad Run Trail, a multi-use trail that runs through public land and private HOA open space parcels. The trail is a part of the Loudoun County Linear Parks and Trails System and is predominantly forested.

Route 2 crosses Broad Run Stream Valley Park and briefly parallels the Broad Run Trail for approximately 400 feet. Route 3 crosses the park for 0.7 mile, including two Broad Run Trail crossings. Route 3 also parallels the park and the trail to some degree for approximately 1.3 miles. Route 4 does not cross the trail but crosses the park for 0.4 mile and parallels the park and the trail for approximately 0.8 mile.

Because the park and trail are minimally improved, construction and operation of Routes 2, 3, and 4 would create noticeable impacts. In areas with dense vegetation, clearing required for the transmission line would alter the park's current appearance and increase visibility to nearby residences. For Route 2, this impact would be minimal because existing vegetation in the Route 2 right-of-way is sparser than for Routes 3 and 4.

The Project's most substantial impacts would be from Route 3 north of Loudoun Reserve Drive, where the right-of-way is located between the trail and nearby residences. In this area, tree and dense vegetation clearance would increase visibility between the trail and residences and would result in close-proximity views of the Project from the trail. South of Loudoun Reserve Drive, where Routes 3 and 4 converge, impacts to the trail would be less substantial, due to the distance and dense vegetation between the routes and the trail. In this area, Routes 3 and 4 parallel the existing cleared right-of-way for the Broad Run Interceptor and would thus have incremental visual impacts.

Creekside Park

Creekside Park is an approximately 6-acre park in the Loudoun Valley Estates II residential area. The park has a playground, two tennis courts, and connects into the Broad Run Stream Valley Park trail system. Routes 3 and 4 would have minor visual impacts on this park, although most views would be screened by existing vegetation between the park and the shared right-of-way of the two routes.

DGIF Birding Trail: Foothills to Falls Loop

The Foothills to Falls loop is a driving "trail" that connects parks, natural areas, and cultural sites across the Piedmont Region of the state. Within the study area, the trail follows the Dulles Greenway, a short segment of Moorefield Boulevard, Old Ryan Road, and Ryan Road. Except for temporary construction impacts described above, the Project—specifically, Routes 1 and 5—would primarily have visual impacts on this resource, as described in Section 5.3.

Evermoore Neighborhood Park

The Evermoore Neighborhood Park is an approximately 3.5-acre park in the Moorefield Station residential area owned and maintained by Loudoun County. The park features an amphitheater, grills, pavilions, picnic areas, and a playground. Existing and planned residential and nonresidential structures and vegetation would likely screen views of Routes 1 and 5 from the park, resulting in limited if any impacts.

Glenside Park

Glenside Park is an approximately 0.9-acre HOA-owned and -managed park in the Loudoun Valley Estates II residential area. The park contains a playground and open space. Existing residential structures would likely screen views of Routes 1 and 5 (on the far side of Loudoun County Parkway) from the park, although some structures and conductors may be visible above or between individual residential units.

Highland Park

Highland Park is an approximately 1.8-acre, HOA-owned-and-managed park within the Loudoun Valley Estates II residential area. The contains a playground and open space. Existing residential structures would likely screen views of Routes 2, 3, and 4 from the park, resulting in limited if any impacts.

Loudoun County Linear Parks and Trails System

Loudoun County's Linear Parks and Trails System is a proposed network of interconnected, multi-use trails along streams and natural corridors throughout the county. The Loudoun County BOS adopted the Linear Parks and Trails System Countywide Plan in 2021 to create a general "roadmap" for future trails to be built out in a phased development, although this plan does not specify the exact route of new trails. The county's goal is to expand its existing 224 miles of trails to 509 miles throughout the county to provide citizens with safe recreational opportunities, travel accessibility, and for the preservation of natural and cultural resources (Loudoun County 2021).

Within the study area, the system includes the existing Broad Run Trail and existing county-managed trails along major roads, as well as new proposed trails. An existing asphalt shared-use trail that runs along the west side of Loudoun County Parkway would be within the rights-of-way of Routes 1 and 5. Trails are a compatible, allowable use within transmission line rights-of-way. The Golden–Mars Routes would not prevent the use of existing trails or the development and use of future trails, although Project infrastructure would have visual impacts on trail users.

Loudoun County Estates II Playground

The Loudoun County Estates II Playground is an approximately 1.6-acre, HOA-owned and managed amenity for the Loudoun Valley Estates II residential area. Existing residential structures and vegetation would likely screen views of Route 1 from the park, although structures and conductors for Route 5 may be visible above or between individual dwellings.

Lyndora Park

Lyndora Park is a 17-acre park in the Loudoun Valley Estates neighborhood that is owned and maintained by Loudoun County. The park contains a multi-use trail, fields, and picnic areas. Existing residential structures and a 400-foot-wide vegetated buffer along Broad Run would likely screen views of Routes 2, 3, and 4 from the park, resulting in limited if any impacts.

Moorefield Green Community Park

Moorefield Green Community Park is an 0.2-acre HOA-owned and -managed linear park within Naugatuck Square in the Moorefield Station neighborhood. Existing residential and nonresidential structures and vegetation would likely screen views of Routes 1 and 5 from the park, resulting in limited if any impacts.

Moorefield Station Regional Trail and Neighborhood Trail

The Moorefield Station Regional Trail and Neighborhood Trail is a 10-foot wide shared-use trail along Loudoun County Parkway. The trail connects to the existing Loudoun County Trail system and is associated with the larger Moorefield Station development, which is discussed further in Section 5.1.6.

The trail is within the shared rights-of-way of Routes 1 and 5 along the north side of Loudoun County Parkway. Trails are a compatible, allowable use within transmission line rights-of-way, and the Project would not prevent the use of existing trails or the development and use of future trails although Project infrastructure would have visual impacts on trail users.

Southview Park

Southview Park is a 2.1-acre HOA-owned and -managed park in the Loudoun Valley Estates II neighborhood. The park contains tennis courts, playgrounds, and open space. Existing residential structures would likely screen views of Routes 1 and 5 (on the far side of Loudoun County Parkway) from the park, although some structures and conductors may be visible above or between individual residential units.

Stone Hill Residential Park

The Stone Hill Residential Park is an approved within the proposed Stone Hill Residential development in the southeast quadrant of the Loudoun County Parkway / Evergreen Ridge Drive intersection (see Section 5.1.6). The park, which has not yet been developed and would occupy approximately 0.9 acre. Proposed residential structures within the development may screen some views of Routes 1, 2, and 5; however, Project structures would likely be clearly visible from at least some portions of the park. The routes would not prevent use of the park but would have visual impacts on park users, as described in Section 5.3.

Valley Falls Community Park

Valley Falls Community Park is located within the Loudoun Valley Estates II neighborhood. The park is owned and managed by the Loudoun Valley Estates II HOA and consists of approximately 32 acres of forested lands. Two existing asphalt trails run along the park's perimeter; the park has no additional recreational amenities and consists mostly of passive open space.

The common right-of-way for Routes 1, 2, and 5 runs along the park's western boundary, collocated with Loudoun County Parkway. Dominion would install transmission structures in locations that avoid disrupting the trail itself. Because the trail is forested, construction and operation of Routes 1, 2, and 5 would create noticeable impacts on the visual character of the park.

Washington & Old Dominion Trail

The W&OD Trail runs through the northern portion of the study area from Ashburn to Sterling. Previously called the W&OD Railroad, the multi-use asphalt trail runs approximately 45 miles (also adjacent to a 32-mile-long gravel equestrian trail), connecting recreational land in Loudoun, Fairfax, and Arlington Counties. The trail is owned by NOVA Parks and is managed for recreational uses, including walking, running, biking, skating, and horseback riding. The trail is collocated with the Company's existing Lines #227/#274 for the entirety of its crossing within the study area.

All of the Golden–Mars Routes would cross the trail twice where the 230 kV and 500 kV are separated exiting the future Golden Substation. Because the trail is collocated with and often directly underneath existing 230 kV transmission lines, the additional crossing of the W&OD Trail would not change the overall character or use of this segment of the trail. Dominion will coordinate with NOVA Parks regarding potential mitigation measures to minimize impacts.

Woodside Park

Woodside Park is an approximately 1-acre HOA-owned and -managed park within the Loudoun Valley Estates II neighborhood. Existing residential structures and vegetation would likely screen views of Routes 1, 2, and 5 from the park, resulting in limited if any impacts.

Summary

The Golden-Mars Routes—especially Routes 1, 2, and 5—predominantly impact HOA amenity recreation areas or small neighborhood parks. Impacts on these areas would include noise, traffic, and temporary trail closures during construction and potential visual impacts during operation. Vegetation clearing has the greatest potential to result in visual impacts. Project construction and operation would not require closures of entire parks.

Golden-Mars Routes 2, 3, and 4 would have the largest impacts on recreation areas, especially in Broad Run Stream Valley Park. These routes would not affect actual use of the park; however, transmission infrastructure and associated tree clearing along any of these routes would be visible from within the park and its trails and would alter the current visual conditions of the area. As discussed in Section 5.3.3, Route 3 would have the greatest potential for visual impacts on Broad Run Stream Valley Park.

5.1.9 CEMETERIES, SCHOOLS, AND PLACES OF WORSHIP

ERM reviewed the following sources to identify cemeteries, schools, and places of worship along and near the right-of-way for the Golden–Mars Lines, Lockridge Loop, and Sojourner Loop:

- U.S. Geological Survey (USGS) topographic quadrangles (USGS 2025)
- Recent digital aerial photography from Loudoun County (Loudoun County 2024a)
- Historic and recent digital aerial photography from Google Earth (Google Earth LLC 2025)
- Site plan submissions for planned developments (Loudoun County 2024b)
- County GIS data (Loudoun County 2024c)
- Information from Loudoun Public Schools (LCPS 2025)
- Information from the VCRIS (VDHR 2025)
- Websites like findagrave.com (Find a Grave 2025)

ERM identified cemeteries, schools, and places of worship within 0.25 mile of the Project's route alternatives. ERM's review of schools considered public and private pre-kindergarten through secondary schools, religious schools, daycare centers (excluding in-home daycares), technical schools, after-school enrichment and tutoring programs, and college/university campuses. Resources identified include:

- Two cemeteries;
- Three public schools, two private daycare centers/preschools, and one private religious school; and
- One place of worship.

Table 5.1-13 provides descriptions of cemeteries, schools, and places of worship, which are also shown on Figure 5.1.9-1.

TABLE 5.1-13 CEMETERIES, SCHOOLS, AND PLACES OF WORSHIP WITHIN 0.25 MILE OF THE ROUTE ALTERNATIVES

Name	Description	Approximate Distance and Direction from Routes [a]
French–Bradshaw	A cemetery within a forested parcel southeast of the intersection of Lucketts Bridge Circle and Mechanicville Glen Street in the Loudoun Valley Estates Section I subdivision. The parcel containing the cemetery is bounded to the east and west by residences and to the north by the street. The burial ground, which is inactive and unmaintained, contains three interments dating between 1852 and 1885. Find a Grave (2025) notes that "several unreadable markers are present, along with a pile of debris collected from disturbed or destroyed headstones," suggesting other burials could be present. There is no indication of headstones on examined aerial photography of the cemetery.	900 feet north of Golden–Mars Routes 2, 3, and 4 (shared alignment)
Mankin	An inactive burial ground, located at the southwest corner of the intersection of Hopewell Manor Terrace and Evergreen Ridge Drive in the Stone Hill development (discussed in	700 feet west of Golden–Mars Routes 1,

Name	Description	Approximate Distance and Direction from Routes [a]
	Section 5.1.6) contains a single interment dating from 1863. The cemetery is fenced and maintained by the county.	2, and 5 (shared alignment)
Kiddie Academy of Moorefield Station	A private day care center consisting of a freestanding structure with fenced outdoor play area and parking lot, partially occupying a 2-acre parcel in a commercial development north of Loudoun County Parkway, west of the Dulles Greenway. The surrounding area consists of developed commercial land.	200 feet north of Golden–Mars Routes 1 and 5 (shared alignment)
Primrose School at Moorefield Station	A private day care center consisting of a freestanding structure with fenced outdoor play area and parking lot, occupying a 2.5-acre parcel west of the intersection of Loudoun County Parkway and Mooreview Parkway. The surrounding area consists of residential neighborhoods to the north, east, and south, and commercial lands to the west.	200 feet northwest of Golden–Mars Routes 1 and 5 (shared alignment)
Rosa Lee Carter Elementary School	A public elementary school sharing a 113-acre parcel with Rock Ridge High School on Loudoun Reserve Drive. The southern two-thirds of the parcel is developed, with the remainder predominantly forested land along Broad Run. Facilities associated with the elementary school, which occupies the southwest portion of the parcel, include the school building, parking lot, playground areas, and athletic fields. Surrounding lands are forested to the north, residential to the west and south, and industrial to the east.	450 feet west of Route 3; 500 feet north of Route 4
Rock Ridge High School	A public high school sharing the same 113-acre parcel as Rosa Lee Carter Elementary School. Facilities associated with the high school, which occupies the south-central and southeastern portion of the parcel, include the main campus building, parking lots, tennis courts, a football field with bleachers and track, service buildings, and baseball/softball fields.	350 feet north of Route 4
Stone Hill Middle School	A public middle school occupying a 30-acre parcel at the intersection of Evergreen Ridge Drive and Carters Meadow Terrace. School facilities, which include the main building, parking, and athletic fields, occupy the entire parcel. Surrounding lands are residential.	600 feet east of Golden–Mars Routes 1, 2, and 5 (shared alignment)
Pearls Academy	A private school within a multi-tenant flex industrial building also containing Tranquil Hearts Musallah along Old Ox Road, north of the Overland Drive intersection. Surrounding lands are forested or residential to the north and commercial or industrial to the east, south, and west.	0.2 mile west of the terminus of Sojourner Loop
Tranquil Hearts Musallah	A place of worship within a multi-tenant flex industrial building, which also houses Pearls Academy. The location and surrounding area are as described above for Pearls Academy.	0.2 mile west of the terminus of Sojourner Loop

[a] The distances measured are from the route alternative centerline to an estimated boundary for the French–Bradshaw Cemetery and from the route alternative centerline to the fence line for the Mankin Cemetery for each applicable route.

5.1.9.1 IMPACT ASSESSMENT

Impacts on land uses at cemeteries, schools, and places of worship may be physical, due to direct crossings, or non-physical due to impacts on the resource's setting, such as changes in viewsheds. Because the magnitude of non-physical impacts declines as the distance from a transmission line increases, the discussions below address potential land use effects on resources within 500 feet of at least one of the Golden–Mars routes. Four schools—Kiddie Academy of Moorefield Station, Primrose School at Moorefield Station, Rosa Lee Carter Elementary School, and Rock Ridge High—meet this criterion. No further discussion is provided for cemeteries, schools, and places of worship more than 500 feet from a route alternative. Section 5.3 discusses the Project's visual impacts. There are no cemeteries, schools, or places of worship within 500 feet of the Lockridge Loop or Sojourner Loop.

Kiddie Academy of Moorefield Station

The shared alignment of Routes 1 and 5 would be on the opposite side of Loudoun County Parkway from the school, in a developed and developing area east of the Dulles Greenway interchange, resulting in no direct impact on the campus. Transmission structures and conductors would be visible from the school's outdoor play area and parking lot but would not impact use of the school.

Primrose School at Moorefield Station

The shared alignment of Routes 1 and 5 would be on the opposite side of Loudoun County Parkway from the school, in a developed area west of the Mooreview Parkway intersection, resulting in no direct impact on the campus. Transmission structures and conductors would be visible from the school's outdoor play area and parking lot but would not impact use of the school.

Rosa Lee Carter Elementary School/Rock Ridge High School

Routes 2, 3, and 4 cross the parcel shared by Rosa Lee Carter Elementary and Rock Ridge High School. Only Routes 3 and 4 are within 500 feet of a school building. See Section 5.1.1.2 for discussion of impacts on the school land area.

Route 3 crosses approximately 150 feet of open land in the parcel's southwest corner, south of Loudoun Reserve Drive. It is also directly west of but adjacent to the western school parcel boundary. These segments would be more than 450 feet from the elementary school building at their closest point and would be separated from the building by trees, Broad Run, and Loudoun Reserve Drive. Therefore, Route 3 would have no direct impacts on developed school facilities.

The Route 4 right-of-way would generally follow the eastern and southern boundaries of the school parcel before rejoining Route 3 south of Loudoun Reserve Drive. Approximately 0.4 mile of the Route 4 centerline would be within the southern boundary of the tract, overlapping the access road to the campus (the private extension of Loudoun Reserve Drive). This area contains a narrow band of trees and shrubs separating the campus from the Loudoun Valley Estates III neighborhood to the south. This vegetation would be removed within the right-of-way, opening views from both the school and subdivision.

The nearest school features to Route 4 are the football field complex, about 100 feet west of the right-of-way, and a service area for the softball field, about 20 feet north of the right-of-way. The

route is about 0.2 mile east and 0.1 mile south of the high school building and about 0.1 mile south of the elementary school building.

Conclusions

Golden-Mars Routes 1 and 5 follow a shared alignment near, but do not cross, the Kiddie Academy of Moorefield Station, Primrose School at Moorefield Station, and Stone Hill Middle School. Transmission infrastructure installed along the routes would be visible from each resource, but the change in viewshed would not impact the functioning of the facilities as schools.

Golden-Mars Routes 2, 3, and 4 each cross the parcel containing the Rosa Lee Carter Elementary School and Rock Ridge High School (Section 5.1.1.2). Route 2 is over 500 feet from school buildings. Route 3 is approximately 450 feet from the elementary school building, while Route 4 is approximately 350 feet from the high school building and 500 feet from the elementary school building. Transmission infrastructure installed along any of the routes would be visible from within the campus, although the Project's visual impacts would not affect school operations after construction. Route 4 would have the greatest potential for visual impacts, as discussed in Section 5.3.3.

5.1.10 TRANSPORTATION INFRASTRUCTURE

5.1.10.1 EXISTING TRANSPORTATION INFRASTRUCTURE

The road network in the study area consists of a variety of road types, including freeways such as the Dulles Greenway, major and minor arterials such as Loudoun County Parkway, major and minor collectors, local roads, and access drives. In addition, the Metrorail Silver Line bisects the study area from east to west. The Silver Line is part of Washington Metrorail system and runs from Washington DC to Dulles Airport, then continues west from Dulles Airport along the Dulles Greenway, terminating at Ashburn Station. No other railroads or Metrorail lines are in the study area. Figure 5.1.10-1 shows the existing and planned transportation infrastructure crossed by the Project.

5.1.10.2 PLANNED ROADWAY PROJECTS

ERM reviewed the Loudoun County Transportation Projects and Programs website (Loudoun County 2024h) and VDOT's Six-Year Improvement Program (VDOT 2022) to identify planned road projects in the study area. The subsections below describe planned road construction and transportation improvement projects within 0.25 mile of the Project. These projects respond to the recommendations in the county's General Plan (Loudoun County 2023b) and Countywide Transportation Plan (Loudoun County 2023a).

Waxpool Road at Pacific Boulevard/Broderick Drive

This project includes improvements and turn lanes at the intersection of Waxpool Road with Pacific Boulevard and Broderick Drive. The project scope includes adding new turn lanes at Pacific Boulevard from Columbia Place, AOL Drive and Broderick Drive; traffic signal modifications; and improvements to the pedestrian network along Pacific Boulevard south of Waxpool Road. Construction is anticipated to begin in winter 2024 and to be completed by winter 2025. This project is included in the VDOT Six-Year Improvement Program.

Waxpool Road & Loudoun County Parkway Intersection

This project includes widening and intersection improvements along Waxpool Road at Loudoun County Parkway. The scope of work includes triple left turn lanes from westbound Waxpool Road onto southbound Loudoun County Parkway and a channelized (separated) right turn lane with an acceleration lane from northbound Loudoun County Parkway onto eastbound Waxpool Road. When complete, the new lanes will accommodate left turns and greater capacity from Waxpool Road onto southbound Loudoun County Parkway and right turns from northbound Loudoun County Parkway onto Waxpool Road. Construction is anticipated to begin in winter 2025 and to be completed by winter 2026. This project is included in the VDOT Six-Year Improvement Program.

Prentice Drive—Loudoun County Parkway to Shellhorn and Lockridge West

This project includes construction of a new segment of Prentice Drive from Loudoun County Parkway to Shellhorn Road at its intersection with Metro Center Drive and a new road, Lockridge West, between Prentice Drive and Waxpool Road. The project will enhance connectivity to the planned Ashburn Metrorail Station. Both roadways will be designed as four-lane urban major collectors, with associated turn lanes and bicycle/pedestrian lanes. Construction is anticipated to begin in summer 2025 and to be completed by spring 2027.

Prentice Drive—Lockridge Road to Loudoun County Parkway Project

This project includes the extension of Prentice Drive from Lockridge Road to Loudoun County Parkway (where the road would connect with the Prentice Drive—Loudoun County Parkway to Shellhorn and Lockridge West Project described above). The roadway will be a four-lane urban major collector with turn lanes, in-road bike lanes and sidewalks. Completion of both projects would extend Prentice Drive from Lockridge Road to Shellhorn Road, providing essential connectivity to the Ashburn Metro station. Construction is anticipated to begin in winter 2031 and to be completed by fall 2033.

Shellhorn Road—East of Loudoun County Parkway to Bullpen Drive/Thumb Drive Project

This includes extension of Shellhorn Road from east of Loudoun County Parkway to the MWAA property line on the north side of Loudoun County Parkway. The project entails the construction of a four-lane roadway within a 120-foot right-of-way and includes a bridge crossing over Broad Run. Construction is anticipated to begin in winter 2031 and to be completed by fall 2033.

Shellhorn Road Extension—MWAA Property Boundary to Moran Road Project

This project includes extension of Shellhorn Road from the MWAA Property line to Moran Road. The project entails the construction of a four-lane roadway within a 120-foot right-of-way. Construction is anticipated to begin in winter 2031 and to be completed by fall 2033.

Westwind Drive—Loudoun County Parkway to Old Ox Road Project

The project would upgrade and extend Westwind Drive from Loudoun County Parkway Old Ox Road and would replace a segment of Ladbrook Drive. This four-lane, divided, urban collector road will include construction of a new segment of Westwind Drive from State Street to Ladbrook Drive in addition to other improvements along existing sections of Westwind Drive and Ladbrook Drive within the project limits. The project also includes a new bridge over Broad Run and a sidewalk

and shared-use path that will extend for the full length of the project. This project will directly link the roadways between the Silver Line Loudoun Gateway Station and Ashburn Station. Construction is anticipated to begin in summer 2029 and to be completed by summer 2031.

5.1.10.3 IMPACT ASSESSMENT

Project construction would result in temporary road closures and possible increased traffic. These impacts would end after construction is complete. Section 5.3 discusses the Project's visual impacts on road users. Dominion would coordinate with the county and VDOT in cases where construction activities require temporary road closures. Table 5.1-14 lists the roads crossed by each route alternative.

VDOT guidelines indicate a preference for perpendicular road crossings, which reduce the distance spanned and the visual impacts of a crossing. VDOT also prefers that transmission structures are placed outside their rights-of-way to avoid conflicts with future road improvements. The route alternatives include perpendicular road crossings where possible. In some cases, perpendicular crossings are not possible, due to constraints associated with existing or planned development, collocation with existing transmission line crossings, natural resources, and landowner preferences for routes that follow parcel boundaries. Dominion would install the Project's transmission structures outside of existing and planned road rights-of-way.

TABLE 5.1-14 ROADS CROSSED BY PROJECT ROUTE ALTERNATIVES

Road Name	Crossed by	Lanes at Crossing	Crossing Type
Loudoun County Parkway	Golden-Mars Routes 1 and 5	4	• Route 1: one angled, one perpendicular • Route 5: one angled, three perpendicular
Lockridge Road	Lockridge Loop	2	Perpendicular
Loudoun Reserve Drive	Golden-Mars Route 3	2	Angled
Old Ryan Road	Golden-Mars Route 5	4	Perpendicular
Willington Square	Golden-Mars Route 5	2	Perpendicular
Ryan Road	Golden-Mars Route 5	4	Angled
Barrister Street	Golden-Mars Routes 1 and 5	6	Perpendicular
Gleedsville Manor Drive	Golden-Mars Routes 1 and 5	4	Perpendicular
Dulles Greenway	Golden-Mars Routes 1–5	6	Angled
Waxpool Road On-ramp	Golden-Mars Routes 1–5	1	Angled
Pacific Boulevard	Golden-Mars Routes 1–5	5	Angled
Waxpool Road	Golden-Mars Routes 1–5	9	Perpendicular
Broderick Drive	Golden-Mars Routes 1–5	4	Angled
Old Ox Road	Golden-Mars Routes 1–5	4	Angled

Road Name	Crossed by	Lanes at Crossing	Crossing Type
Pebble Run Place	Golden-Mars Routes 1–5	4	Perpendicular
Auto World Circle	Golden-Mars Routes 1–5	4	Perpendicular
Dulles Greenway On-ramp	Golden-Mars Routes 1 and 5	1	Angled
Evergreen Ridge Drive	Golden-Mars Routes 1, 2, and 5	7	Perpendicular

5.1.11 AIRPORTS AND HELIPORTS

Transmission line structures have the potential to affect airspace in and around airports. This section describes the airports near the study area, the airspace regulations that could impact the Project, and potential impacts of transmission line structures on airports and navigable airspace.

5.1.11.1 AIRPORTS NEAR THE PROJECT AREA

ERM reviewed the FAA's website to identify public use airports, airports operated by a federal agency or the US Department of Defense (DoD), airports or heliports with at least one FAA-approved instrument approach procedure, and public use or military airports under construction (FAA n.d.-a, n.d.-b). Based on this review, 10 airports, private airstrips, or heliports, listed and described in Table 5.1-15 and depicted on Figure 5.1.11-1, are within 10 nautical miles (nm) of the proposed facilities.

5.1.11.2 FEDERAL AVIATION ADMINISTRATION REGULATIONS

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

TABLE 5.1-15 AIRPORTS AND HELIPORTS LOCATED WITHIN 10 NAUTICAL MILES OF THE PROJECT

Airport/Heliport Name	FAA ID	Approximate Distance and Direction from Nearest Project Facility [a]	Use	Maximum Runway Length (feet)
Washington Dulles International Airport (Dulles Airport)	IAD	Dulles Airport has three existing north-south runways and one existing northwest-southeast runway. The closest runways to the Project include: • Runway 01L/19R: 0.4 nm east of the Sojourner Loop • Runway 12/30: 0.5 nm south of the future Mars Substation, the southern terminus of Golden-Mars Routes 1, 2, 3, 4, and 5, and the Sojourner Loop	Public	11,500
Stonesprings Heliport	6VG4	1.9 nm southwest of Golden–Mars Routes 1, 2, and 5.	Private	NA

Airport/Heliport Name	FAA ID	Approximate Distance and Direction from Nearest Project Facility [a]	Use	Maximum Runway Length (feet)
Inova Loudoun Hospital Heliport	34VA	4.1 nm northwest of the future Golden Substation	Private	NA
Reston Hospital Center Heliport	43VA	4.4 nm southeast of the future Golden Substation and the northern terminus of all Golden–Mars routes.	Private	NA
Crippen's Heliport	VA54	4.8 nm east of the future Golden Substation and the northern terminus of all Golden–Mars routes.	Private	NA
Leesburg Executive Airport	JYO	5.2 nm north of Golden–Mars Route 5	Public	5,500
Goose Hunt Farm Airport	3VA5	5.6 nm northwest of Golden–Mars Route 5	Private	1,700
Inova Fair Oaks Hospital Heliport	74VA	6.4 nm southeast of the Sojourner Loop	Private	NA
Fairfax County Police Heliport	26VA	7.9 nm southeast of the Sojourner Loop	Private	NA
Egypt Farms Heliport	4VA0	9.6 nm northwest of Golden–Mars Route 5	Private	NA

FAA = Federal Aviation Administration; NA = not applicable; nm = nautical mile(s).
[a] Distance (nm) is measured from the end or edge of the nearest runway to the nearest route.

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

The FAA regulates public use and federally operated (military use) airports and heliports. Therefore, private use airports without at least one instrument approach procedure do not require obstruction evaluation under 14 CFR Part 77. Of the airports identified in Table 5.1-18, the only public use airports within 10 nautical miles of any route alternative are Dulles Airport and Leesburg Executive Airport, and only Dulles Airport is close enough to the Project for transmission structures to impact airspace.

5.1.11.3 CIVIL AIRPORT IMAGINARY SURFACES

The FAA establishes civil airport imaginary surfaces (described below) for each airport and each runway, pursuant to 14 CFR Part 77. Imaginary surfaces are intended to prevent existing or proposed objects from extending from the ground into navigable airspace.

- **Horizontal surface**: This surface is a horizontal plane 150 feet above the established airport elevation, the perimeter of which is constructed by swinging arcs of specified radii from the center of each end of the primary surface of each runway and connecting the adjacent arcs by lines tangent to those arcs. The radius of the arc is 5,000 feet for all runways designated as utility or visual, and 10,000 feet for all other runways. Dulles Airport has a surveyed elevation

of 312.3 feet above mean sea level (AMSL); therefore, the horizontal surface is positioned at 462.3 feet AMSL.

- **Conical surface**: This is a surface extending outward and upward from the periphery of the horizontal surface at a slope of 20 to 1 for a horizontal distance of 4,000 feet. The Dulles Airport conical surface extends from 462.3 feet to 662.3 feet AMSL.
- **Primary surface**: This surface is longitudinally centered and extends 200 feet beyond the end of each runway. The elevation of any point on the primary surface is the same as the elevation of the nearest point on the runway centerline. This surface is 250 feet wide for visual approach runways, 500 feet wide for runways with non-precision instrument approaches, and 1,000 feet wide for precision instrument runways. All the runways at Dulles Airport have primary surfaces that are 1,000 feet wide.
- **Approach surface**: This surface is longitudinally centered on the extended runway centerline and extends outward and upward from each end of the primary surface. An approach surface is applied to each end of each runway based upon the type of approach available or planned for that runway end (e.g., precision instrument approach, visual approach). Runways 01C/19C, 01L/19R, 01R/19L and 12 at Dulles Airport have precision approach procedures. Thus, their inner approach surface edges are the same width as the primary surface (1,000 feet) and expand uniformly to an outer approach surface width of 16,000 feet. The approach surfaces extend for a horizontal distance of 10,000 feet at a slope of 50 to 1 with an additional 40,000 feet at a slope of 40 to 1. Runway 30 is a visual approach runway and has an approach surface that extends from the primary surface at a 20 to 1 slope for 5,000 feet to an outer surface width of 1,500 feet.
- **Transitional surface**: These surfaces extend outward and upward at right angles to the runway centerline and the runway centerline extended at a slope of 7 to 1 from the sides of the primary surface and from the sides of the approach surfaces. Transitional surfaces for those portions of the precision approach surface that project through and beyond the limits of the conical surface extend 5,000 feet measured horizontally from the edge of the approach surface and at right angles to the runway centerline.

Figure 5.1.11-2 provides a visual representation of the imaginary surfaces for Dulles Airport near the Project.

5.1.11.4 TERMINAL INSTRUMENT PROCEDURES

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

Pursuant to 14 CFR Part 77, an existing object (including a mobile object) is, and a future object would be, an obstruction to air navigation if it is of greater height than any of the following heights or surfaces:

- 499 feet above ground level (AGL) at the site of the object;
- 200 feet AGL or above the established airport elevation, whichever is higher, within 3 nm of the established reference point of an airport (excluding heliports) where the longest runway is more than 3,200 feet in actual length. That height increases in the proportion of 100 feet for each additional nautical mile from the airport up to a maximum of 499 feet;
- A height within a terminal obstacle clearance area, including an initial approach segment, a departure area, and a circling approach area, that would result in the vertical distance between any point on the object and an established minimum instrument flight altitude within that area or segment to be less than the required obstacle clearance;
- A height within an enroute obstacle clearance area, including turn and termination areas, of a Federal Airway or approved off-airway route, that would increase the minimum obstacle clearance altitude; or
- The surface of a takeoff and landing area of an airport or any imaginary surface established under 14 CFR §§ 77.19, 77.21, or 77.23.

Dulles Airport has Obstacle Clearance Slopes of 50:1 on Runways 01C/19C, 01L/19R, 01R and 12/30 and 44:1 on Runway 19L and an established elevation of 312.3 feet AMSL. Therefore, based on the above discussion, transmission structures within 3 nm of the airport reference point (38° 56' 50.843" N / 77° 27' 35.743" W) are restricted to a maximum height of 512.3 feet AMSL or to the most restrictive imaginary surface, whichever is lower.

5.1.11.5 FEDERAL AVIATION ADMINISTRATION NOTICE REQUIREMENTS AND TIMING

Construction of any structure that exceeds any of the surfaces or heights identified in the previous sections requires notice to the FAA. In addition, pursuant to 14 CFR Part 77.9, a notice must be filed with the FAA for the following:

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

Construction or alteration of any structure meeting the criteria requires submittal of a FAA Form 7460-1, Notice of Proposed Construction or Alteration, to the FAA regional office with jurisdiction over the area, or submittal electronically via the FAA website. The information that needs to be

provided with the notice includes the coordinates, site elevation, and structure height AGL for each pole/structure and the height of construction equipment, such as cranes.

5.1.11.6 STATE AND LOCAL AVIATION REGULATIONS

Va. Code §5.1-25.1 prohibits erection of any structure that penetrates into or through any licensed airport's clear zone, approach zone, imaginary surface, obstruction clearance surface, obstruction clearance zone, or surface or zone (as defined by the FAA or the regulations of the Virginia Department of Aviation) without first securing a permit from the Board of Aviation. This requirement does not apply to structures erected in a jurisdiction that has an ordinance regulating the height of such structures to prevent the penetration of zones and surfaces established in 14 CFR Part 77 and Rule 19 of the Virginia Department of Aviation. State law (Va. Code §§15.2-2280, 15.2-2282, 15.2-2293, and 15.2-2294) gives local jurisdictions the power to establish and regulate zoning districts, make airspace subject to their zoning ordinance, and establish airport safety zoning.

Loudoun County has established zoning and land use restrictions around Dulles Airport associated with noise contour lines, referred to as the Airport Impact Overlay District (AIOD). The restrictions acknowledge the unique land use impacts of airports, regulate the siting of noise-sensitive uses, ensure that heights of structures are compatible with airport operations, and complement FAA regulations regarding noise and height.

The Loudoun County AIOD is a zoning overlay district administered by the county's Department of Building and Development. The AIOD boundaries are based on the 60-decibel (dB) and 65-dB day-night noise contours and a 1-mile buffer extending beyond the 60 dB day-night average sound level contour for Dulles Airport (Loudoun County 2024c). The zone includes all land lying beneath the approach surfaces, transitional surfaces, horizontal surfaces, and conical surfaces that apply to this airport. Each Golden-Mars alternative route and the Lockridge and Sojourner loops overlap the Loudoun County AIOD. Building heights within the AIOD are required to comply with FAA standards, however, the Loudoun County regulations are less restrictive than FAA standards for non-residential structures. As such, the CFR Part 77 airspace restrictions apply to the Project rather than the local ordinance.

5.1.11.7 IMPACT ASSESSMENT

ERM conducted an airport analysis to review the height limitations associated with the FAA-defined imaginary surfaces for the airport runways identified in Table 5.1-18. As part of a typical airport analysis, ERM conducts preliminary evaluations of transmission infrastructure heights and locations using the FAA defined Civil and DoD Airport Imaginary Surfaces, and applies standard GIS tools, including ESRI's ArcGIS Pro software with Spatial Analyst, 3D Analyst, and Aviation Airports Extensions, to create and georeference imaginary surfaces in space and in relationship to transmission structures. ERM derived ground surface data for the study area from a USGS 10 Meter Digital Elevation Model.

Of the 10 airports and heliports identified within 10 nautical miles of all the Project routes, two are public use airports (Dulles Airport and Leesburg Executive Airport), one is a private use airport, and seven are private use heliports. There are no military airports within 10 nautical miles of the Project. Private airports and heliports are not regulated by the FAA. None of the private facilities

listed in Table 5.1-18 would conflict with transmission infrastructure installed along the route alternatives or loops.

Leesburg Executive Airport is approximately 31,700 feet (5.2 nautical miles) north of Golden–Mars Route 5, the closest proposed alternative route to this airport. Based on the company's review of the airport's single runway, the project will not overlap the horizontal extent of any imaginary surface. As such, the Project will have no impact on the regulated airspace of Leesburg Executive Airport.

As discussed in Section 5.1.1, the Dulles Airport property is adjacent to the Project terminus at the future Mars Substation. Of the airport's four runways, Runway 01L/19R is the closest to the proposed Project. Runways 01C/19C and 01R/19L are parallel to and farther form the Project than Runway 01L/19R. Runway 12/30 is south of and nearly perpendicular to the other three runways. Based on communication between the Company and Dulles Airport, an additional northwest-southeast runway has been planned for construction south of Runway 12/30. Based on a review of FAA airport data and obstruction categories, all the runway approaches at Dulles Airport are considered Precision Instrument Approach (PIR) Runways, except for Runway 30, which is a visual approach runway (B[V]) runway that points away from the project.

Regardless of the route selected for the Golden-Mars Lines, the Project when built will be completely within the horizontal extents of Dulles Airport's imaginary surfaces, including the airport's horizontal and conical surface and the runway approach and transitional surfaces for Runways 19R, 19C, 19L, and 12, which all point toward the Project area. Figure 5.1.11-2 provides a visual representation of Dulles Airport's imaginary surfaces in relation to the various Project routes.

The Company conducted a Maximum Structure Height analysis that compared ground elevation at planned structure locations to the most restrictive imaginary surface altitudes above them. The highest ground elevations along Golden-Mars Route 1, 2 and 5 occur along Loudoun County Parkway near Evergreen Ridge Drive (up to 318 feet AMSL), and the highest ground elevations along Routes 3 and 4 occur near the future Mars Substation (up to 298 feet AMSL). Ground elevations along the Lockridge Loop range from 222 to 264 feet AMSL, and elevations along the Sojourner Loop range from 273 to 293 feet AMSL. Imaginary surface altitudes vary based on a structure's distance from the runway; however, in general, structures closer to the runway, or structures placed at higher ground elevations will be more restricted. Based on the results of the maximum structure height analysis, the following maximum structure height ranges would apply to each of the routes.

- Golden-Mars Route 1, 2, 3, 4, and 5: 165.1 to 520.7 feet AGL, with the most restricted structure locations occurring along Carters School Road and the Mars Substation for all alternatives.
- Lockridge Loop: 191.9 to 233.6 feet AGL
- Sojourner Loop: 169.7 to 189.7 feet AGL

Based on these limitations, the following structure types and heights would apply to each component and route. Structure type and height will be dependent on location needs and FAA restrictions. No penetration of imaginary surfaces is anticipated.

- Golden-Mars Routes 1 through 5: Monopole, 2-pole, 3-pole, H-frame, and backbone structures with heights ranging from 95 feet to 185 feet AGL.
- Lockridge Loop: Monopole and backbone structures ranging from 95 to 120 feet AGL.
- Sojourner Loop: Monopole, 2-pole, and 3-pole structures ranging from 50 to 120 feet AGL.

In addition, none of the Project's structure heights would exceed 200 feet AGL or 200 feet above the established airport elevation (312.3 feet AMSL).

Structures may not be considered a hazard to air navigation if they do not penetrate any imaginary surfaces or exceed obstruction thresholds; however, a notice must be filed with the FAA for each structure that penetrates a 100 to 1 imaginary notice surface within 20,000 feet of the runway primary surfaces at Dulles Airport.

All structures associated with each Project route alternative are within 20,000 feet of at least one runway. The Golden-Mars routes, Lockridge Loop, and Sojourner Loop each have structure locations requiring notification to the FAA for penetrating the 100 to 1 imaginary surface. The Company will use FAA Form 7460-1, Notice of Proposed Construction or Alteration, pursuant to 14 CFR Part 77 for FAA notification. The submittal will occur after a route is selected for the Golden-Mars transmission lines and the Project is certificated by the SCC. Based on the results of the maximum structure height analysis, the Company believes it is unlikely that any route would be infeasible based on FAA requirements, and the Company plans to construct structures below imaginary surfaces in all locations. The FAA may require design alterations to minimize the chance of airspace impacts, including lighting and marker-balls, on transmission structures in places they deem necessary to protect air safety. The Company will consult with the FAA and implement design and routing alterations as required.

5.2 NATURAL RESOURCES

5.2.1 SURFACE WATERS

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

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

Figure 5.2-1 depicts the locations of NWI-mapped wetlands, NHD-mapped waterbodies, and watershed boundaries in the study area and Figure 5.2-2 depicts the locations of desktop-delineated wetlands within the route alternative rights-of-way.

5.2.1.1 WATERSHEDS

Watersheds are used to define the geographic area within the boundaries of drainage divides throughout the country. For purposes of classifying watersheds, the United States is divided into four levels of hydrologic units—regions, subregions, accounting units, and cataloging units—which may contain all or part of a watershed. Each level is identified by a hydrologic unit code (HUC). The first level, 2-digit, is a major geographic area or region containing several rivers or the drainage area of a major river. Subsequent levels encompass progressively smaller areas based on the drainage divides of lower order waterbodies.

The study area is within the following HUC areas:

- The Mid-Atlantic HUC 2-digit (02) region, which discharges into the Atlantic Ocean, Long Island Sound, and the Riviere Richelieu, a tributary of the St. Lawrence River;
- The Potomac HUC 4-digit (0207) subregion, which drains about 14,600 square miles within the Potomac River basin, including Washington D.C. and portions of Maryland, Pennsylvania, Virginia, and West Virginia;
- The Middle Potomac-Catoctin (02070008) HUC 8-digit watershed, which drains about 1,210 square miles of Virginia into the Potomac River; and
- The Broad Run-Potomac River (0207000809) HUC 10-digit watershed (USGS 2023).

The study area is further split into the three smaller HUC 12-digit watersheds: the Beaverdam Run-Broad Run watershed (020700080903), the Lenah Run-Broad Run watershed (020700080901), and the Horsepen Run watershed (02070080902). The watersheds divide approximately along Old Ox Road and Dulles Greenway, converging into Broad Run, which runs southwest to northeast through the center of the study area.

The northeastern portion (approximately 5,893 acres or 41%) of the study area encompasses portions of Golden–Mars Routes 1 through 5 and all of the Lockridge Loop within the Beaverdam Run-Broad Run watershed (020700080903). Waterbodies within this section of the study area include Broad Run, which bisects the study area on the southeast side of Loudoun County Parkway and passes through wetlands and modified open waters associated with the 1757 Golf Club, as well as unnamed tributaries to Broad Run. Alder Lake, Tippecanoe Lake, and Beaverdam Run are located in the northwest corner of the study area and are not crossed by any Project infrastructure. Surface waters within this watershed generally flow toward the center of the study area (north and northeast) into Broad Run.

The western portion (approximately 4,943 acres or 35%) of the study area encompasses approximately the southern two thirds of Routes 1 through 5 within the Lenah Run-Broad Run watershed. Waterbodies within the watershed include Broad Run and associated tributaries. Surface waters within the watershed generally flow to the southeast into Broad Run, which runs from the southwest to the northeast.

The southeastern portion (approximately 3,491 acres or 24%) of the study area encompasses portions of Routes 1 through 5) and the Sojourner Loop within the Horsepen Run watershed. Waterbodies within this portion of the study area include perennial Stallion Branch, Horsepen Run, Indian Creek, and their associated, unnamed tributaries. Surface waters within this section of the

study area generally flow north, ultimately converging into Horsepen Run, which then flows into Broad Run.

5.2.1.2 WETLANDS

Existing Conditions

ERM identified wetlands within the rights-of-way for the route alternatives based on a desktop wetland and waterbody probability analysis, described in the Wetland and Waterbody Desktop Summary (Appendix E). ERM did not conduct an onsite delineation of wetlands or waterbodies along the route alternatives. Wetlands and waterbodies were classified based on the Cowardin system using the following categories:

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

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

Most wetlands in the study area are adjacent to, or contiguous with, rivers, streams, and associated tributaries that may be regulated by the U.S. Army Corps of Engineers (USACE) and Virginia Department of Environmental Quality (VDEQ) under Sections 404 and 401 of the Clean Water Act (CWA), respectively. Wetlands within the study area are predominantly forested and associated with Broad Run and its tributaries, including Horsepen Run, Stallion Branch, and other associated perennial and intermittent tributaries. Large areas of PFO wetlands are concentrated in the northern and central portions of the study area around Broad Run, Stallion Branch, and Beaverdam Run.

Wetlands within the Beaverdam Run-Broad Run watershed in the northeastern portion of the study area generally flow northeast into Broad Run and its associated tributaries. Wetlands within the Lenah Run-Broad Run watershed in the western portion of the study area generally flow south and east, converging with perennial Broad Run, although wetlands associated with Broad Run predominantly flow northeast. Wetlands within the Horsepen Run watershed in the southeastern

portion of the study area generally flow northeast, converging with Stallion Branch. Figure 5.2-1 shows the HUC 12 watershed boundaries, as well as NWI and NHD mapped surface waters.

Impact Assessment

As discussed in more detail below, segments of the Golden–Mars Lines share rights-of-way or are collocated with existing or permitted transmission lines; therefore, impacts within these existing rights-of-way have already been accounted for under existing permits. Wetlands within shared rights-of-way would be limited to temporary impacts. Table 5.2-1 provides the acres of wetlands identified within new and existing or permitted rights-of-way along each route. Figure 5.2-2 depicts locations of desktop delineated wetlands and waterbodies. The sections below discuss impacts on PEM, PSS, and PFO wetlands. Section 5.2.1.4 discusses impacts on riverine (stream) and PUB (open water) features.

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

Permanent direct impacts on wetlands would be limited to placement of structures within wetlands, if unavoidable, and the permanent conversion of PSS/PFO wetlands within the right-of-way to PSS or PEM type wetlands due to the necessity of removing trees and shrubby vegetation from the right-of-way. Forested wetlands and riparian buffers provide functions such as peak flood flow reduction, nutrient and sediment capture, filtration of pollutants to adjacent waterbodies, and habitat diversity. The conversion of forested wetlands would reduce or eliminate some of these functions. Where the routes are collocated with existing transmission lines, fragmentation of PFO wetlands is minimized by clearing trees adjacent to existing cleared rights-of-way rather than in unfragmented areas.

TABLE 5.2-1 ACREAGE OF HIGH, MEDIUM-HIGH, AND MEDIUM PROBABILITY WETLANDS AND WATERBODIES WITHIN THE PROJECT FOOTPRINT

Route	Right-of-way	Total	PFO	PSS	PEM	PUB	Riverine
Golden–Mars Route 1 [b]	New	20.6	9.4	0.8	6.2	2.2	2.0
	Existing	6.6	6.3	NA	0.2	NA	0.1
	Total	27.2	15.8	0.8	6.4	2.2	2.1
Golden–Mars Route 2 [b]	New	27.5	15.5	0.8	5.8	2.3	3.1
	Existing	7.2	6.4	NA	0.5	0.2	0.1

Route	Right-of-way	Total	PFO	PSS	PEM	PUB	Riverine
	Total	34.7	21.9	0.8	6.4	2.4	3.2
Golden–Mars Route 3 [b]	New	20.9	13.4	NA	3.1	1.7	2.7
	Existing	7.2	6.4	NA	0.5	0.2	0.1
	Total	28.1	19.8	NA	3.6	1.9	2.8
Golden–Mars Route 4 [b]	New	22.6	15.8	NA	3.0	1.7	2.1
	Existing	7.2	6.4	NA	0.5	0.2	0.1
	Total	29.8	22.1	NA	3.6	1.9	2.2
Golden–Mars Route 5 [b]	New	20.5	9.1	0.6	6.3	2.5	2.0
	Existing	6.6	6.3	NA	0.2	NA	0.1
	Total	27.2	15.5	0.6	6.5	2.5	2.1
Lockridge 230 kV Loop	New	0.8	0.7	NA	NA	NA	0.2
	Existing	0.3	0.3	NA	NA	NA	<0.1
	Total	1.2	1.0	NA	NA	NA	0.2
Sojourner 230 kV Loop	New	3.1	2.2	NA	0.5	<0.1	0.3

kV = kilovolt(s); NA = Not applicable due to absence of a wetland type within the Project footprint; PEM = palustrine emergent; PFO = palustrine forested; PSS = palustrine scrub-shrub; PUB = palustrine unconsolidated bottom.
[a] Values have been rounded to the tenths place; as a result, the totals may not reflect the sum of the addends. A value of <0.1 indicates that less than 0.05 acre of a wetland type is present.
[b] Values within the "new" column include only aquatic resources within only proposed new right-of-way only. "Existing" consists of wetlands within the rights-of-way of existing or permitted transmission lines.

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

No change in contours of wetlands and waterbodies, or redirection of the flow of water, is anticipated and the amount of spoil from foundation and structure placement would be minimal. Excess spoil in wetlands generated through foundation construction would be controlled through construction best management practices (BMPs) (e.g., the implementation erosion and sediment controls).

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

Wetlands crossed by routes are summarized in Table 5.2-1 and discussed below. Figure 5.2-2 depicts locations of desktop delineated wetlands and waterbodies.

Golden–Mars Lines

Golden–Mars Routes 1, 3, 4, and 5 each cross approximately the same number of desktop-delineated wetlands, with Route 2 crossing approximately six acres more than other routes. Most wetlands crossed are PFO wetlands located around Broad Run and its tributaries. Sections of the Golden-Mars Lines have been routed to collocate with or overlap with existing or future transmission line rights-of-way, which avoid new impacts to wetlands where they overlap and reduces PFO wetland fragmentation where they collocate (see Table 5.2-2 Figure 5.2-2).

All the Golden-Mars Lines share the right-of-way between the future Golden Substation and Dulles Greenway, crossing large areas of PFO and PEM wetlands around crossings of Broad Run near Waxpool Road and Lockridge Road. The routes diverge approximately at Dulles Greenway and converge again between Overland Drive and the future Mars Substation. Between Overland Drive and the future Mars Substation, the shared Golden-Mars Lines alignment cross areas of PFO associated with Stallion Branch and an unnamed tributary to Stallion Branch.

Where the routes diverge south of Dulles Greenway, Routes 1 and 5 route to the west of Broad Run, minimizing wetland crossings (in particular, PFO wetlands) associated with Broad Run and its tributaries and collocating with larger roads (Loudoun County Parkway, Ryan Road, Claiborne Parkway).

Routes 3 and 4 run southwest along Broad Run, crossing large areas of PFO and PEM wetlands associated with Broad Run and its tributaries, but minimizing new wetland impacts and PFO fragmentation by collocating with or sharing rights-of-way with the Company's existing or permitted transmission lines (#s 2095 and 2218).

Route 2 collocates or shares rights-of-way with existing Lines #2095/#2218 along Broad Run for about 1.8 miles between Dulles Greenway and the Rock Ridge High School property and then heads west, away from Broad Run and collocates with Loudoun County Parkway for the remaining 1.9 miles to the convergence of the routes at Overland Drive.

Construction and operation of each Golden–Mars route alternative would permanently convert the PFO and PSS wetlands crossed to PEM-type wetlands within the proposed new right-of-way of each route, as listed below.

- Route 1: 16.6 acres
- Route 2: 22.7 acres
- Route 3: 19.8 acres
- Route 4: 22.1 acres
- Route 5: 16.1 acres

Of the acres of PFO within the Golden-Mars Lines, approximately 4.5 overlap with the future Mars Substation (not proposed as part of this Project) and would be cleared by the property owner prior to Project construction.

Lockridge 230 kV Loop

Construction and operation of this route would convert the approximately 1.0 acre of PFO to PEM-type wetlands within the maintained right-of-way. This route overlaps 1.9 acres of right-of-way

with the Prentice Drive Substation (not proposed as part of this Project), including approximately 0.4 acre of the 1.0 acre of PFO wetland crossed, which would be cleared and permitted by the property owner prior to construction of the Project.

Sojourner 230 kV Loop

The Sojourner 230 kV Loop right-of-way encompasses areas of PFO and PEM wetlands associated with Stallion Branch and a tributary to Stallion Branch near the proposed Mars Substation. Construction and operation of this route would convert approximately 2.2 acres of PFO to PEM-type wetlands within the maintained right-of-way.

5.2.1.3 WATERBODIES

Existing Conditions

ERM identified and mapped waterbodies, including streams, rivers, and other open waterbody features (e.g., reservoirs, lakes, impoundments, ponds, and stormwater features) within the study area using the publicly available GIS databases identified above. Waterbody crossings are regulated by the USACE under Section 404 of the CWA and by VDEQ under Section 401 of the CWA and the Virginia Water Protection permit program. The Project would not cross any navigable waters; therefore, the Project would not require a Rivers and Harbors Act Section 10 authorization from the USACE.

Perennial Broad Run would be crossed multiple times by all the Golden–Mars Lines and the Lockridge 230 kV Loop would cross the stream once. The Sojourner Loop would cross perennial Stallion Branch. In addition to these named waterbodies, the routes would cross unnamed perennial and intermittent tributaries and open waterbody features. Based on recent (2024) aerial imagery, the open waterbody features along the routes are stormwater control features.

Table 5.2-2 lists the number of waterbody crossings for each route alternative. Figure 5.2-2 and Attachments 2 and 3 in Appendix E depict waterbody crossing locations for each route.

Impact Assessment

Regardless of the route selected, waterbodies crossed by the routes selected for the Project would be spanned, with permanent impacts to waterbodies limited to the conversion of riparian buffer from tree cover to herbaceous vegetation within the maintained rights-of-way. Tree removal adjacent to waterbodies would reduce riparian buffer functions such as stream bank stabilization and erosion control, nutrient and sediment filtration, floodwater storage and peak flow reduction, and water temperature changes due to loss of shading. Tree removal in the Broad Run floodplain could reduce water absorption capacity, which could increase total waterflow in the area. Increased waterflow would generally have a negative impact on vegetation within the floodplain. The right-of-way would be maintained with a cover of herbaceous vegetation during operations, which would provide some filtration and stabilization to protect waterbodies from runoff. Perpendicular stream crossings, where feasible, would minimize riparian stream buffer impacts.

TABLE 5.2-2 WATERBODIES CROSSED BY PROJECT ROUTE ALTERNATIVES

Waterbodies Crossed	Golden–Mars Route 1	Golden–Mars Route 2	Golden–Mars Route 3	Golden–Mars Route 4	Golden–Mars Route 5	Lockridge 230 kV Loop	Sojourner 230 kV Loop Route
Total Waterbodies Crossed	**33**	**40**	**34**	**31**	**37**	**2**	**5**
NHD-Mapped Perennial Streams/Rivers	6	13	11	7	6	1	0
NHD-Mapped Intermittent Streams/Rivers	12	9	5	6	13	0	2
NHD-Mapped Perennial Lakes/Ponds	2	1	1	1	2	0	0
Non-NHD Mapped Waterbodies [a]	13	17	17	17	16	1	3

Source: USGS NHD (USGS 2024).

kV = kilovolt(s); NHD = National Hydrography Dataset.

[a] Identified via aerial imagery during desktop analysis using recent (Loudoun County 2024) and (Google Earth LLC 2024) aerial imagery.

As discussed in more detail below, segments of the Golden-Mars Lines are collocated or share rights-of-way with existing or permitted transmission lines along Broad Run between Dulles Greenway and Hemmingford Circle and between Old Ox Road and the future Mars Substation. Waterbodies crossed in shared rights-of-way are within existing maintained corridor, with vegetation/riparian buffer only along the proposed expanded right-of-way segments of the features, thereby minimizing riparian buffer loss at these crossings. Waterbodies crossed where the routes are collocated with the existing rights-of-way will extend riparian buffer removal in those crossing locations.

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

Project construction could result in temporary, minor impacts on water quality from disturbed soils transported by stormwater entering adjacent surface waters during rain events. Increased turbidity and localized sedimentation of stream bottoms may occur as a result of runoff. Potential impacts would be mitigated by the implementation of erosion control measures.

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

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

Golden–Mars Lines

The Golden-Mars Lines share the right-of-way between the future Golden Substation and Dulles Greenway, crossing two stormwater features, unnamed, intermittent tributaries to Broad Run, and Broad Run in three locations. Two waterbody crossings are adjacent to the Company's existing transmission lines, including Lines #2165/#2170 on the south side of Waxpool Road and Lines #2149/#2214 approximately 0.5 mile southwest of Waxpool Road. The third crossing, approximately 0.3 mile west of the intersection of Prentice Drive and Lockridge Road, is near but not adjacent to the intersection of existing Lines #2031/#2223. All three crossings of Broad Run and most of the intermittent tributary crossings have riparian buffer/forested land adjacent to the waterbodies.

The routes diverge approximately at Dulles Greenway and converge again between Overland Drive and the future Mars Substation. Between Overland Drive and the future Mars Substation along Carters School Road, the common alignment of the Golden-Mars Lines cross non-NHD-mapped riverine features that appear to be tributaries to Stallion Branch. Trees along this feature either have been cleared will have been cleared for construction of the future Mars Substation (approved

as part of a separate project); therefore, any impacts from the Project in this area would not be new and would be temporary.

Where the routes diverge on the south side of Dulles Greenway, Routes 1 and 5 route to the west of Broad Run, avoiding the Broad Run floodplain corridor and collocating with existing roads for most of their lengths. Routes 1 and 5 cross along approximately 0.1 mile of a non-NHD-mapped riverine feature within a forested recreational area with a walking path northeast of the intersection of Loudoun County Parkway and Mooreview Parkway and an associated forested unnamed tributary to Broad Run, and have only one crossing of Broad Run between a forested wetland complex around Broad Run between Loudoun County Parkway/Greely Square and Overland Drive. Routes 1 and 5 also cross unnamed tributaries to Broad Run and multiple open waterbody features, most of which appear to be stormwater features. All trees within the proposed right-of-way at these crossing locations would be cleared adjacent to the waterbodies.

Between Dulles Greenway and a point just west of Barnstead Drive and north of the Rock Ridge High School recreational fields, Routes 2, 3, and 4 route for approximately two miles along Broad Run within its floodplain. Approximately 1.4 miles of these routes collocate or overlap with existing Lines #2095/#2218 (see Figure 5.2-2), minimizing the amount of riparian buffer clearing and/or fragmentation adjacent to Broad Run and its tributaries in these locations. This segment of Routes 2, 3, and 4 crosses Broad Run in five locations and a tributary to Broad Run in one location. The first of these crossings, approximately 0.3 mile southwest of Dulles Greenway, occurs in a shared transmission line right-of-way, limiting the new right-of-way required in this location to approximately 70 feet rather than 100 feet.

Golden-Mars Route 2 diverges from Routes 3 and 4 near Barnstead Drive, crossing Broad Run and a tributary to Broad run and then following Loudoun County Parkway (in the same alignment with Routes 1 and 5) for the remainder of its length, including the crossing of Broad Run in the same forested wetland complex between Loudoun County Parkway/Greely Square and Overland Drive.

Golden-Mars Routes 3 and 4 also diverge near Barnstead Drive north of Rock Ridge High School. From this point, Route 3 continues to approximately parallel the west side of Broad Run on the west side of Rock Ridge High School, while Route 4 parallels a tributary to Broad Run on the east side of the high school and then avoid waterbodies on the south side of the high school property before they reconverge. Route 3 would require the clearing of approximately 370 feet of riparian buffer immediately adjacent to Broad Run and would cross Broad Run where it passes under Loudoun Reserve Drive, with a small amount of forested buffer crossed on its south side. Route 4 would require riparian buffer clearing along nearly its entire length around Rock Ridge High School.

After rejoining each other on the south side of Loudoun Reserve Drive, Routes 3 and 4 would require new riparian clearing in a 100-foot-wide corridor for approximately 0.7 mile and a 50-foot-wide corridor within a 0.1-mile segment that collocates with the already-cleared corridor for existing Loudoun County Water sewer lines.

Lockridge 230 kV Loop

The Lockridge Loop crosses Broad Run in a forested area approximately 0.3 mile west of Lockridge Road, which would require clearing of the riparian buffer adjacent to the waterbody in this

location. Lockridge Loop also crosses a non-NHD-mapped riverine feature within the footprint of the future Prentice Drive Substation, which would be cleared and permitted by the property owner prior to Project construction. Both crossings would be perpendicular.

Sojourner 230 kV Loop

The Sojourner 230 kV Loop crosses five waterbodies along mostly forested land, including perennial Stallion Branch, three tributaries to Stallion Branch, and an open waterbody feature near the future Mars Substation north of West Perimeter Road. The Sojourner Loop is collocated with an existing cleared corridor for a portion of its route, including the crossing of Stallion Branch and two tributaries to Stallion Branch. All crossings of streams are perpendicular.

5.2.2 NATURAL HERITAGE RESOURCES

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

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

ERM consulted VDCR's Natural Heritage Program (NHP) and requested an environmental review of the routes to identify NHRs in the study area and along and near each alternative. ERM reviewed and requested data from the NHP's ecological datasets for the area within 1.0 mile of the rights-of-way for each route alternative. The requested NHP review included natural area preserves, conservation sites, SCSs, and ecological cores (VDCR 2024b).

The VDCR responded to ERM's request for environmental review of the routes in a letter dated November 25, 2024 (attached as Appendix F). The VDCR letter indicates that no natural area preserves or state-listed insects are present along the routes; therefore, no further discussion of these resource types is provided in this study. The VDCR's review identified one SCS, ecological cores, and diabase soils supporting rare plant species along the routes. The SCS and ecological cores are described below, while rare plant species associated with diabase soils are discussed in further detail in Section 5.2.3.

5.2.2.1 STREAM CONSERVATION SITES

Stream Conservation Sites "encompass stream/river reaches, waterbodies, and terrestrial contributing areas containing or associated with aquatic or semi-aquatic resources, including upstream and downstream reaches and tributaries up to 3-kilometer stream distance from the aquatic resources" (VDCR 2024c). The VDCR considers hydrology of the waterway and

surrounding landscape, dam locations, and determination of tidal waterways to establish the size and dimensions of a SCS. The SCS designation can be used to identify land management needs, protection priorities, and potential conflicts with development activities.

VDCR assigns a biodiversity significance ranking (a "B-ranking") to each SCS based on rarity, quality, and the number of NHRs it contains. Rankings range from B1 to B5, as follows (VDCR 2021a):

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

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

VDCR identified one SCS within the Project study area—the Broad Run–Rt. 607 SCS, described below. The site is depicted on Figure 5.2.2-1.

Broad Run–Rt. 607 Stream Conservation Site

The Broad Run–Rt. 607 SCS encompasses 590 acres of land along Broad Run and tributaries in the area along and around Loudoun County Parkway, between its intersections with Waxpool Road and the Dulles Greenway. The resource has a B4 ranking, indicating a site of moderate significance. Approximately 325 acres (about 55%) of the SCS has been cleared or is currently developed. The remainder is mainly comprised of forested riparian land along Broad Run and its tributaries, although this forested land is fragmented by multiple existing transmission lines and roads.

The species associated with this SCS is the Yellow lampmussel (*Lampsilis cariosa*), which is neither federally listed nor state-listed, but is classified as Tier II in the Virginia Wildlife Action Plan, indicating a very high conservation need for the species (VDWR 2025a). This species is described in further detail in Section 5.2.3.

Table 5.2-3 summarizes the lengths and acreages of the Project's SCS crossings. The crossings are depicted on Figure 5.2.2-1. The common alignment of the Golden-Mars Lines north of the Dulles Greenway crosses approximately 0.8 mile of the SCS in two places, of which approximately 0.4 mile are collocated with existing Lines #2149/#2203 and less than 0.1 mile is collocated with or crosses existing Lines #2188/#2223. South of the Dulles Greenway, Routes 1 and 5 head west away from the SCS, while Routes 2, 3, and 4 cross another approximately 0.3 mile of the SCS in two locations, all of which are collocated with existing Lines #2095/#2218. The Lockridge Loop crosses approximately 0.2 mile of the SCS, some of which is within the boundaries of the future Prentice Drive Substation.

In addition to the Project and the Prentice Drive Substation (approved as part of a separate project), several planned developments are proposed within the SCS, including Project NOVA Broad Run, Dulles Berry LC 4 and LC 8 Data Centers, and Silver District West. Section 5.1.6.2

discusses each of these projects. These projects would impact and further fragment the remaining natural habitat in the SCS.

TABLE 5.2-3 STREAM CONSERVATION SITE CROSSING LENGTHS AND CONSTRUCTION FOOTPINTS BY ROUTE ALTERNATIVE

Stream Conservation Site	Units	Golden –Mars Route 1	Golden –Mars Route 2	Golden –Mars Route 3	Golden –Mars Route 4	Golden –Mars Route 5	Lockridge 230 kV Loop	Sojourner 230 kV Loop
Broad Run—Rt. 607 SCS	acres	13.3	16.3	16.3	16.3	13.3	2.2	0.0
	miles	0.7	1.1	1.1	1.1	0.7	0.2	0.0

kV = kilovolt(s).

Impact Assessment

As noted above, a significant amount of the land within the SCS has been developed, resulting in tree and other vegetation removal that has reduced riparian habitat along Broad Run and its tributaries. As discussed in Section 5.1.6.2, additional projects are planned to occur within the SCS, which would further reduce the habitat. Golden-Mars Routes 1 and 5 cross 0.4 mile less of the SCS and would therefore have a smaller construction footprint within the resource than Routes 2, 3, and 4; however, each Golden–Mars route alternative leverages existing transmission infrastructure as a routing opportunity across the SCS to the extent feasible, which would minimize additional fragmentation impacts within the resource.

The Project would span waterbodies and would require no instream work in Broad Run. Therefore, with adherence to applicable state/local erosion and sediment control requirements and stormwater management laws and regulations, it is unlikely that Project construction or operation would impact the Yellow lampmussel, regardless of the route alternative selected for construction. Once a route is selected for the Project by the SCC, Dominion will coordinate with VDCR regarding impacts on the SCS.

5.2.2.2 ECOLOGICAL CORES

Existing Conditions

Ecological cores are areas comprising at least 100 acres of continuous interior, natural cover (e.g., forests or woodlands) that provide habitat for a wide range of species, from interior-dependent forest species to habitat generalists. Interior ecological core areas begin 100 meters inside the nearest core edges and continue to the deepest parts of the ecological core. Smaller areas of continuous interior cover (i.e., 10 to 99 acres), called habitat fragments, support ecological cores and provide similar functions and values. Ecological cores and habitat fragments together provide the natural and economic benefits of open space, recreation, water quality (including erosion prevention and drinking water recharge and protection), and air quality (including carbon sequestration and oxygen production). VDCR ranks the integrity of ecological cores from C1 to C5 (see description below) using nine prioritization criteria, including the NHR habitats within the cores. Habitat fragments are similarly classified, although none are ranked above C3 (VDCR 2023a, 2024c).

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

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

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

Based on VDCR data, none of the Project routes cross ecological cores with rankings of C3 or higher. Each of the routes, however, crosses ecological cores with rankings of C4 or C5, as shown in Table 5.2-4. Figure 5.2.2-2 shows that all ecological cores crossed by the routes have been cleared, contain development, or are fragmented by existing utility rights-of-way.

Impact Assessment

Impacts on ecological cores occur when their natural cover is partially or completely converted to developed land uses. Habitat conversion can result in changes that reduce ecosystem processes, biodiversity, population viability, and habitat quality (VDCR 2024c). The VDCR review of the Project found that the Project route alternatives intersect multiple ecological cores with rankings of C4 and C5. Impacts on these cores would occur through tree clearing for the new transmission right-of-way (VDCR 2024c). Based on the recommendation of VDCR, this section does not provide a formal impact analysis of the affected C4- or C5-ranked cores (Gustafson 2024; see Appendix F).

As shown in Table 5.2-4, Routes 1 and 5 would impact the smallest area of ecological cores among the Golden-Mars routes. Routes 1 and 5 primarily cross residential areas and have fewer and shorter crossings of Broad Run and associated riparian corridors, thereby avoiding the ecological cores associated with these riparian areas. Figure 5.2.2-2 shows the locations of each ecological core crossed by the Project route alternatives. As shown on this figure, all ecological cores crossed by the route alternatives contain some amount of developed or cleared areas or are planned for development (refer to Figures 5.1.6-1 and 5.1.6-2 for planned developments). Prior to the Project, the impacted cores have been or will be altered; therefore, the Project is unlikely to create significant impacts on the cores crossed. Additionally, most of the route alternatives are collocated with existing utility rights-of-way or cleared/developed areas to reduce the potential core fragmentation.

TABLE 5.2-4 VDCR-MAPPED ECOLOGICAL CORES CROSSED BY ROUTE ALTERNATIVES

Ecological Cores	Unit	Golden–Mars Route 1	Golden–Mars Route 2	Golden–Mars Route 3	Golden–Mars Route 4	Golden–Mars Route 5	Lockridge 230 kV Loop	Sojourner 230 kV Loop
Outstanding (C1)	acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Very High (C2)	acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0
High (C3)	acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Moderate (C4)	acres	11.8	11.8	11.8	11.8	11.8	0.0	15.7
General (C5)	acres	12.1	23.4	22.4	23.8	12.1	4.8	0.0
Total [a]	acres	23.9	35.2	34.2	35.6	23.9	4.8	15.7

kV = kilovolt(s).

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

5.2.3 PROTECTED SPECIES

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

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

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

- USFWS Information for Planning and Consultation System (IPaC) online system (USFWS n.d.)
- VDCR NHP (VDCR 2024b)
- VDCR Environmental Review (VDCR 2024c)
- VDWR Wildlife Environmental Review Map Service (WERMS) (VDWR 2025b)
- Virginia Fish and Wildlife Information Service (VaFWIS) (VDWR 2025c)
- Center for Conservation Biology (CCB) Eagle Nest Locator (CCB 2022)
- VDWR Little Brown Bat and Tricolored Bat Winter Habitat and Roost Tree Application (VDWR 2025d)
- VDWR Northern Long-eared Bat Regulatory Buffer Interactive Tool (VDWR 2025e)

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

Query results from the VDCR include species known to occur in the area and communities known to historically or currently contain protected species (VDCR 2024a). Query results from IPaC include species that may occur in the study area (USFWS n.d.). Query results from VaFWIS include species known to occur or likely to occur within a 2.0-mile radius of the Project study area (VDWR 2025c). Bald eagle nest data and migratory bird information is provided in the CCB database (CCB 2022). Data for species known to occur within the rights-of-way of the various Project route alternatives were retrieved using queries of the VDWR WERMS.

5.2.3.1 FEDERAL- AND STATE-LISTED THREATENED AND ENDANGERED SPECIES

To protect and recover imperiled species and the ecosystems they depend on, Congress passed the federal ESA in 1973, which states that T&E plant and animal species are of aesthetic, ecological, educational, historic, and scientific value to the U.S., and protection of these species and their habitats is required. The ESA is administered by both the NOAA and USFWS. It protects

fish, wildlife, plants, and invertebrates that are federally listed as endangered or threatened by prohibiting the "take" of these species and the interstate or international trade of the species, including their parts and products, unless federally permitted.

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

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

Under the Virginia Endangered Plant and Insect Species Act (2 VAC 5-320-10), the taking or possession of endangered or threatened plant and insect species is prohibited. The VDCR represents the Virginia Department of Agriculture and Consumer Services, which is responsible for state-listed plants and insects, in providing comments regarding potential impacts on these species.

ERM database queries identified multiple federal- and state-listed T&E species within and adjacent to the study area. Federal-listed and federal-proposed species include Northern long-eared bat (NLEB; *Myotis septentrionalis*), Dwarf wedgemussel (*Alasmidonta heterodon*), Tricolored bat (TCB; *Perimyotis subflavus*), Green floater (*Lasmigona subviridis*), and Monarch butterfly (*Danaus plexippus*). Of these federal-listed and federal-proposed species, the Monarch butterfly was the only species identified that was not also state-listed. Three additional state-listed species (which are not federally listed) identified by the queries include: Wood turtle (*Glyptemys insculpta*), Henslow's sparrow (*Centronyx henslowii*), and Torrey's mountain-mint (*Pycnanthemum torreyi*).

ERM reviewed the potential for each federal- and state-listed species to occur within and adjacent to the route alternatives. Table 5.2-5 provides information on the federal- and state-listed species with potential to occur in the study area and/or within a 2.0-mile buffer around the study area.

TABLE 5.2-5 FEDERAL- AND STATE-LISTED SPECIES POTENTIALLY OCCURRING IN THE STUDY AREA

Common Name	Scientific Name	Status [a]	Global Rank [b]	Habitat	Source	Confirmed Presence [c]
Mammals						
Northern long-eared bat	*Myotis septentrionalis*	FE, ST	G2	Generally associated with old growth or late successional interior forests. Partially dead or decaying trees are used for breeding, summer day roosting, and foraging. Hibernation occurs primarily in caves, mines, and tunnels.	IPaC VDWR—Winter Habitat and Roost Tree Map VDWR—NLEB Regulatory Buffer Interactive Tool	No
Tricolored bat	*Perimyotis subflavus*	FPE, SE	G3	Typically roost in trees near forest edges during summer. Hibernate deep in caves or mines in areas with warm, stable temperatures during winter.	IPaC VaFWIS VDWR—Winter Habitat and Roost Tree Map	Yes
Invertebrates						
Dwarf wedgemussel	*Alasmidonta heterodon*	FE, SE	G1	Large rivers and small streams, often burrowed into clay banks among the root systems of trees; also associated with mixed substrates of cobble, gravel, and sand.	IPaC	No
Green floater	*Lasmigona subviridis*	FPT, ST	G3	Small to medium streams in quiet pools and eddies with gravel and sand substrates.	IPaC	No
Monarch butterfly	*Danaus plexippus*	FPT	G4	Habitat generalists that rely on flowering plants. Require milkweed to lay eggs and for reproduction and the caterpillar stage.	IPaC	No
Reptiles						
Wood turtle	*Glyptemys insculpta*	ST	G3	Forested floodplains, fields, wet meadows, and farmland with a perennial stream nearby.	VaFWIS	Yes
Birds						
Henslow's sparrow	*Ammodramus henslowii*	ST	G4	Open grasslands with few or no woody plants and tall dense grasses and litter layer.	VaFWIS	Yes
Plants						

Common Name	Scientific Name	Status [a]	Global Rank [b]	Habitat	Source	Confirmed Presence [c]
Torrey's mountain-mint	*Pycnanthemum torreyi*	ST	G2	Dry, rocky or sandy woodlands and clearings. Occur on both extremely acidic and strongly basic substrates.	VDCR	No

Sources: USFWS n.d.; VDCR 2024c; VDWR 2025c, 2025d, 2025e; Digital Atlas of the Virginia Flora 2024.

IPaC = Information for Planning and Consultation; VaFWIS = Virginia Fish and Wildlife Information Service; VDCR = Virginia Department of Conservation and Recreation; VDWR = Virginia Department of Wildlife Resources.

[a] Federal/State Status:

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

[b] Global Rank:

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

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

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

G4 Apparently Secure: Uncommon but not rare; some cause for long-term concern due to declines or other factors

G5 Secure: Common, widespread, and abundant

[c] Indicates whether there is confirmed presence of the species within the Project's study area or within the 2.0-mile buffer from those study area.

Federal-Listed Species

As shown in Table 5.2-5, ERM identified two federally listed species and three species with a proposed federal-listing that may potentially occur within the study area. The Monarch butterfly was the only species identified that was not also state-listed. While all five of these species were identified by either the IPaC database or VaFWIS database as having potential occurrence within a 2.0-mile search radius of the study area boundary, only the TCB has occurrences confirmed within this buffer. The TCB was observed on the Dulles Airport property in July 2022, approximately 1.0-mile southwest of the study area boundary (VDWR 2025c).

Potential summer foraging habitat for the NLEB and TCB in the study area includes multiple forested areas along each route. VDWR's online mapping of winter habitat and roost trees shows no summer habitat (i.e., maternity roosts), winter habitat (i.e., hibernacula), or roost trees for NLEB or TCB within the route alternatives (VDWR 2025d, 2025e).

State-Listed Species

As shown in Table 5.2-5, ERM identified three state-listed species that are not also federally listed species (Wood turtle, Henslow's sparrow, and Torrey's mountain-mint) that may potentially occur within the study area. The Wood turtle and Henslow's sparrow have been documented within the 2.0-mile search radius around the study area.

The VaFWIS database confirmed the presence of the Wood turtle within the 2.0-mile search radius for the Project. The closest occurrence was recorded approximately 0.4 mile east of the study area, near the intersection of South Sterling Boulevard and West Maple Avenue (VDWR 2025c).

The Virginia Breeding Bird Atlas Survey recorded the presence of Henslow's sparrow in 1986 within the Arcola, SE Atlas Quadrangle Block and in 1988 within the Herndon, NW Atlas Quadrangle Block. The Arcola, SE block is approximately 2.0 miles southwest of the study area, and the Herndon, NW block is northwest of Dulles Airport, near the center of the study area (VDWR 2025c). Henslow's sparrow habitat is sparsely present across each of the route alternatives.

Impact Assessment

Table 5.2-5 provides information on the eight federal-listed and/or state-listed species identified as potentially occurring within the study areas and/or within a 2.0-mile radius of the study area. Potential habitat exists for all eight species along the route alternatives; however, the VaFWIS and WERMS data show that only the TCB, Wood turtle, and Henslow's sparrow have been confirmed within the study area or 2.0-mile radius of the study area boundary.

While VDWR's Winter Habitat and Roost Tree Application and Regulatory Interactive Tool does not document any occurrences of federal- and state-listed bat hibernaculum (winter habitat) within a 2.0-mile radius of the study area, the TCB was observed along the southwest boundary of the study area (VDWR 2025c, 2025d, 2025e). Summer foraging habitat for this species is likely present within forested habitats crossed by each route alternative. No impacts on these bat species are anticipated for any route alternative if trees are cleared during the winter according to VDWR time-of-year restrictions (TOYRs).

ERM's review accounted for regulatory changes and requirements associated with the USFWS uplisting of the NLEB from federally threatened to federally endangered. On October 15, 2024, USFWS issued the NLEB Final Guidance for development projects. The USFWS Interim Guidance for the NLEB expired on November 30, 2024, and the Final Guidance for NLEB took effect.

The review also accounted for regulatory changes and requirements associated with TCB and the proposed USFWS listing of this species as federally endangered. The Company is anticipating the TCB will be listed; therefore, it assumes any regulatory changes associated with the potential listing of the TCB will affect this Project. On September 14, 2022, the TCB was proposed to be listed as Endangered by the USFWS (USFWS 2022). USFWS extended its Final Rule issuance target from September 2023 to the end of 2024. At this time, the TCB Final Rule has not been issued.

In October 2024 USFWS issued a final NLEB and TCB Range-wide Determination Key (DKey) to allow project proponents to assess project impacts, practicable avoidance and minimization measures, and consultation requirements under the final NLEB guidance and the eventual TCB listing ahead of the final decision. The Company will use the DKey to further assess project impacts and determine appropriate avoidance and minimization measures to ensure compliance with state and federal regulations when the Project enters permitting.

The Monarch butterfly was federally proposed as threatened in December 2024 and a 90-day public comment period that ended on March 12, 2025 (USFWS 2024b). Potential Monarch butterfly habitat exists within the study area, along the edge of development and open spaces. Permanent impacts to butterfly habitat would be limited to structure placement because the rights-of-way would be maintained to allow for flowering vegetation and milkweed plants necessary for the survival of the Monarch butterfly.

While none of the routes cross the area where the Wood turtle was documented in 2022, 2015, and 1998, the route alternatives cross potentially suitable habitat where they cross streams and wetlands. The Project would not require instream construction activities but would require tree clearing within the right-of-way in forested floodplains adjacent to waterbodies. Coordination with the VDWR may be needed to determine if surveys and/or construction timing windows are warranted for the Project to avoid the Wood turtle.

Although suitable habitat may be present near the route alternatives, Henslow's sparrow has not been documented in the area in the last few decades. The species prefers open grasslands for habitat, whereas most of the landcover crossed by the routes is forested or developed. Therefore, it is unlikely that the Project would impact Henslow's sparrow.

The presence of Torrey's mountain-mint, Dwarf wedgemussel, and Green floater was not confirmed within 2.0 miles of the study area. Due to development in the region, it is unlikely that suitable habitat is present for Torrey's mountain-mint. To the degree that tree and vegetation clearing reduces shade along streambanks, the Project could result in increased water temperatures, which could adversely impact Dwarf wedgemussel and Green floater, if present. The Company will employ BMPs before, during, and after construction to control erosion and sediment runoff, prevent stream and groundwater flow changes, and reduce adverse impacts on aquatic and riparian habitat.

Regardless of the route alternative selected for the Project, Dominion will coordinate with state and federal agencies as needed to determine if surveys, construction TOYRs, or other mitigation would be required to mitigate potential impacts on threatened or endangered species.

5.2.3.2 BALD EAGLE MANAGEMENT

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

While the Bald eagle is no longer federally listed under the ESA and was de-listed from the Virginia List of T&E Species in 2013, the species remains protected under the federal Bald and Golden Eagle Protection Act and Migratory Bird Treaty Act, as well as Va. Code § 29.1-521 and VDWR regulations (4 VAC 15-30-10). *The Management of Bald Eagle Nests, Concentration Areas, and Communal Roosts in Virginia: A Guide for Landowners*, issued by the then Virginia Department of Game and Inland Fisheries (now VDWR) identifies management practices for avoiding the take of Bald eagles and outlines restrictions on construction activities within defined management zones. Proposed activities that have the potential to affect Bald eagles are evaluated by the VDWR on a case-by-case basis (Virginia Department of Game and Inland Fisheries 2012).

ERM reviewed current eagle datasets in Virginia, including Eagle Concentration Areas and individual Bald eagle nests, available from the CCB VaEagles website (CCB 2022) and the CCB's annual eagle nest survey. ERM also reviewed Bald eagle data provided through the VaFWIS and WERMS databases. Current CCB and VDWR data show that the study area is not within an Eagle Concentration Area. The eagle nest nearest to the Project (Nest ID LD1901) is along Broad Run, south of the intersection of Waxpool Road and Loudoun County Parkway, about 400 feet southeast of the right-of-way for the common alignment of the Golden–Mars Lines (see Figure 3.2-1). According to the CCB, this nest was last observed to be occupied in 2023 (CCB 2022).

Impact Assessment

The VDWR provides activity-specific guidelines for work within 330-foot and 660-foot buffer zones surrounding a known Bald eagle nest. Nest ID LD1901 is within the 660-foot buffer of the Project. Dominion will work with the VDWR and other appropriate jurisdictional agencies to minimize any impacts on the species.

5.2.3.3 OTHER SPECIES OF INTEREST

Other species of interest when evaluating projects typically include rare plants and animals that are not afforded the same level of protection as federal- and state-listed T&E species. NatureServe, an international network of NHPs, assigns a global rank to species based on their rarity and conservation status (NatureServe 2024). Species ranked "G1" (global rank 1/critically imperiled) or "G2" (global rank 2/imperiled) are most at risk. State rankings are similar (S1 and S2) but only indicate the status of the species within Virginia. The VDCR continually catalogues,

gathers, and analyzes geographic information about Virginia's rare species to develop land conservation data, provide online mapping tools, and help resource agencies make conservation decisions.

As part of their November 2024 review, VDCR concluded that the Project as planned would not affect any documented state-listed insects and does not cross any state natural area preserves under VDCR's jurisdiction. VDCR indicated a potential for several rare plant species and one invertebrate species to occur in the study area if suitable habitat is present (VDCR 2024c). Table 5.2-6 lists these species and describes their habitats.

TABLE 5.2-6 RARE SPECIES WITH THE POTENTIAL TO OCCUR IN THE STUDY AREA

Common Name	Scientific Name	Status	Global Rank	State Rank	Habitat
Invertebrates					
Yellow lampmussel	*Lampsilis cariosa*	None	G3/G4	S2	Larger streams and rivers with moderate currents over sand/gravel substrates; small creeks/ponds.
Plants					
Earleaf false foxglove	*Agalinis auriculata*	None	G3	S1	Clearings and old fields on soils weathered from diabase. Known only from the Culpeper Basin of Fairfax and Prince William counties.
American bluehearts	*Buchnera americana*	None	G5?	S1/ S2	Seasonally moist to dry soils of barrens, clearings, old fields, meadows, and roadsides. In the Piedmont region, the species occurs on calcareous or mafic substrates.
Downy phlox	*Phlox pilosa*	None	G5	S1	Dry to less often mesic open forests, clearings, and road banks. Occurs in rocky or clay hardpan soils.
Stiff goldenrod	*Solidago rigida var. rigida*	None	G5	S2	Dry, rocky woodlands, barrens, and outcrops. Also located in clearings and old fields in areas that once supported vegetation with prairie affinities. Strictly located on calcareous or mafic substrates (limestone, dolostone, metabasalt, amphibolite, diabase, and calcareous shales).
Hairy hedgenettle	*Stachys arenicola*	None	G4?	S1	Fens, wet meadows, power-line clearings, and depression swamps on soils weathered from carbonate or basic intrusive rocks. Moderately shade-intolerant.

Source: VDCR 2024c, Digital Atlas of the Virginia Flora 2024.

Global Rank:
G1: Critically Imperiled: At very high risk of extinction due to extreme rarity (often five or fewer populations), very steep declines, or other factors
G2: Imperiled: At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors
G3: Vulnerable: At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors
G4: Apparently Secure: Uncommon but not rare; some cause for long-term concern due to declines or other factors
G5: Secure: Common, widespread, and abundant
* Global ranks followed by a question mark denote inexact or uncertain ranking by the VDCR
State Rank:

S1: Critically Imperiled: At very high risk of extirpation in the jurisdiction due to very restricted range, very few populations or occurrences, very steep declines, severe threats, or other factors
S2: Imperiled: At high risk of extirpation in the jurisdiction due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors
S3: Vulnerable: At moderate risk of extirpation in the jurisdiction due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors
S4: Apparently Secure: At a fairly low risk of extirpation in the jurisdiction due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors
S5: Secure: At very low or no risk of extirpation in the jurisdiction due to a very extensive range, abundant populations or occurrences, with little to no concern from declines or threats

Impact Assessment

Based on the above discussion, one invertebrate and five rare plants could potentially occur within the study area (VDCR 2024c). The Yellow lampmussel is the species associated with the Broad Run—Rt. 607 SCS, as mentioned in Section 5.2.2.1. It occurs in sand and gravel substrates within larger streams or rivers and in small creeks and ponds (VDCR 2024c). While the Project would require no instream construction, reduced shade along the streambank due to right-of-way clearing could increase water temperatures, potentially impacting the presence of the Yellow lampmussel. To avoid impacts on the aquatic environments that could support this species, the Company will adhere to applicable state and local erosion and sediment control/stormwater management laws and regulations and will coordinate with VDWR, if needed, to determine if surveys and/or construction timing windows are warranted for the Project.

Habitat requirements for all five plant species typically include semi-open diabase glades and prairies. Table 5.2-7 quantifies the acreage of diabase soil within the right-of-way of each alternative and Figure 5.2.2-3 shows the locations of diabase soils in the study area. Site-specific field investigations are necessary for detailed habitat and impact analyses. In suitable habitat types that meet specific habitat requirements for any of these rare plant species, VDCR recommends conducting detailed plant inventories and coordinating with VDCR biologists to minimize habitat impacts. If suitable habitat conditions for these species are identified within the Project, the Company will work with the VDCR and appropriate regulatory agencies to minimize impacts on rare plants and/or rare plant habitat.

TABLE 5.2-7 ACRES OF DIABASE SOILS CROSSED BY ROUTE ALTERNATIVES

Golden-Mars Route 1	Golden-Mars Route 2	Golden-Mars Route 3	Golden-Mars Route 4	Golden-Mars Route 5	Lockridge 230 kV Loop	Sojourner 230 kV Loop
3.5	4.3	1.9	3.8	3.5	0.0	0.0

kV = kilovolt(s).

While each Golden-Mars route crosses diabase soils, Route 2 crosses the most and Route 3 the least. Due to the prevalence of forested land, developed land, and lack of suitable habitat along the routes, it is unlikely that rare plant species would occur in the study area.

5.2.4 VEGETATION

5.2.4.1 LOCAL VEGETATION CHARACTERISTICS

The study area is situated within the Northern Piedmont physiographic province. Upland forest vegetation in this province has been extensively altered by clearing as part of ongoing agricultural and silvicultural practices and development. This has resulted in a patchwork of forested and developed land in the study area. Forest clearing has occurred across a large portion of land within the study areas in the last 20 years. Much of the vegetation in the study area consists of immature mixed pine (*Pinus spp*.), hardwood forest types, and forested "edge" communities. Small areas of open space within the study area are generally associated with lawns on residential and commercial parcels.

As noted in Section 5.1.2, ERM used a combination of local and statewide datasets along with aerial photo interpretation to identify the land use and land cover along the route alternatives (NAIP 2023, VGIN 2024). Table 5.2-8 summarizes the extent of forested and open space (herbaceous) vegetation types crossed by the route alternatives. Figure 5.1.2-1 depicts land use/land cover types, including forested areas, along the routes.

TABLE 5.2-8 ACREAGE OF VEGETATION TYPES CROSSED BY THE PROJECT

Vegetation Cover Type	Golden-Mars Route 1	Golden-Mars Route 2	Golden-Mars Route 3	Golden-Mars Route 4	Golden-Mars Route 5	Lockridge 230 kV Loop	Sojourner 230 kV Loop
Forest [a]	44.8	59.2	61.0	61.5	43.7	4.4	23.2
Open Space	42.4	31.6	20.3	19.2	46.8	0.3	4.3
Total [b]	**87.2**	**90.8**	**81.3**	**80.7**	**90.4**	**4.8**	**27.5**

Sources: VGIN Land Cover data with aerial photo interpretation by ERM (NAIP 2023, VGIN 2024).

kV = kilovolt(s).

[a] Forested acreage for the Golden-Mars Routes reduced by 5.5 acres to account for the permitted clearing and construction under the priorly approved Digital Dulles datacenter development. Trees would be cleared prior to Project construction.

[b] Totals may not match the sum of the addends due to rounding.

Forested vegetation in the study area generally is associated with relatively small contiguous tracts of trees found in upland forests. These forests contain both deciduous hardwood stands and evergreen/mixed forests that include Shortleaf pine (*Pinus echinata*), Loblolly pine (*Pinus taeda*), and Virginia pine (*Pinus virginiana*) where the land has been altered by human activities (VDCR 2021a).

5.2.4.2 FOREST CONSERVATION VALUES

The Forest Conservation Values (FCV) model is a tool designed by the Virginia Department of Forestry to strategically identify the highest priority forestland for conservation in Virginia (VDCR 2023b, VDOF 2020). The intent is to maximize the efficiency of limited resources by focusing conservation efforts on the highest quality, most productive, and most vulnerable forestland statewide. The FCV model identifies five conservation values:

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

ERM reviewed FCV data to assess the value of forest vegetation along the route alternatives. Upon reviewing recent aerial photography, ERM found that many recently cleared areas have been ranked using the FCV model data; therefore, the model appears outdated and not reflective of current conditions. Table 5.2-9 summarizes the area of FCV within the right-of-way for each route alternative.

TABLE 5.2-9 FOREST CONSERVATION VALUE ALONG ROUTE ALTERNATIVES

Forest Conservation Value	Unit	Golden-Mars Route 1	Golden-Mars Route 2	Golden-Mars Route 3	Golden-Mars Route 4	Golden-Mars Route 5	Lockridge 230 kV Loop	Sojourner 230 kV Loop
Average (1)	acres	38.2	42.0	43.8	45.6	38.2	4.8	12.3
Moderate (2)	acres	2.8	16.9	14.9	14.3	2.8	0.0	0.0
High (3)	acres	0.0	0.6	0.6	0.6	0.0	0.0	0.0
Very High (4)	acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Outstanding (5)	acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total [a]	acres	**41.1**	**59.5**	**59.3**	**60.5**	**41.1**	**4.8**	**12.3**

kV = kilovolt(s).

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

5.2.4.3 IMPACT ASSESSMENT

The Company would clear forested vegetation from the right-of-way, which would be subsequently maintained with an herbaceous cover during Project operations. Vehicle movement associated with construction of the transmission line in open areas would temporarily impact herbaceous vegetation. Impacts on vegetation within open space would be limited to transmission structure footprints along the routes, temporary construction impacts, and intermittent mowing required for maintenance access. Disturbed areas resulting from use of temporary workspace would revert to preconstruction vegetative conditions.

As shown in Table 5.2-9, none of the Project route alternatives would cross FCV with rankings of very high or outstanding. Routes 1 and 5 cross the smallest extent of FCV ranked as average or moderate and avoid FCV ranked as high. Routes 2, 3, and 4 cross the largest extent of FCV ranked as average or moderate and each cross a small area of FCV ranked as high. Thus, while all the routes avoid forested vegetation with the highest FCV rankings, Routes 2, 3, and 4 would have greater impact on average, moderate, or high ranked FCV forested land.

5.3 VISUAL RESOURCES

Visual resources capture the combination of natural landforms, vegetation, water features, and human modifications that characterize and contribute to a landscape's visual quality. This section identifies important visible features (e.g., natural and/or cultural resources that contribute to scenic quality) and elements (i.e., forms, lines, colors, textures, etc.) of the surrounding landscape as the basis for determining how and to what degree the Project will affect visual resources. Appendix G provides more detailed information about existing visual conditions and visual impacts.

5.3.1 METHODOLOGY

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

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

The visual impact approach in this section draws on established techniques for describing existing landscape characteristics and identifying the potential changes or contrasts created by proposed

surface-disturbing activities, including (but not limited to) the Bureau of Land Management's Visual Resource Management system (BLM 1984), U.S. Forest Service's Scenery Management System (USFS 1995), and Federal Highway Administration's Visual Impact Assessment for Highway Projects (FHWA 2015).

5.3.2 EXISTING CONDITIONS

The Project study area is in eastern Loudoun County. This mixed urban residential, industrial, and commercial area is within the Piedmont physiographic province and is characterized by gently rolling topography, including the Broad Run floodplain. The Project study area is characterized by gently sloped hills, many of which have been graded to allow for development, and upland and forest ecosystems, remnants of which are generally found in local parks and other open spaces (VDCR 2021b). The densely urban portion of the Project study area is a mixture of residential, commercial, and industrial uses, including data centers. Viewing distances are generally constrained to the foreground (up to 0.5-mile) and middle ground (0.5 to 2 miles), due to topography (e.g., a lack of elevated areas that provide panoramic views) and buildings and other structures that screen more distant views. Appendix G provides additional detail on the existing visual resource setting in the Project study area.

5.3.2.1 REGULATORY SETTING

The Virginia Outdoors Plan includes guidance on scenic resources in the state (VDCR 2018). In general, VDCR defers to local governments for the protection and management of scenic resources; however, VDCR works with local governments and other stakeholders on scenic resources with statewide importance through the Virginia Scenic Rivers Program and Virginia's Byways. There are no designated Virginia Scenic Rivers or Scenic Byways in the study area.

The General Plan's Historic, Archaeologic, and Scenic Resources policies focus on the preservation of scenic corridors, scenic rivers, and natural features and the enhancement of landscape and scenic resources through community action, public/private acquisition, conservation easements, and the use of corridor management plans to preserve scenic quality with the viewsheds of scenic rivers (Loudoun County 2023b). The Loudoun County Zoning Ordinance does not identify scenic resource objectives and/or established thresholds (or criteria) for what constitutes a significant impact to scenic resources (Loudoun County 2023c). In the absence of a local regulatory framework for assessing visual resources, ERM visual resource specialists based the visual resource assessment in this Routing Study on commonly used federal systems and best practices noted above.

5.3.2.2 VISUALLY SENSITIVE RESOURCES

VSRs are sites or areas where existing scenic qualities are susceptible to and could be impacted by a proposed project. Common examples of VSRs include designated scenic resources (e.g., scenic byways, rivers, overlooks, and landscapes), residential areas, parks and other recreational sites, historic sites, conservation areas and other open spaces, natural features, cultural destinations, road corridors, and areas of high public concentration. VSRs are typically identified based on designated scenic protections and/or the expectation of scenic quality, public visibility, and the level of viewer sensitivity to change.

Table 5.3-1 lists (and Figure 5.3.2-1 shows the location of) the VSRs in the study area, including locations or features where views contain unique scenic qualities, sensitive viewsheds, and/or areas where a project's components and any associated vegetation clearing would likely contrast with the surrounding landscape. Section 5.4 discusses potential Project visibility from and visual impacts on historic and cultural resources. Section 5.1.8 discusses the Project's impacts on recreational resources. Section 5.1.9 discusses the Project's impacts on cemeteries, schools, and places of worship. Appendix H provides detailed descriptions of existing conditions and impacts at each KOP. The VSR tables also include the primary viewer groups—defined in Section 5.3.2.3—at each VSR.

While VSRs capture regionally important scenic resources, they may not have views of the Project. Appendix G discusses potential regional visibility and exposure to potential changes in visual landscape elements from the Project.

5.3.2.3 VIEWER GROUPS

The way that viewer groups perceive visual resources provides additional context for assessing a project's potential impacts on the visual elements and features of a landscape. Viewer groups identified for the study area (and included in Table 5.3-1) are described below. Individuals may fall into one or more viewer group categories, depending on the context of the view. For example, a local resident may also be considered a commuter as they travel to their job

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

TABLE 5.3-1 VISUALLY SENSITIVE RESOURCES AND USER GROUPS

VSR #	VSR Name	VSR Description	Primary Viewer Group(s) [a]
Educational Resources (Schools)			
1	Legacy Elementary School	Public elementary school (Kindergarten through 5th grade) with associated playground and athletic fields.	L, R
2	Primrose School at Moorefield Station	Private school for infants through Kindergarten	L
3	Rock Ridge High School	Public high school (9th through 12th grade) with associated athletic fields.	L, R
4	Rosa Lee Carter Elementary School	Public elementary school (Kindergarten through 5th grade) with associated playground and athletic fields.	L, R
5	Stone Hill Middle School	Public middle school (6th through 8th grade) with associated athletic fields.	L, R
Places of Worship & Cemeteries			
6	Mankin Cemetery	Cemetery at the southwest corner of Evergreen Ridge Drive and Hopewell Manor Terrace.	L
Recreational Resources (see Section 4.1.7)			
7	1757 Golf Club	Private golf club with an 18-hole golf course and event center.	R
8	Brambleton Park and Lake Birchwood	Local park with fishing pier, trails, outdoor fitness stations, and playground within the Birchwood at Brambleton subdivision.	L, R
9	Broad Run Stream Valley Park	Forested park owned by Loudoun County, located along Broad Run through the Loudoun Valley Estates subdivision. The Broad Run Trail runs generally north-south along this linear park corridor.	R
10	Broad Run Trail	Partially paved, approximately 3.2-mile trail located between and roughly parallel to Broad Run and Loudoun County Parkway. The trail follows the county's Broad Run Stream Valley Park and extends north towards Loudoun County Parkway, bordering the Loudoun Valley Estates Subdivisions.	R
11	Creekside Park	Local park with a tennis court, basketball court, and playground maintained by the Loudoun Valley Estates II HOA.	L, R
12	Evermoore Neighborhood Park	3.5-acre Loudoun County Park featuring an amphitheater, pavilion, picnic area, dog park, playground, paved paths, and open fields.	L, R
13	Fair Ridge Pool and Community Playground	Private pool and playground operated by the Loudoun Valley Estates II HOA.	L, R

VSR #	VSR Name	VSR Description	Primary Viewer Group(s) [a]
14	Grandmoore Park	Community park consisting of wooded and landscaped areas with a paved multi-use path along a stream near the Westmoore subdivision.	L, R
15	Hemmingford Circle Park	Landscaped area with paved walking path within the Loudoun Valley Estates subdivision.	L, R
16	Highland Park	Local park with a playground maintained by the Loudoun Valley Estates II HOA, between Barnstead Drive and Broadrun Meadow Circle, northeast of Evergreen Ridge Drive.	L, R
17	Loudoun County Parkway Trail	Paved, non-motorized path parallel to and on the southeast side of Loudoun County Parkway.	L, R
18	Loudoun Valley Pool	Private pool operated by the Loudoun Valley Estates II HOA on the north side of Barnstead Drive, northeast of Evergreen Ridge Drive.	L, R
19	Lyndora Park	17-acre Loudoun County Park featuring a multi-use trail, wooded areas, athletic fields, picnic area, and playground within the Loudoun Valley Estates II subdivision. The park's multi-use trail connects to Broad Run Trail.	L, R
20	Old Ox Road Multi-use Path	Paved, non-motorized path parallel to and on the northwest side of Old Ox Road.	R
21	Southview Park	Local park with a tennis court, basketball court, and playground maintained by the Loudoun Valley Estates II HOA.	L, R
22	Valley Falls Community Park	Local park managed by the Loudoun Valley Estates II HOA with forested area and paved trails.	L, R
23	Washington & Old Dominion Trail	Former railroad grade between Shirlington and Purcellville, converted to a paved, non-motorized trail and parallel unpaved trail for horseback riding.	L, R
Road Corridors [b]			
24	Creighton Road/Evergreen Ridge Drive	Four-lane, divided road with at-grade intersections. Creighton Road AADT is approximately 8,000 VPD; AADT data are not available for Evergreen Ridge Drive.	L, M, W
25	Rt. 28	Six-lane, controlled access freeway with entrance and exit ramps at grade-separated interchanges, with AADT of approximately 127,000 VPD north of Waxpool Road.	L, M, W
26	Dulles Greenway	Six-lane, controlled access, divided toll freeway with grade-separated interchanges with AADT of approximately 38,000 VPD.	L, M, W
27	Loudoun County Parkway	Four- to six-lane divided highway with at-grade intersections and AADT of approximately 19,000 VPD.	L, M, W

VSR #	VSR Name	VSR Description	Primary Viewer Group(s) [a]
28	Old Ox Road	Four-lane divided highway with at-grade intersections and AADT of approximately 30,000 VPD.	L, M, W
29	Waxpool Road	Six-lane divided highway with at-grade intersections and AADT of approximately 61,000 VPD.	L, M, W
Areas of High Public Concentration			
30	Ashburn CDP	2023 population of 45,551	L, M, W
31	Brambleton CDP	2023 population of 23,999	L, M, W
32	Moorefield CDP	2023 population of 5,528	L, M
33	Birchwood at Brambleton Subdivision	Subdivision with townhomes and condominiums on the west side of Loudoun County Parkway, south of Creighton Road.	L
34	Dulles Parkway Condos	Condominium complex on the southeast side of Centergate Drive, north of Loudoun County Parkway.	L
35	Loudoun Parkway Center	Subdivision of single-family homes and multi-family residences on the south side of Loudoun County Parkway, west of Barrister Street and bordering the east side of Loudoun Valley Estates I subdivision.	L
36	Loudoun Valley Estates I, II, and III Subdivisions	Large subdivisions each consisting of single-family homes, townhomes, and condominiums located along the Loudoun County Parkway corridor between Hamilton Chapel Terrace and Creighton Road / Evergreen Ridge Drive.	L
37	Moorefield Station Subdivision	Subdivision consisting of townhomes located north of Loudoun County Parkway and Ryan Road, west of Dulles Greenway and Vinegar Hill Drive. Includes Old Ryan Road residences and the southern portion of Mooreview Parkway northwest of Loudoun County Parkway.	L, W

Sources: U.S. Census Bureau 2024 (population data); VDOT 2024 (AADT data).

AADT = annual average daily traffic; ACS = American Community Survey; CDP = Census Designated Place; HOA = homeowners association; Rt. = Virginia State Route; VSR = visually sensitive resource.

[a] Viewer Groups (see Section 5.2.2.3): L = local area residents; M = motorists, commuters, and through travelers; R = recreationists; W = workers

[b] AADT includes total daily traffic volume—expressed as vehicles per day—in both directions.

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

5.3.2.4 KEY OBSERVATION POINTS

In addition to considering the existing landscape characteristics across broader geographic areas through the lens of VSRs, ERM identified 22 KOPs to document location-specific existing conditions and anticipated changes due to Project construction and operation. Table 5.3-2 describes the location and justification for including each KOP in this analysis. The KOPs for the Project were selected because they:

- Illustrate visibility from specific VSRs (not every VSR has a corresponding KOP);
- Illustrate representative views that would be available to identified user groups;
- Illustrate the route alternatives and substations; and
- Provide views of Project structures and vegetative clearing.

Appendix G provides a more detailed description of existing conditions at these KOPs, an assessment of changes in visual conditions due to the Project, photographs of existing conditions, and photographic simulations of the proposed Project. Figure 5.3.2-2 shows KOP locations.

TABLE 5.3-2 KEY OBSERVATION POINTS

KOP #	Location	Reason for Inclusion	Viewer Groups Represented [a]	Project Component(s) Represented [b]
201	View looking south from the parking lot of the 1757 Golf Club	Example of the proposed right-of-way (with clearing) through a suburban mixed industrial and commercial area. Representative of VSRs 1757 Golf Club and Waxpool Road.	L, R	GM 1–5
202	View looking south from Loudoun County Parkway Trail	Example of proposed right-of-way (with clearing) through a suburban residential and commercial landscape. Representative of VSRs Loudoun County Parkway Trail and Moorefield Station Subdivision	L, R	GM 1 and 5
203	View looking northwest from Loudoun County Parkway Trail.	Example of the proposed right-of-way (with clearing) through a suburban landscape along Loudoun County Parkway. Representative of VSRs Broad Run Trail and Loudoun County Estates I Subdivision.	L, R	GM 1
204	View looking south from Lyndora Park	Example of the proposed right-of-way (with clearing) through a suburban landscape. Representative of VSRs Lyndora Park and Loudoun County Estates I Subdivision.	L, R	GM 2–4
205	View looking southeast from residential recreation path at the southern end of Lamoreaux Landing Square	Example of the proposed right-of-way (with clearing) through a partially wooded area south of Loudoun Parkway Center Subdivision. Representative of VSR Loudoun Parkway Center Subdivision.	L, R	GM 2–4
206	View looking west from Loudoun County Parkway Trail	Example of the proposed right-of-way (with clearing) through a suburban landscape along Loudoun County Parkway. Representative of VSRs Loudoun County Parkway and Trail.	L, M, R, W	GM 1, 2, and 5
207	View looking southeast from Broad Run Trail	Example of the proposed right-of-way (with clearing) through a suburban and forested landscape. Representative of VSRs Broad Run Stream Valley Park and Loudoun Valley Estates II Subdivision	L, R	GM 2 and 3
209 (South)	View looking southeast from the top of the east bleachers at the Rock Ridge High School stadium	Example of the proposed right-of-way (with clearing) through a suburban residential and wooded area south of the school. Representative of VSR Rock Ridge High School.	L, R, W	GM 4

KOP #	Location	Reason for Inclusion	Viewer Groups Represented [a]	Project Component(s) Represented [b]
209 (West)	View looking west from the top of the east bleachers at the Rock Ridge High School stadium	Example of the proposed right-of-way (with clearing) along Brough Run west of the school. Representative of VSR Rock Ridge High School.	L, R, W	GM 3
211	View looking south from Loudoun County Parkway Trail	Example of the proposed right-of-way (with clearing) through a wooded suburban landscape along Loudoun County Parkway. Representative of VSRs Loudoun County Parkway and Loudoun County Parkway Trail.	L, M, R	GM 1, 2, and 5
212	View looking east from Creekside Park	Example of the proposed right-of-way (with clearing) through a suburban landscape. Representative of VSRs Creekside Park and Loudoun Valley Estates II Subdivision.	L, R	GM 3 and 4
213	View looking northwest from Hemmingford Circle Park	Example of the proposed right-of-way (with clearing) through a suburban landscape. Representative of VSRs Hemmingford Circle Park and Loudoun Valley Estates III Subdivision.	L, R	GM 2–4
214	View looking east from Southview Park	Example of the proposed right-of-way (with clearing) through a suburban residential landscape. Representative of VSR Southview Park and VSR Loudoun Valley Estates II Subdivision.	L, R	GM 1, 2, and 5
216	View looking southeast from Old Ox Road Multi-use Path on the west side of Old Ox Road	Example of the proposed right-of-way (with clearing) through a suburban, commercial, and industrial landscape along Old Ox Road. Representative of VSRs Old Ox Road and Old Ox Road Multi-use Path.	L, M, R	GM 1–5, SL
217	View looking east from path on Lake Birchwood Dam	Example of the proposed right-of-way (with clearing) through a suburban landscape along Loudoun County Parkway. Representative of VSRs Brambleton Park, and Lake Birchwood, and Birchwood at Brambleton Subdivision	L, M, R, W	GM 1, 2, and 5
221	View looking northwest from the W&OD Trail bridge over Rt. 28	Example of proposed substation and right-of-way (with clearing) in a suburban commercial and industrial landscape. Representation of VSRs Washington & Old Dominion Trail and Rt. 28.	L, M, R	GM 1–5
322	View looking northeast from Rock Ridge High School Track and Field—Top of west bleachers	Example of the proposed right-of-way (with clearing) along Broad Run north of the school. Representative of VSR Rock Ridge High School.	L, R, W	GM 2-4

KOP #	Location	Reason for Inclusion	Viewer Groups Represented [a]	Project Component(s) Represented [b]
324	View looking south from the main entrance to Rock Ridge High School	Example of the proposed right-of-way (with clearing) visible from the school facilities. Representative of VSRs Rock Ridge High School and Rosa Lee Carter Elementary School.	L, R, W	GM 4
325	View looking southeast from Hopewell Manor Terrace	Example of proposed right-of-way through a suburban residential landscape along Claiborne Parkway. Example of VSR Loudoun Valley Estates II Subdivision.	R	GM 1, 2, and 5
326	View looking west from the north side of Ryan Road	Example of the proposed right-of-way (with clearing) through a suburban residential landscape along Ryan Road.	L, M	GM 5
327	View looking west from west side of Unison Knoll Circle	Example of the proposed right-of-way (with clearing) through a suburban landscape.	L, M	GM 5
332	View looking east from the intersection of Weybridge Square and Reigate Way	Example of the proposed right-of-way (with clearing) through a suburban residential landscape. Representative of VSR Southview Park and VSR Loudoun Valley Estates II Subdivision.	L, R	GM 3 and 4

KOP = key observation point; Rt. = Virginia State Route; Loop; VSR = visually sensitive resource.

[a] Viewer Groups: L = local/area residents viewer group; M = motorists, commuters, and through travelers; R = recreationists and tourists viewer groups; W = workers viewer groups.

[b] Components Represented: GM = Golden–Mars Route; LL = Lockridge 230 kV Loop; SL = Sojourner 230 kV.

5.3.3 VISUAL IMPACT ASSESSMENT

The degree to which overhead transmission lines influence and are visible on a landscape depends on a number of factors, including (but not limited to) structure height and color, existing landscape features (e.g., topography, vegetation, human-made development), duration of the view, and distances from the viewer. The specific combination of these factors changes from location to location, contributing to a range of potential influences and impacts across the study area. Appendix G provides photographic simulations and a description of visual changes from the proposed Project at each KOP.

5.3.3.1 IMPACT ASSESSMENT FOR VISUALLY SENSITIVE RESOURCES AND KEY OBSERVATION POINTS

Table 5.3-3 and Appendix G describe the Project's impacts on visual resource conditions and indicates the anticipated degree of visual change, viewer sensitivity to changes in visual resource conditions, and an overall impact rating for each VSR (negligible, minor, moderate, major). The degree of visual change and viewer sensitivity are based in part on the assessment of visual change and sensitivity at each KOP (see Appendix G).

5.3.3.2 IMPACT ASSESSMENT BY ROUTE

Table 5.3-4 summarizes the anticipated impacts of each route alternative on visual conditions. This table also provides a potential impact rating (major, moderate, minor, or negligible) for each route. The first subsection below discusses the shared alignments of the Golden–Mars Lines north of the Dulles Greenway and south of Old Ox Road. The remaining subsections discuss the impacts of the individual Golden–Mars routes (not within those shared segments), the Lockridge Loop, and the Sojourner Loop. Table 5.3-4 considers each Golden–Mars route separately, in its entirety.

Golden–Mars Routes 1 through 5

Golden-Mars Routes 1 through 5 would share a common alignment north of the Dulles Greenway and south of Old Ox Road. The northern shared alignment primarily crosses industrial lands within Data Center Alley. Motorists, workers, and recreationists (specifically along the Washington & Old Dominion Trail) would have direct views of the Project where it crosses roads or trails and indirect views in other areas. Regardless of the route selected, the Project would add tall, vertical poles and long, linear, overhead conductors to the landscape and would require some vegetation removal. These new structures would also add cylindrical forms, tall vertical and repeating horizontal lines, and gray hues to the landscape. These elements would be similar to elements associated with multiple existing transmission lines (e.g., Lines #2031, #2149, #2081, #2150, #2152, #2165, #2170, #2188, #2203, #2214, and #2223) and would be consistent with industrial features (such as data centers) that are already typical in the built environment north of the Greenway and South of Old Ox Road.

TABLE 5.3-3 SUMMARY OF ANTICIPATED IMPACTS BY VISUALLY SENSITIVE RESOURCE AND KOP

VSR # and Name		KOP #	Approximate Distance to Relevant Project Features [a]	Summary of Impacts	Impact Assessment
Educational Resources (Schools)					
1	Legacy Elementary School	NA	GM 1, 2, and 5: 0.5-mile east of the front entrance of Legacy Elementary School	The school sits on an open parcel with maintained lawns, a parking lot, and athletic fields to the south and west, respectively. Existing residences and topography screen views to the east. • GM 1, 2, and 5: Minimal to no visibility due to topography, vegetation, and buildings.	Degree of Visual Change: Small Viewer Sensitivity: Medium Overall Impact: Negligible to Minor
2	Primrose School at Moorefield Station	NA	GM 1 and 5: 200 feet southeast of the eastern side of Primrose School.	The school is on a fenced parcel with outdoor playgrounds and a parking lot to the northwest. • GM 1 and 5: Transmission poles and conductors would be prominently visible across Loudoun County Parkway.	Degree of Visual Change: Medium to Large Viewer Sensitivity: Low to Medium Overall Impact: Moderate to Major
3	Rock Ridge High School	209 S 209 W	All measurements are from the south-facing front entrance of Rock Ridge High School. • GM 2 and 3: 0.3-mile north • GM 4: 0.1-mile south	The building is on an open parcel with maintained lawns, parking lots, and athletic fields. Existing vegetation on all sides of the school campus generally blocks distant views. • GM 2 and 3: Existing topography and vegetation likely screen all but the upper portions of the poles. • GM 4: Transmission poles and conductors would be prominently visible across Loudoun Reserve Drive and from the football stadium	Degree of Visual Change: Medium Viewer Sensitivity: Medium Overall Impact: Minor to Moderate
4	Rosa Lee Carter Elementary School	NA	All measurements are from the south-facing entrance of Rosa Lee Carter Elementary School • GM2: 0.3-mile north • GM3:0.1-mile southwest • Golden-Mars Route 4: 0.1-mile south	The school is immediately west of Rock Ridge High School. Athletic fields, playgrounds, and parking surround the building. Dense vegetation largely blocks west-facing views. • GM 2: Existing vegetation largely screens transmission poles and associated infrastructure.	Degree of Visual Change: Medium to Large Viewer Sensitivity: Medium

VSR # and Name		KOP #	Approximate Distance to Relevant Project Features [a]	Summary of Impacts	Impact Assessment
				• GM 3: Existing vegetation largely screens transmission poles and associated infrastructure. The Project will be intermittently visible through the western treeline, and more apparent during leaf-off season. • GM 4: Transmission poles and conductors prominently visible across Loudoun Reserve Drive.	Overall Impact: Moderate to Major
5	Stone Hill Middle School	NA	GM 1, 2, and 5: 0.2-mile west of the south-facing entrance of Stone Hill Middle School	The school sits on an open parcel of land with maintained lawns, parking lots, and athletic fields. • GM 1, 2, and 5: Transmission poles and conductors visible. Although nearby residences partially block the field of sight, flat terrain allows for more distant views.	Degree of Visual Change: Medium Viewer Sensitivity: Low to Medium Overall Impact: Minor to Moderate
Places of Worship & Cemeteries					
6	Mankin Cemetery	NA	GM 1, 2, and 5: 0.1-mile west of the cemetery driveway along Evergreen Ridge Drive	The cemetery is within a fenced area in an otherwise flat parcel. The parcel features well-maintained grass and a driveway to the west. The route would be prominent, especially with noticeable vegetation removal from the southern treeline.	Degree of Visual Change: Medium Viewer Sensitivity: Low to Medium Overall Impact: Moderate
Recreational Resources					
7	1757 Golf Club	201	GM 1 through 5: 0.1-mile west of KOP 201	Well-maintained vegetation, a parking lot, and multiple manmade ponds exist on the parcel. A dense treeline screens views to the east. Transmission poles and conductors would visible across Waxpool Road.	Degree of Visual Change: Medium Viewer Sensitivity: Medium Overall Impact: Minor to Moderate

VSR # and Name		KOP #	Approximate Distance to Relevant Project Features [a]	Summary of Impacts	Impact Assessment
8	Brambleton Park and Lake Birchwood	217	GM 1, 2, and 5: 0.2-mile east of KOP 217	The resource is an open, recreational area with a fishing pier, trials, outdoor fitness stations, and a playground, situated between residences to the north and south, and forested areas to the east and west. GM 1, 2, and 5 would be visible along Loudoun County Parkway alongside existing infrastructure.	Degree of Visual Change: Medium Viewer Sensitivity: Medium Overall Impact: Moderate
9	Broad Run Stream Valley Park	207	All measurements are taken from KOP 207 • GM 1 and 5: 0.2-mile northwest • GM 2: approximately 200 feet northeast • GM 3: 0.1-mile south • GM 4: 0.3-mile southeast	Broad Run Stream Valley Park is a heavily forested park located along Broad Run. This VSR includes trail crossings for VSR 10 (Broad Run Trail). • GM1 and 5: Existing vegetation would screen direct views, but upper portions of structures may be visible above the treeline when in open areas within the park. • GM 2: Existing vegetation would screen direct views, but upper portions of structures may be visible above the treeline and during off-leaf season. Noticeable vegetation removal from the dense vegetation would increase views of the route corridor. • GM 3: Transmission lines and infrastructure will transect the park from north to south paralleling and crossing Broad Run. • GM 4: Existing topography and vegetation likely screen all but the upper portions of the poles from VSR 9.	Degree of Visual Change: Medium to High Viewer Sensitivity: High Overall Impact: Moderate to Major
10	Broad Run Trail	203 207	All measurements are taken from KOP 207. • GM 1 and 5: 0.1-mile north • GM 2: approximately 200 feet northeast • GM 3: 0.1-mile south • GM 4: 0.3-mile southeast	Broad Run Trail is a partially paved trail located between and roughly parallel to the densely vegetated Broad Run. All routes would require vegetation clearing. • GM 1 and 5: Existing vegetation would screen direct views, but upper portions of structures may be visible above the treeline when in open areas within the park. • Golden-Mar Route 2: Transmission lines and infrastructure would bisect the trail and be	Degree of Visual Change: Medium to High Viewer Sensitivity: High Overall Impact: Moderate to Major

VSR # and Name		KOP #	Approximate Distance to Relevant Project Features [a]	Summary of Impacts	Impact Assessment
				prominently visible, especially where clearing is necessary. • GM 3: Crosses the trail multiple times and parallels the trail the length of the park, similar to VSR 9 (Broad Run Stream Valley Park). Transmission lines and infrastructure would be predominantly visible. • GM 4: Parallels the east side of the trail as described above VSR 9 (Broad Run Stream Valley Park). Existing topography and vegetation would likely screen all but the upper portions of the poles.	
11	Creekside Park	212	All measurements are taken from KOP 212. • GM 3: 0.2-mile east • GM 4: 0.2-mile east	The park is situated between residences on all sides, and features a basketball court, a tennis court, and maintained vegetation. • GM 3: Existing topography and vegetation would likely screen all but the upper portions of the poles. • GM 4: Existing topography and vegetation would likely screen all but the upper portions of the poles.	Degree of Visual Change: Small to Medium Viewer Sensitivity: Medium Overall Impact: Minor to Moderate
12	Evermoore Neighborhood Park	NA	GM1 and 5: 0.2-mile southeast of the nearest park boundary	The park sits on a parcel surrounded by residences. The open 3.5-acre parcel includes paved paths, open fields, a pavilion, picnic area, dog park, playground, and amphitheater. Existing topography and structures would likely screen all but the upper portions of the route.	Degree of Visual Change: Medium Viewer Sensitivity: Medium to High Overall Impact: Moderate to Major
13	Fair Ridge Pool and Community Playground	NA	All measurements are taken from the southwest corner of the pool. • GM1, 2, and 5: 0.1-mile west • GM 3 and 4: 0.5-mile east	The resource sits on an open parcel with a small parking lot that lies on the north and west sides of the parcel. • GM 1, 2, and 5: Transmission poles and infrastructure would be visible behind the structures to the west. • GM 3 and 4: Route runs through VSR 9 (Broad Run Stream Valley Park) with screening	Degree of Visual Change: Medium Viewer Sensitivity: Medium to High Overall Impact: Minor to Moderate

VSR # and Name		KOP #	Approximate Distance to Relevant Project Features [a]	Summary of Impacts	Impact Assessment
				vegetation and residences blocking direct views.	
14	Grandmoore Park	NA	GM1 and 5:0.3-mile south of the closest park boundary	Grandmoore Park contains wooded and landscaped areas with paved multi-use paths along a stream drainage. • GM 1 and 5: Transmission poles and infrastructure would be visible as they parallel the north side of Loudoun County Parkway, south of the southern edge of the park.	Degree of Visual Change: Small Viewer Sensitivity: Medium Overall Impact: Minor to Moderate
15	Hemmingford Circle Park	213	All measurements are taken from KOP 213 • GM2 and 3: 0.4-mile north • GM 4:0.1-mile north	Located within the Loudoun Valley Estates Subdivision, the park features a landscaped area with a paved walking path. • GM 2 and 3: Existing topography and structures would likely screen all but the upper portions of the poles. • GM 4: Transmission poles and infrastructure would be prominently visible behind the residences that surround the park.	Degree of Visual Change: Medium Viewer Sensitivity: Low to Medium Overall Impact: Minor to Moderate
16	Highland Park	NA	GM 3: 0.1-mile east of the center of the park	This local park is on an open parcel, bordered by maintained vegetation, and surrounded by residential structures. The required tree clearing would be perceptible from this VSR and views of the transmission poles and infrastructure would be apparent.	Degree of Visual Change: Small Viewer Sensitivity: Low to Medium Overall Impact: Minor
17	Loudoun County Parkway Trail	202 206 211	GM 1, 2, and 5: the route is collocated and/or parallel with (less than 0.1 mile east of) the trail	This paved trail is intended for non-motorized use that follows the southern and eastern side of Loudoun County Parkway. All routes would require tree clearing; transmission poles and infrastructure would be visible as they parallel the route.	Degree of Visual Change: Medium to Large Viewer Sensitivity: High Overall Impact: Major

VSR # and Name		KOP #	Approximate Distance to Relevant Project Features [a]	Summary of Impacts	Impact Assessment
18	Loudoun Valley Pool	NA	All measurements are taken from the northwest corner of the pool. • GM 1, 2, and 5:0.2-mile west • GM 3: 0.3-mile east	The resource sits on an open parcel with maintained vegetation, and open field, and parking lots to the north and south. • GM 1, 2, and 5: Transmission poles and infrastructure parallel the east side of Loudoun County Parkway and would be partially visible. • GM 3: Existing topography, structures, and vegetations screen views along the west side of VSR 9 (Broad Run Stream Valley Park).	Degree of Visual Change: Small Viewer Sensitivity: Medium to High Overall Impact: Minor to Moderate
19	Lyndora Park	204	GM2, 3, and 4: 0.2-mile south of KOP 204	This multi-use park contains trails, wooded areas, and athletic fields. Existing topography and structures would likely screen all but the upper portions of the poles.	Degree of Visual Change: Small Viewer Sensitivity: Medium to High Overall Impact: Minor to Moderate
20	Old Ox Road Multi-use Path	216	All measurements are taken from KOP 216 • GM 1 through 5: 0.4-mile southwest • Sojourner Loop 800 feet east	The path runs parallel to and on the northwest side of Old Ox Road. All corridors would require vegetation clearing. Transmission poles and infrastructure would be visible where they cross the route. Sojourner Loop would be visible at the intersection with Beaver Meadow Road as it leaves Sojourner Substation.	Degree of Visual Change: Small Viewer Sensitivity: Medium Overall Impact: Minor to Moderate
21	Southview Park	214	GM1, 2, and 5: 0.1-mile east of KOP 214	The park, within a residential community, includes athletic courts, a playground, maintained vegetation, and paved sidewalks. Existing topography and structures would likely screen all but the upper portions of the poles.	Degree of Visual Change: Medium Viewer Sensitivity: Low to Medium Overall Impact: Minor to Moderate
22	Valley Falls Community Park	NA	GM 1, 2, and 5: the route runs north-south through the western edge of the park, immediately adjacent to KOP 211	Located between Loudoun County Parkway and Evergreen Ridge Drive, this community park is heavily forested has no active recreation facilities except paved trails. Vegetation removal along the western side of the park and collocation of the	Degree of Visual Change: High Viewer Sensitivity: Medium to High

VSR # and Name		KOP #	Approximate Distance to Relevant Project Features [a]	Summary of Impacts	Impact Assessment
				right-of-way with the park would provide extensive views of the Project. The route would be prominent or dominant in some views from the western portion of the property.	Overall Impact: Moderate to Major
23	Washington & Old Dominion Trail	221	GM 1 through 5: less than 0.1-mile west of KOP 221	Routes 1 through 5 cross the trail in two locations (one crossing each for the 230 kV and 500 kV lines) and parallels the south side of the trail for 0.1 mile. The corridor would require vegetation clearing and transmission poles and infrastructure would be visible from the trail.	Degree of Visual Change: Medium Viewer Sensitivity: Medium to High Overall Impact: Moderate to Major
Road Corridors					
24	Creighton Road/Evergreen Ridge Drive	NA	• GM 1, 2, and 5 cross the road at the intersection with Loudoun County Parkway. • GM 3 and 4 are 0.3 mile east where they cross VSR 9 (Broad Run Stream Valley Park)	Vegetation removal would be necessary for all routes. • GM 1, 2, and 5: Transmission poles and infrastructure would be visible at and near the Loudoun County Parkway intersection. • GM 3 and 4: Existing structures, vegetation, and topography would likely screen views of the project.	Degree of Visual Change: Small Viewer Sensitivity: Low to Medium Overall Impact: Moderate
25	Rt. 28	221	GM 1 through 5 parallel the west side of the roadway from Golden Substation to the south side of VSR 23 (Washington & Old Dominion Trail)	All routes would require vegetation clearing. Transmission lines and poles would be visible from Rt. 28.	Degree of Visual Change: Small to Medium Viewer Sensitivity: Low to Medium Overall Impact: Minor to Moderate
26	Dulles Greenway	NA	GM 1 through 5 cross the road between the Old Ox Road and Loudoun County Parkway interchanges. Routes 1 and 5 run parallel and adjacent to the south side of the Greenway for 0.4 mile	All routes would require vegetation clearing. Transmission lines and poles would be visible from Dulles Greenway at the crossing. Routes 1 and 5 would be visible and south of the road for 0.4 mile, including 0.2 mile collocated with and on the far side of existing Lines #2095/#2218.	Degree of Visual Change: Medium Viewer Sensitivity: Low to Medium

VSR # and Name		KOP #	Approximate Distance to Relevant Project Features [a]	Summary of Impacts	Impact Assessment
					Overall Impact: Minor to Moderate
27	Loudoun County Parkway	203 211 212	GM 1 and 5 parallel and cross the roadway from the Dulles Greenway interchange to the south side of Evergreen Ridge Drive (except for the segment between Ryan Road and Claiborne Parkway, where only Route 5 parallels the resource).	All routes would require some degree of vegetation clearing near the roadway. Trees on either side of the roadway would be partially cleared, expanding views to either side of the road.	Degree of Visual Change: High Viewer Sensitivity: Low to Medium Overall Impact: Moderate to Major
28	Old Ox Road	216	GM 1 through 5 crosses Old Ox Road at the intersection with Carters School Road	Impacts along Old Ox Road would be the same as those listed above for VSR 20 (Old Ox Road Multi-use Path).	Degree of Visual Change: Small Viewer Sensitivity: Low to Medium Overall Impact: Minor to Moderate
29	Waxpool Road	NA	GM 1 through 5 cross Waxpool Road at the intersection with Pacific Boulevard, then run parallel to the south side of the road for approximately 0.5 mile.	All routes would require vegetation clearing. The corridor is offset from the roadway by approximately 300 feet and is partially screened behind an existing treeline. Where visible, the Project would be on the far side of existing Lines #2165/#2170.	Degree of Visual Change: Small Viewer Sensitivity: Low to Medium Overall Impact: Minor to Moderate
Areas of High Public Concentration					
30	Ashburn CDP	201 221	GM 1 through 5 north of the Dulles Greenway are within Ashburn CDP	Segments of GM 1 through 5 would be intermittently visible from commercial and industrial areas from the Dulles Greenway to the south and Waxpool Road to the north. Crossings of specific VSRs 7, 25, 26, 28, and 29 are described above.	Degree of Visual Change: Small to Medium Viewer Sensitivity: Low to Medium (motorists); Medium to

VSR # and Name		KOP #	Approximate Distance to Relevant Project Features [a]	Summary of Impacts	Impact Assessment
					High (local residents and recreationists) Overall Impact: Minor to Moderate (motorists); Moderate to Major (local residents, recreationists)
31	Brambleton CDP	217	GM 1, 2, and 5 cross small segments of the Brambleton CDP on the west side of Loudoun County Parkway and south of Evergreen Ridge Drive	The routes cross the southeastern corner of VSR 33 (Birchwood at Brambleton Subdivision) and would require vegetation clearing through existing forested areas north of Old Ox Road.	Degree of Visual Change: Small to Medium Viewer Sensitivity: Medium to High Overall Impact: Minor to Major
32	Moorefield CDP	202	GM 1 and 5 cross the southern segment of Moorefield CDP on the north side of Loudoun County Parkway.	The routes parallel and cross VSRs 27 (Loudoun County Parkway) and 17 (Loudoun County Parkway Trail) and would be visible from VSR 36 (Moorefield Station Subdivision) to the north and west of Loudoun County Parkway. The crossings of VSR 17 and 27 are described above, and VSR 36 is described below.	Degree of Visual Change: Small to Medium Viewer Sensitivity: Low to Medium (motorists); Medium to High (local residents and recreationists) Overall Impact: Minor to Moderate (motorists); Moderate to Major (local residents, recreationists)
33	Birchwood at Brambleton Subdivision	217	GM 1, 2, and 5 cross the eastern corner of the subdivision near Broad Run.	GM 1, 2, and 5 would require vegetation clearing through the resource and would be potentially prominent from the eastern portion of the neighborhood.	Degree of Visual Change: Minor to Moderate Viewer Sensitivity: Medium to High

VSR # and Name		KOP #	Approximate Distance to Relevant Project Features [a]	Summary of Impacts	Impact Assessment
					Overall Impact: Moderate to Major
34	Dulles Parkway Center Subdivision	NA	Golden-Mars Roues 1 and 5 cross the southwest corner of the subdivision	GM 1 and 5 would cross open views along Loudoun County Parkway. Non-residential structures screen most views from the residential portion of the resource.	Degree of Visual Change: Small Viewer Sensitivity: Medium to High Overall Impact: Minor to Moderate
35	Loudoun Parkway Center	205	• GM 1 and 5 cross the Inova property along Loudoun County Parkway • GM 2, 3, and 4 cross 1,000 feet of the subdivision along Broad Run.	GM 2, 3, and 4 would require vegetation clearing. GM 1 and 5 would be visible across Loudoun County Parkway from residences in the northern portion of the resource. Routes 2, 3, and 4 would be visible from residences and the recreational trail in the southern portion of the resource.	Degree of Visual Change: Small to Medium Viewer Sensitivity: Low to Medium for motorists and those visiting the emergency center and Medium to High for residents Overall Impact: Minor to Moderate
36	Loudoun Valley Estates I, II, and III Subdivisions	203 204 206 207 211 212 213 214 332	GM 1 through 5 cross substantial portions of these neighborhoods, primarily along Loudoun County Parkway: • GM 1: 2.8 miles • GM 2: 2.2 miles • GM 3: 1.1 miles • GM 4: 0.5 mile • GM 5: 2.5 miles	This VSR incorporates the subdivisions that border and include most of VSR 29 (Loudoun County Parkway) from Welborne Manor Square to the south side of VSR 25 (Creighton Road/Evergreen Ridge Drive) and the south side of Loudoun Reserve Drive to the west of VSR 28 (Old Ox Road). The area is primarily residential. All GM routes would require vegetation clearing. Impacts on VSRs 3–6, 9–11, 13, and 15–22, are discussed above.	Degree of Visual Change: Small to Large Viewer Sensitivity: Low to Medium for motorists and Medium to High for residents Overall Impact: Minor to Major

VSR # and Name		KOP #	Approximate Distance to Relevant Project Features [a]	Summary of Impacts	Impact Assessment
37	Moorefield Station Subdivision	202	The common alignment of GM 1 and 5 crosses 0.7 mile of the subdivision along Loudoun County Parkway. GM 5 crosses 0.4 mile of the subdivision along Ryan Road.	GM 1 and 5 would require some vegetation clearing along VSR 29 along the southernmost edge of the subdivision. Existing and planned residential and nonresidential uses would screen some views. The Route 1 and 5 rights-of-way would follow the recreational trail along the north side of VSR 29.	Degree of Visual Change: Moderate Viewer Sensitivity: Medium to High Overall Impact: Moderate to Major

GM = Golden–Mars Routes; CDP = Census Designated Place; KOP = key observation point; NA = not applicable; VSR = visually sensitive resource.
[a] Where multiple routes are listed together (e.g., "GM 1, 2, and 5"), the table refers to the shared alignment of those routes, except where otherwise specified.

Golden-Mars Route 1

Golden-Mars Route 1 would primarily parallel public roadways in the study area. Motorists, residents in adjacent neighborhoods, and other viewers would have direct views of the new transmission line infrastructure along these roads. The route would add tall, vertical poles and long, linear, overhead conductors to the landscape and would require some vegetation removal. These new structures would also add cylindrical forms, tall vertical and repeating horizontal lines, and gray hues to the landscape, similar to elements that are already present in the built environment that but that are not typically prominent south of the Dulles Greenway. The changes in visual conditions due to Route 1 would be magnified by the visual prominence of the route's new structures, which would be the tallest features on the landscape and would dominate foreground views across the area. Homes, buildings, and other structures, as well as pockets of existing trees and forested areas would screen and limit views of Route 1 from middle ground and background of views.

South of the Dulles Greenway Route 1 would increase amount of visible industrial development (energy infrastructure) within a largely suburban residential landscape. This would result in medium to large changes in existing visual conditions along the route. Viewer sensitivity would be medium to high, primarily due to the level of residential development in the area. Residential viewers tend to be more sensitive to changes in visual conditions compared to other types of viewers. Overall, the visual impacts of Route 1 would range from minor to major—with the largest impacts generally along major travel corridors such as Loudoun County Parkway—and would be moderate to major overall.

Golden–Mars Route 2

The impacts of Golden-Mars Route 2 would be similar to Route 1 except that there would be fewer areas of high visibility along major travel corridors in the Project study area, due to the route's alignment through primarily forested areas (collocated with existing Lines #295/#2185) along Broad Run from the Dulles Greenway to the area north of the Loudoun County Public School property that includes Rock Ridge High School and Rosa Lee Carter Elementary School. These forested areas generally separate several neighborhoods along Loudoun County Parkway from and commercial (warehouse) development to the south. While this portion of the route would require vegetation removal, several stands of tall trees would remain and would help limit the visibility of Route 2 from nearby residential areas. Where visible along Broad Run, Route 2 would add visual elements to the landscape that are similar to those present for the existing transmission lines (e.g., tall, vertical, cylindrical forms, vertical and horizontal lines, gray hues).

Route 2 would increase the level of visible industrial development on the landscape, especially where Route 2 joins Loudoun County Parkway and continues to the south in the same alignment as Routes 1 and 5. Between the added visual elements and reductions in vegetation density, Route 2 would result in medium to large changes to existing visual resource conditions. Similar to Route 1, viewer sensitivity to the visual changes from Route 2 would be medium to high, primarily due to the level of residential development in the area. Overall, the visual impacts of Route 2 would range from minor to major—with the largest impacts generally along major travel corridors such as Loudoun County Parkway. The route's overall impacts would be somewhat less than Route

1 due to the screening effect of trees and topography along Broad Run; however, the overall visual impact of Route 2 would remain moderate to major.

Golden–Mars Route 3

Golden-Mars Route 3 would primarily follow Broad Run south of the Dulles Greenway. As such, it's impacts would be similar to those described for the Broad Run segment of Route 2, except that Route 3 would have even fewer areas of high visibility along major travel corridors in the Project study area. Route 3 would require tree clearing that reduces the amount of vegetation along Broad Run and may open new gaps in the forest cover. These gaps would provide new viewing opportunities for certain viewer groups, including residents and school workers, students, and visitors. The remaining trees in these areas, along with other features of the built environment (e.g., homes, buildings) would help partially screen some views of the proposed infrastructure. Where visible, Route 3 would add similar visual elements to the landscape (e.g., tall, vertical, cylindrical forms, vertical and horizontal lines, gray hues).

Route 3 completely avoids highly visible areas along Loudoun County Parkway and other major roads. This would reduce the overall visibility of the proposed route and would substantially reduce the number of typical viewers (although those viewers—especially local residents) would have medium to high sensitivity levels and would view Route 3 in areas with less existing electrical infrastructure and development. The route would result in medium to large changes to the visual setting, resulting in impacts that would range from minor to major and would be marginally smaller than the impacts of Routes 1, 2, and 5, with an overall moderate visual impact.

Golden–Mars Route 4

Route 4 shares the same route corridor as Route 3 except in the vicinity of the Loudoun County Public School property that includes Rock Ridge High School and Rosa Lee Carter Elementary School. Here, Route 4 runs along the eastern and southern boundary of the school property instead of the northern and western boundary (Route 3). Route 4 would be substantially more visible and prominent in this area, in part because the route along the southern boundary of the school property is collocated with the only entrance road for both schools. In all other aspects, the impacts of Route 4 would be the same as those described above for Route 3. Route 4 would therefore result in similar medium to large changes to existing visual conditions and medium to high viewer sensitivity. The overall impact on visual resources would be smaller than Routes 1, 2, and 5, incrementally larger than Route 3, and moderate overall.

Golden–Mars Route 5

Golden-Mars Route 5 shares the same corridor as Route 1 except for a segment that runs west along Ryan Road and then turns south along Claiborne Parkway before rejoining Routes 1 and 2 along Loudoun County Parkway. The segment of Route 5 along Ryan Road and Claiborne Parkway would add the same types of new features as described for Routes 1 and 2, although the route's structures and conductors would be somewhat closer to residences (encroaching on nine residential lots in the Reserve at Belle Terra neighborhood) and would be viewed in the context of lower-volume roadways with narrower road rights-of-way than Loudoun County Parkway. As a result, the visual impacts of Route 5 would be larger than for Route 1. Route 5 would result in

medium to large changes in existing visual conditions along the route, with medium to high viewer sensitivity. Overall, Route 5 would have moderate to major impacts on visual resources, primarily due to the proximity to and actual encroachment on residential properties along Ryan Road.

Lockridge Loop

The Lockridge Loop follows a short, east-west alignment and is generally routed through a forested area that has been approved for the Project Nova Southeast data center development (see Section 5.1.6) and is bordered by major travel corridors (e.g., Dulles Greenway) and industrial/commercial development. The proposed route would add additional cylindrical forms, tall vertical and repeating horizontal lines, and gray hues to the landscape. However, these tall, linear visual features and elements would be substantially the same as the elements of existing built environment in this location, which currently includes existing Line #2223 to the north and a distribution line along Lockridge Road, as well as multiple geometric forms and solid vertical and horizontal lines. Moreover, the Lockridge Loop would be visually compatible with the approved data center development on the property (which would include the future Prentice Substation). Viewing opportunities of the route and corresponding visual changes would generally be limited to Lockridge Road and indirect views form the Dulles Greenway.

The Lockridge Loop would result in negligible to small changes to existing and approved future visual conditions along the route. Motorists would be the primary viewer group and their sensitivity to visual changes in this area would be low. Overall, this route would result in minor impacts on visual resource conditions.

Sojourner Loop

The Sojourner Loop connects the Sojourner Substation to the future Golden Substation through an area that is developed for and will be more intensely developed for an extensive cluster of data centers as part of the Digital Dulles development (see Section 5.1.6) adjacent to Dulles Airport. Existing Lines #2095/#2137 and #2218, as well as distribution lines are prominent features of the landscape in this area, primarily along Old Ox Road. Multiple commercial and light industrial buildings and other structures also characterize the area. These features contribute to an overall high level of industrial development and human presence on the landscape. The proposed route would add similar structures and visual elements to the landscape, but views of the new structures would be limited by distance, data center and other buildings and structures, and trees. Most views would be from viewer groups travelling primarily along Old Ox Road.

The Sojourner Loop would result in negligible to small changes to existing visual conditions in the area. Motorists would be the primary viewer group and their sensitivity to visual changes in this area would be low. Overall, this route would result in minor impacts on visual resources.

TABLE 5.3-4 VISUAL RESOURCE IMPACT SUMMARY

Route Alternative	Impacted VSRs	Impacted Areas and Viewer Groups	Impacted Viewer Groups	Potential Impact Rating
Golden-Mars Route 1	1, 2, 5 through 10, 12 through 14, 17, 18, 20 through 37 **Total: 30**	Road crossings: • New right-of-way—17 crossings Sensitive VSRs (impacts > negligible): • Legacy Elementary School (VSR 1) • Primrose School at Moorefield Station (VSR 2) • Stone Middle School (VSR 5) • Mankin Cemetery (VSR 6) • 1757 Golf Club (VSR 7) • Brambleton Park and Lake Birchwood (VSR 8) • Broad Run Stream Valley Park (VSR 9) • Broad Run Trail (VSR 10) • Evermoore Neighborhood Park (VSR 12) • Fair Ridge Pool and Community Playground (VSR 13) • Grandmoore Park (VSR 14) • Loudoun County Parkway Trail (VSR 17) • Loudoun Valley Pool (VSR 18) • Old Ox Road Multi-use Path (VSR 20) • Southview Park (VSR 21) • Valley Falls Community Park (VSR 22) • Washington & Old Dominion Trail (VSR 23) • Evergreen Ridge Dr (VSR 24) • Rt. 28 (VSR 25) • Dulles Greenway (VSR 26) • Loudoun County Parkway (VSR 27) • Old Ox Road (VSR 28) • Waxpool Road (VSR 29) • Ashburn CDP (VSR 30) • Brambleton CDP (VSR 31) • Moorefield Station CDP (VSR 32) • Birchwood at Brambleton Subdivision (VSR 33) • Dulles Parkway Center Subdivision (VSR 34) • Loudoun Parkway Center (VSR 35) • Loudoun Valley Estates I, II, and III (VSR 36) • Moorefield Station Subdivision (VSR 37)	• Residents • Motorists, commuters, through travelers • Recreationists/ tourists • Workers	Degree of Visual Change: Medium to Large Viewer Sensitivity: Medium to High Overall Rating: Moderate to Major

Route Alternative	Impacted VSRs	Impacted Areas and Viewer Groups	Impacted Viewer Groups	Potential Impact Rating
Golden-Mars Route 2	1, 3 through 10, 13, 15, 17 through 26, 28 through 31, 33, 35, 36 **Total: 28**	Road crossings: • New right-of-way—10 crossings Sensitive VSRs (impacts > negligible): • Legacy Elementary School (VSR 1) • Rock Ridge High School (VSR 3) • Rosa Lee Carter Elementary School (VSR 4) • Stone Middle School (VSR 5) • Mankin Cemetery (VSR 6) • 1757 Golf Club (VSR 7) • Brambleton Park and Lake Birchwood (VSR 8) • Broad Run Stream Valley Park (VSR 9) • Broad Run Trail (VSR 10) • Fair Ridge Pool and Community Playground (VSR 13) • Loudoun County Parkway Trail (VSR 17) • Loudoun Valley Pool (VSR 18) • Lyndora Park (VSR 19) • Old Ox Road Multi-use Path (VSR 20) • Southview Park (VSR 21) • Valley Falls Community Park (VSR 22) • Washington & Old Dominion Trail (VSR 23) • Evergreen Ridge Drive (VSR 24) • Rt. 28 (VSR 25) • Dulles Greenway (VSR 26) • Loudoun County Parkway (VSR 27) • Old Ox Road (VSR 28) • Waxpool Road (VSR 29) • Ashburn CDP (VSR 30) • Brambleton CDP (VSR 31) • Birchwood at Brambleton Subdivision (VSR 33) • Loudoun Parkway Center (VSR 35) • Loudoun Valley Estates I, II, and III (VSR 36)	• Residents • Motorists, commuters, through travelers • Recreationists/ tourists • Workers	Degree of Visual Change: Medium to Large Viewer Sensitivity: Medium to High Overall Rating: Moderate to Major

Route Alternative	Impacted VSRs	Impacted Areas and Viewer Groups	Impacted Viewer Groups	Potential Impact Rating
Golden-Mars Route 3	3, 4, 7, 9 through 11, 13, 15, 16, 18 through 20, 26, 28 through 30, 35, 36 **Total: 18**	Road crossings: • New right-of-way—9 crossings Sensitive VSRs (impacts > negligible): • Rock Ridge High School (VSR 3) • Rosa Lee Carter Elementary School (VSR 4) • 1757 Golf Club (VSR 7) • Broad Run Stream Valley Park (VSR 9) • Broad Run Trail (VSR 10) • Creekside Park (VSR 11) • Fair Ridge Pool and Community Playground (VSR 13) • Hemmingford Circle Park (VSR 15) • Highland Park (VSR 16) • Loudoun Valley Pool (VSR 18) • Lyndora Park (VSR 19) • Old Ox Road Multi-use Path (VSR 20) • Southview Park (VSR 21) • Valley Falls Community Park (VSR 22) • Washington & Old Dominion Trail (VSR 23) • Evergreen Ridge Dr (VSR 24) • Rt. 29 (VSR 25) • Dulles Greenway (VSR 26) • Old Ox Road (VSR 28) • Waxpool Road (VSR 29) • Ashburn CDP (VSR 30) • Loudoun Valley Estates I, II, and III Subdivisions (VSR 36)	• Residents • Motorists, commuters, through travelers • Recreationalists/ tourists • Workers	Degree of Visual Change: Medium to Large Viewer Sensitivity: Medium Overall Rating: Moderate

Route Alternative	Impacted VSRs	Impacted Areas and Viewer Groups	Impacted Viewer Groups	Potential Impact Rating
Golden-Mars Route 4	3, 4, 7, 9, through 11, 13, 15, 19, 20, 23 through 26, 28 through 30, 35, 36 **Total: 19**	Road crossings: • New right-of-way—8 crossings Sensitive VSRs (impacts > negligible): • Rock Ridge High School (VSR 3) • Rosa Lee Carter Elementary School (VSR 4) • 1757 Golf Club (VSR 7) • Broad Run Stream Valley Park (VSR 9) • Broad Run Trail (VSR 10) • Creekside Park (VSR 11) • Fair Ridge Pool and Community Playground (VSR 13) • Hemmingford Circle Park (VSR 15) • Lyndora Park (VSR 19) • Old Ox Road Multi-use Path (VSR 20) • Washington & Old Dominion Trail (VSR 23) • Evergreen Ridge Dr (VSR 24) • Rt. 29 (VSR 25) • Dulles Greenway (VSR 26) • Old Ox Road (VSR 28) • Waxpool Road (VSR 29) • Ashburn CDP (VSR 30) • Loudoun Valley Estates I, II, and III (VSR 36)	• Impacted Viewer Groups: • Residents • Motorists, commuters, through travelers • Recreationists/ tourists • Workers	Degree of Visual Change: Medium to Large Viewer Sensitivity: Medium to High Overall Rating: Moderate

Route Alternative	Impacted VSRs	Impacted Areas and Viewer Groups	Impacted Viewer Groups	Potential Impact Rating
Golden-Mars Route 5	1, 2, 5 through 8, 10, 12 through 14, 17, 18, 20 through 37 **Total: 31**	Road crossings: • New right-of-way—21 crossings Sensitive VSRs (impacts > negligible): • Legacy Elementary School (VSR 1) • Primrose School at Moorefield Station (VSR 2) • Stone Middle School (VSR 5) • Mankin Cemetery (VSR 6) • 1757 Golf Club (VSR 7) • Brambleton Park and Lake Birchwood (VSR 8) • Broad Run Trail (VSR 10) • Evermoore Neighborhood Park (VSR 12) • Fair Ridge Pool and Community Playground (VSR 13) • Grandmoore Park (VSR 14) • Loudoun County Parkway Trail (VSR 17) • Loudoun Valley Pool (VSR 18) • Old Ox Road Multi-use Path (VSR 20) • Southview Park (VSR 21) • Valley Falls Community Park (VSR 22) • Washington & Old Dominion Trail (VSR 23) • Evergreen Ridge Dr (VSR 24) • Rt. 28 (VSR 25) • Dulles Greenway (VSR 26) • Loudoun County Parkway (VSR 27) • Old Ox Road (VSR 28) • Waxpool Road (VSR 29) • Ashburn CDP (VSR 30) • Brambleton CDP (VSR 31) • Moorefield CDP (VSR 32) • Birchwood at Brambleton Subdivision (VSR 33) • Dulles Parkway Center Subdivision (VSR 34) • Loudoun Parkway Center (VSR 35) • Loudoun Valley Estates I, II, and III Subdivisions (VSR 36) • Moorefield Station Subdivision (VSR 37)	• Impacted Viewer Groups: • Residents • Motorists, commuters, through travelers • Recreationists/ tourists • Workers	Degree of Visual Change: Medium to Large Viewer Sensitivity: Medium to High Overall Rating: Moderate to Major

Route Alternative	Impacted VSRs	Impacted Areas and Viewer Groups	Impacted Viewer Groups	Potential Impact Rating
Lockridge Loop	None	Road crossings: • New right-of-way—1 crossing (Lockridge Rd)	• Motorists—commuters/through travelers	Degree of Visual Change: Negligible to Low Viewer Sensitivity: Low Overall Rating: Minor
Sojourner Loop	None	Road crossings: • New right-of-way—1 crossing Digital Dulles Dr)	• Motorists—commuters/through travelers	Degree of Visual Change: Negligible to Low Viewer Sensitivity: Low Overall Rating: Minor

NA = not applicable; VSR = visually sensitive resource.

5.3.4 VISUAL IMPACT SUMMARY

Both the Lockridge and Sojourner Loops would have minor impacts on visual resources. Golden–Mars Routes 3 and 4 would have moderate impacts, while Routes 1, 2, and 5 would have moderate to high impacts. The primary drivers for higher levels of visual impacts along the Golden–Mars Lines include medium to large changes in existing visual resource conditions due to Project infrastructure, and proximity of the Project infrastructure to viewer groups with medium to high sensitivity to changes in visual conditions. The primary drivers for higher levels of visual impacts along the Golden–Mars Lines include medium to large changes in existing visual resource conditions due to Project infrastructure, and proximity of the Project infrastructure to viewer groups with medium to high sensitivity to changes in visual conditions.

The primary changes in existing visual conditions include reductions in natural vegetation (due to tree clearing for the Project's rights-of-way) and the addition of cylindrical forms, repeating tall vertical and horizontal lines, and gray hues to the portions of the landscape. Some of these elements already exist on the landscape where the proposed route is collocated with or adjacent to other existing energy infrastructure and/or light industrial/commercial development. Especially in and adjacent to residential developments south of the Dulles Greenway, these types of elements represent new incursions into the existing visual setting. The effect of these new elements is to add prominent energy transmission infrastructure to the existing general suburban character of these areas.

Where the Golden–Mars routes cross or are adjacent to residential areas, the primary viewer groups are local residents. As noted in Section 5.3.2.3, these viewers tend to be highly sensitive to potential changes in landscape characteristics, because they value the scenic integrity of the landscape and may have more frequent and longer duration views from their residences. Their high sensitivity is also augmented by proximity to the routes. That is, most of these viewers would have foreground views of the proposed structures at a distance (less than 0.5 mile) where the size and scale would make the Project's structures more visually prominent on the landscape. Routes 1, 2, and 5 provide closer views with less screening vegetation for a larger number of residents (including those in homes, driving along Loudoun County Parkway to or from their homes, using recreational paths near the routes, and viewing the routes from their homes or properties) than Routes 3 or 4.

Overall, the visual changes from all route alternatives would be most perceptible to the greatest number of viewers where they cross and/or are adjacent to major road corridors or are visible from nearby residential areas. However, there is a range of visual change and viewer sensitivity that contributes to some variability in level of visual impact along each route. In addition to the factors described above, other factors that influence the level of visual impact along the proposed route options include the following:

- Existing topography, vegetation (especially tall trees), and buildings/structures help screen some views of the proposed route infrastructure and limit most views to the foreground in the Project study area;
- There is a high degree of human influence on the landscape in this area with a range of development from suburban residential areas to light industrial and commercial areas; and

- A large portion of the study area is already developed for data center and other industrial uses and continues to grow, which necessitates additional infrastructure (e.g., roads, sewers, cell towers, transmission and distribution lines) and results in a changing visual setting.

5.4 CULTURAL RESOURCES

ERM conducted a pre-application analysis (the analysis) of potential impacts on known cultural resources along and near the Project routes in accordance with the VDHR's *Guidelines for Assessing Impacts of Proposed Electric Transmission Lines and Associated Facilities on Historic Resources in the Commonwealth of Virginia* (VDHR Guidelines) (VDHR 2008). For each route, the analysis identified and assessed the potential for impacts on previously recorded resources meeting criteria within the following study tiers as specified in the VDHR Guidelines:

- National Historic Landmarks (NHLs) within a 1.5-mile radius of each route;
- Properties listed on the National Register of Historic Places (NRHP), NHLs, battlefields, and historic landscapes within a 1.0-mile radius of each route;
- NRHP-eligible and NRHP-listed properties, NHLs, battlefields, and historic landscapes within a 0.5-mile radius of each route; and
- All the above qualifying resources and archaeological sites within the right-of-way for each route alternative.

ERM obtained data on previously recorded cultural resources within each study tier from the VCRIS. ERM also reviewed information from the following additional sources to identify locally significant resources (not otherwise included in the VCRIS) within a 1.0-mile radius of each route:

- History of Loudoun County, Virginia (2024),
- Loudoun County Preservation Society (2024),
- Loudoun County Heritage Commission (2024),
- Loudoun County Preservation and Conservation Commission (2024), and
- Loudoun County African American Historic Architectural Resources Survey (EHT Traceries 2024).

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

Along with the records review, ERM conducted field assessments of the architectural resources and historic districts meeting the criteria and within the applicable study tiers defined by the VDHR Guidelines. ERM captured digital photographs of each resource with views toward the applicable route alternative(s). ERM then prepared visual simulations depicting the Project infrastructure as it would appear in views from each resource (Appendix G) to assess potential

visual effects on those resources. For the previously recorded archaeological sites under consideration, ERM examined aerial photographs to assess the current land condition and spatial relationship between the sites and existing and planned transmission lines. The remainder of this section presents the results of these assessments.

As discussed in more detail below, ERM identified a combined 17 previously recorded archaeological sites within the rights-of-way for the Project's route alternatives. Of these, six are considered not eligible for listing in the NRHP while the remainder have not been evaluated by VDHR to determine their eligibility for listing.

Regarding historic architectural resources, ERM identified five previously recorded sites and/or districts within the study tiers described above. Of these, two are eligible for listing in the NRHP, one is potentially eligible for listing in the NRHP, and two have not been evaluated to determine their eligibility for listing but are considered locally significant for purposes of this report.

5.4.1 ARCHAEOLOGICAL SITES AND FINDINGS

Crossings of archaeological sites are considered a routing constraint due to the potential for an electric transmission line to impact intact archaeological deposits, if present, due to tree clearing, transmission structure placement, or the use or movement of heavy equipment within a site. Table 5.4-1 lists and describes the known archaeological sites in the rights-of-way for each route alternative. The information on the condition of sites is based on previous investigations and air photo interpretation; however, a confident and complete assessment of the integrity of each site would require archaeological field investigations. As noted above, a survey would be completed in a subsequent phase of study for the Project along the routes certificated by the SCC.

ERM identified 17 known archaeological sites within the rights-of-way of the Project's route alternatives. Because portions of Golden–Mars Routes 1 through 5 share common alignments, some sites are crossed by more than one (in some cases, up to all five) route alternative. Fifteen sites are directly adjacent to or within the rights-of-way of the Golden–Mars routes. Route 1 crosses 12 sites, Route 2 crosses 11 sites, Route 3 crosses 8 sites, Route 4 crosses 7 sites, and Route 5 crosses 11 sites. One archaeological site is within the right-of-way of the Lockridge Loop and another is within the right-of-way of the Sojourner Loop.

The subsections below provide an assessment of potential impacts on sites by route alternative.

TABLE 5.4-1 PREVIOUSLY RECORDED ARCHAEOLOGICAL SITES IN THE RIGHTS-OF-WAY OF EACH ROUTE

Site Number	Route Alternative	Right-of-way type	Description	NRHP Status
44LD0111	GM 1–5	Existing/Expanded ROW	Prehistoric (Early Archaic) camp, temporary	Not Eligible
44LD0170	GM 1–5	Greenfield	Prehistoric (Pre-Contact) camp, temporary	Not Eligible
44LD0332	GM 1 and 2	Greenfield	Prehistoric (unknown) camp, temporary	Unevaluated
44LD0333	GM 1 and 2	Greenfield	Prehistoric (unknown) camp, temporary	Unevaluated
44LD0472	GM 1–5	Greenfield	Prehistoric (Late Archaic) lithic scatter	Unevaluated
44LD0945	GM 1–5	Greenfield	Historic (20th century) dwelling, multiple	Unevaluated
44LD1244	GM 1 and 5	Greenfield	Historic (18th century) farmstead	Unevaluated
44LD1311	GM 1 and 5	Greenfield	Historic (19th and 20th century) dwelling, single	Unevaluated
44LD1742	GM 1–5	Greenfield	Historic (20th century) schoolhouse (Carter Schoolhouse)	Not Eligible
44LD1909	GM 1–5	Greenfield	Historic (20th century) dwelling, single	Not Eligible
44LD1922	GM 1 and 5	Greenfield	Historic (19th and 20th century) dwelling	Unevaluated
44LD1978	GM 1–5	Greenfield	Historic (19th and 20th century) artifact scatter	Unevaluated
44LD0334	GM 2	Greenfield	Prehistoric (unknown) camp, temporary	Unevaluated
44LD0335	GM 2 and 3	Greenfield	Prehistoric (unknown) camp, temporary	Unevaluated
44LD0330	GM 5	Greenfield	Prehistoric (Pre-Contact) camp, temporary	Unevaluated
44LD1916	LL	Greenfield	Prehistoric (unknown) lithic scatter	Not Eligible
44LD1737	SL	Existing/Expanded ROW	Historic (20th century) farmstead	Not Eligible

Source: VDHR 2024.

GM = Golden–Mars Route; LL = Lockridge 230 kV Loop; NRHP = National Register of Historic Places; ROW = right-of-way; SL = Sojourner 230 kV Loop.

5.4.1.1 GOLDEN–MARS LINES

Route 1

ERM identified twelve previously recorded archaeological resources mapped directly adjacent to or within the Route 1 right-of-way: 44LD0111, 44LD0170, 44LD0332, 44LD0333, 44LD0472, 44LD0945, 44LD1244, 44LD1311, 44LD1742, 44LD1909, 44LD1922, and 44LD1978.

44LD0111 is a prehistoric (Early Archaic) temporary camp previously assessed as not eligible for listing in the NRHP due to impacts from land clearing and commercial development. The Route 1 right-of-way partially intersects approximately 300 feet within the eastern site boundary, with most of 44LD0111 to the north and west within developed lands in the Company's Buttermilk Substation, the right-of-way of existing Line #2152/#2170, and a Digital Loudoun data center. The site was first investigated in 1979, but efforts in 2015 to find the site again were unsuccessful. The authors of a subsequent 2016 study speculated that either the site location was incorrectly plotted in 1979, or the site had been destroyed (Smith and Maas 2016). ERM's review of aerial photography indicates the site was disturbed (and likely destroyed) by construction of the existing transmission line in 2006, the excavation of borrow pits in 2008, and construction of the data center and substation between 2016 and 2019.

Site 44LD0170 is a prehistoric temporary camp site with an unspecified temporal affiliation. Approximately 300 feet of the Route 1 crosses the site's northern boundary. Initially recorded in 1981, the site was the subject of additional Phase I investigations in 2012, 2013, and 2014. After the 2012 survey, VDHR concluded that the site is not eligible for listing in the NRHP due to low artifact density. The final survey in 2014 failed to find the site again and current aerial imagery indicates the area has since been developed, indicating that 44LD0170 has been destroyed (Monroe 2014). ERM's review of aerial photography indicates that the site was cultivated or fallow through 2016. An electric distribution line was built across the site in that year, and most of the site was cleared and graveled for a contractor yard or parking area in 2019. The site is nearly completely covered by the parking area and adjacent road.

Site 44LD0332 is an unknown prehistoric temporary camp site disturbed by previous land clearing and the installation of a paved walking trail. Approximately 200 feet of the Route 1 right-of-way intersects the northwestern boundary of the site, which has not been assessed for NRHP-eligibility. The original site form for 44LD0332 records a light lithic scatter lacking in diagnostic artifacts or intact cultural features (Rust and Wilson 1981a). ERM's review of aerial photography indicates the site area was cultivated through the mid-1990s, then fallow through the mid-2000s, then disturbed by construction of Loudoun County Parkway and an adjacent walking path from 2006 to 2007. Due to the previous ground disturbance, it is unlikely that any intact cultural remains are present at the site.

Site 44LD0333 is an unknown prehistoric temporary camp site that has been disturbed by previous land clearing and the installation of a paved walking trail. The Route 1 right-of-way crosses more than 100 feet within the northern half of the site, which has not been assessed for NRHP-eligibility. The original archaeology site form for 44LD0333 recorded a light lithic scatter lacking in diagnostic artifacts or intact cultural features (Rust and Wilson 1981b). Review of aerial

photography by ERM indicates the site area was cultivated through the mid-1990s, then fallow through the mid-2000s, then disturbed by construction of a Loudoun County Parkway and an adjacent walking path from 2006 to 2007. Due to previous ground disturbance, it is unlikely that any intact cultural remains are present at the site.

44LD0472 is a prehistoric (Late Archaic) lithic scatter previously disturbed by road grading, whose eligibility for listing in the NRHP is undetermined (Haynes 1990). The site's western boundary is directly adjacent to the Route 1 right-of-way. Based on ERM's review of aerial photography, 44LD0472 is within a small area which has been forested since at least 1949. Although adjacent areas have been cultivated and/or disturbed by road construction and/or utility installations, ERM found no direct evidence of previous disturbance at the site on examined aerial photography. The site condition is therefore unknown.

44LD0945 is a historic (twentieth century) multiple-dwelling site previously disturbed by surrounding commercial development and roadside grading, although the eligibility of the site for listing in the NRHP is undetermined. Most of the site is within the Route 1 right-of-way. A previous Phase I survey recorded a historic artifact scatter they associated with two structures east of the site dating from the 1960s that were demolished by 1994 (Goode 2002). Review of aerial photography by ERM indicates that the area within the site boundary was cultivated or fallow farmland from at least 1949 to 2004. In 2002, an electric distribution line was built across the southern edge of the site and in 2006 the site was disturbed by grading and commercial development. The site today is partially covered by a parking lot and partially covered by a paved walking trail and Old Ox Road. There is little potential of intact deposits at the site from the previous impacts.

44LD1244 is a historic (eighteenth century) farmstead site whose eligibility for listing in the NRHP is categorized in VCRIS as unevaluated; however, the history of cultural resource investigations indicates the site was previously determined or treated as eligible. More than 100 feet of Route 1 crosses the site's northern boundary. A 2019 Phase III mitigation investigation found many diagnostic artifacts and intact cultural features associated with the farmstead within the central portion of the site area (Smith 2020).[5] ERM's review of aerial photography indicates that the Route 1 right-of-way is due north of the part of the site covered by the Phase III investigation, in a partially cleared forested area next to the Dulles Greenway. While this area may have been impacted by previous road and utility construction, there is no conclusive evidence of previous disturbance on examined photography. Therefore, intact deposits and features could exist in the portion of the site crossed by the route.

44LD1311 is a historic (nineteenth and twentieth century) dwelling site whose eligibility for listing in the NRHP has not been assessed. The Route 1 right-of-way crosses less than 100 feet of the southern boundary of the site. A 2025 Phase I recorded 44LD1311 as a historic domestic artifact scatter, partially destroyed by previous ground disturbance activities (Thunderbird Archeology 2005). ERM's review of USGS topographic quadrangles found two structures at the site on a map dating from 1951 and one structure on a map dating from 1966. Aerial photography dating from

[5] Completion of a Phase III-level investigation at the site implies it was considered or treated as eligible for listing in the NRHP.

1949 to 1994 shows multiple farm structures at the site, but all buildings are gone on photography from 2002. The eastern approximately one-third of the site was paved over by a road in 2020.

44LD1742 is a historic (early twentieth century) schoolhouse site (Carter Schoolhouse) previously evaluated as not eligible for listing in the NRHP. The site is entirely within the Route 1 right-of-way in a forested area east of Carters Schoolhouse Road. Previous Phase I and Phase II investigations at 44LD1742 in 2016 recorded the ruined foundation of a one-room schoolhouse with modern dumping obscuring much of the archaeological remains (Ward et al. 2016). The site is located on in a forested area. ERM's review of USGS topographic quadrangles found the school depicted on maps from 1951 and 1966 but not on maps from 1994. The school is visible on aerial photography dating from 1949 to 1980.

44LD1909 is a historic (twentieth century) single dwelling site previously determined not eligible for listing in the NRHP. Less than 50 feet of Route 1 crosses the southernmost portion of the site. A 2020 Phase I survey recorded a light historic artifact scatter lacking intact cultural deposits or features and with little research value (Smith and Gryctko 2021). ERM's review of historic USGS topographic quadrangles indicates that the dwelling once present at the site was built in the first half of the 20th century sometime after 1908 and prior to 1952. The dwelling and an outbuilding are visible on aerial photography of the site dating from the early 1960s to 2015. Both buildings appear to have been demolished between 2015 and 2016. The site is area is currently forested, with a concrete pad and debris visible through the foliage on 2024 aerial photography.

44LD1922 is a late nineteenth to early twentieth-century single dwelling site, characterized by structural ruins and a scatter of domestic and architectural artifacts, whose NRHP-eligibility has not been assessed, although it was recommended not eligible by a previous investigator. The site is directly adjacent to the Route 1 right-of-way in a forested area bordered to the east and north by roads and to the west by a residential development. The investigators for a 2021 Phase I survey concluded that between 25 and 49 percent of the site was destroyed (Nubgaard 2021). ERM's review of USGS topographic quadrangles documented one or more structures at the site on maps dating from 1915 to 1994. Aerial photography dating from 1949 to 1991 similarly show a farmhouse and outbuildings at the site. The buildings were removed from the site by 2022. Other than removal of the buildings, there is no indication of previous disturbance at the site in examined images.

44LD1978 is a historic (20th century) artifact scatter disturbed by previous land clearing activities and construction of an access road, which bisects the site. According to the VCRIS, the site's eligibility for listing in the NRHP is undetermined, although a 2022 Phase I survey interpreted the site as a secondary deposit of domestic refuse not eligible for listing in the NRHP (Jockel 2022). Route 1 intersects the northwest corner of the site, which is forested other than the access road. ERM's review of aerial photography suggests that the access road occupies what was once a small, tree-lined drainage passing through a cultivated field in production from at least 1949 to the early 1990s. At that time, the field began reverting to forest, with the access road cleared in 2006.

Route 2

ERM identified 11 previously recorded archaeological resources mapped within the Golden-Mars Route 2 right-of-way. Of these, seven sites—44LD0111, 44LD0170, 44LD0333, 44LD0472, 44LD0945, 44LD1742, 44LD1909, and 44LD1978—are along segments of Route 2 that share a common alignment with Route 1. Impacts on these sites would be the same as described above for Route 1. The Route 2 right-of-of-way intersects a ninth site, 44LD0332, also crossed by Route 1 but along a different alignment. As noted above, ERM concluded based on the results of a previous survey and review of site conditions via aerial photography, that due to previous ground disturbance, intact cultural remains are unlikely to be present at the site.

44LD0334 is an unknown prehistoric temporary camp site that has been previously disturbed by land clearing and is currently unevaluated for NRHP-eligibility. More than 100 feet of Route 2 bisects the northeastern portion of the site. A 2003 survey recorded a light surface lithic scatter described as largely destroyed (Richards 2003). ERM's review of aerial photography indicates the site area was cultivated from at least 1949 to the mid-1990s and fallow from then until through 2008. The Loudoun Valley Estates II residential development was built between 2010 and 2012 on the parcel containing the site, with the resource in a cleared area on the periphery of the development maintained as mowed grassland. Based on the results of the previous study and observed impacts, it is unlikely that intact cultural deposits are present at the site.

44LD0335 is an prehistoric temporary camp whose eligibility for listing in the NRHP is undetermined. Approximately 200 feet of Route 2 bisects the site, which occupies a forested area along Broad Run. When first recorded in 1981, the site consisted of a surface scatter of non-diagnostic lithic artifacts. A 2004 Phase I survey found one lithic artifact on the site surface. The 2004 investigators additionally noted that construction of the Broad Run Interceptor through the area appeared to have disturbed the site (Bodor and Hoffman 2004). ERM's review of aerial photography indicates that the site area was cultivated or fallow from at least 1949 through the 1980s, then reforested through the 1990s, remaining as such today. Based on the previous surveys, it is unlikely that intact cultural deposits are present at the site.

Route 3

ERM identified eight previously recorded archaeological resources mapped within the Golden-Mars Route 3 right-of-way. Of these, seven sites—44LD0111, 44LD0170, 44LD0472, 44LD0945, 44LD1742, 44LD1909, and 44LD1978—are along segments of Route 3 that share common alignments with Routes 1 and/or 2. Impacts on these sites would be the same as described above routes 1 and 2. The Route 3 right-of-of-way also intersects 44LD0335, but along a different alignment than Route 2. As noted above, ERM concluded based on the results of a previous survey and review of site conditions via aerial photography, it is unlikely that intact cultural deposits are present at the site.

Route 4

ERM identified seven previously recorded archaeological resources mapped within the Golden-Mars Route 4 right-of-way: 44LD0111, 44LD0170, 44LD0472, 44LD0945, 44LD1742, 44LD1909, and

44LD1978. All seven sites are along segments of Route 4 that share common alignments with Routes 1, 2, and/or 3. Impacts would be the same as described above for the other routes.

Route 5

ERM identified 11 previously recorded archaeological resources mapped within the Golden-Mars Route 5 right-of-way. Of these, ten sites—44LD0111, 44LD0170, 44LD0472, 44LD0945, 44LD1244, 44LD1311, 44LD1742, 44LD1909, 44LD1922, and 44LD1978—are along segments of Route 5 that share common alignments with Routes 1, 2, 3, and/or 4. Impacts would be the same as described above for the other routes.

Site 44LD0330 is a prehistoric temporary campsite with an unspecified temporal affiliation whose eligibility for listing in the NRHP has not been assessed. Approximately 205 feet of Route 5 bisects the center of the site, which was recorded in 1981 and has not been subject to further survey (Rust 1981). Based on current aerial imagery, the site is beneath and was likely destroyed by construction of a road.

5.4.1.2 LOCKRIDGE 230 KV LOOP

ERM identified one previously recorded archeological resource within the Lockridge Loop. Site 44LD1916 is a prehistoric lithic scatter with an unspecified temporal affiliation that has been determined not eligible for listing in the NRHP. Approximately 300 feet of the route crosses the site's southern boundary. A 2018 Phase I survey LLP recorded the site as a light lithic scatter lacking in diagnostic artifacts or intact cultural features (Cascardi et al. 2020). ERM's review of aerial photography indicates that the site was pasture or agricultural land from at least 1949 through the 1970s. Since then, the site has reforested and remains woodland.

5.4.1.3 SOJOURNER 230KV LOOP

ERM identified one previously recorded archeological resource mapped within the Sojourner Loop. 44LD1737 is a historic (twentieth century) farmstead site that has been evaluated as ineligible for listing in the NRHP. Approximately 200 feet of the route intersects the southern portion of the site. The VDHR evaluation notes indicate that the site consisted of a historic farmhouse and barn, with evidence that the house was burned and the remains removed from the site. No additional cultural features were identified. The VDHR investigators concluded the site lacked the subsurface integrity to be considered significant (Wanner 2016). In 2021 the Company's Sojourner Substation was built over the site.

5.4.2 ABOVEGROUND HISTORIC RESOURCES AND FINDINGS

Each route alternative reviewed in this study has the potential to affect historic architectural sites and districts. This section of the report presents information on known aboveground cultural resources in the vicinity of each route alternative, using the VDHR's tiered study area model described above. The locations of resources relevant to the routes are depicted on Figure 5.4.2-1. Individual descriptions of the resources are provided in the Pre-Application Analysis Report, which is attached as Appendix H. Some of these resources could be affected regardless of which Golden-Mars route is certificated by the SCC for the Project.

5.4.2.1 GOLDEN–MARS LINES

ERM identified five resources within the study tiers for Routes 1 through 5 (Table 5.4-2). In each case, the resource is along an alignment shared by all five route alternatives; thus, the impact assessment for each route is the same. ERM conducted a field reconnaissance at each resource to assess conditions and take photographs to support the preparation of simulations. Based on the simulations, construction and operation of new transmission infrastructure along the five routes would have a minimal impact on each resource, as discussed below.

The Dulles International Airport Historic District (053-0008), which is within the Dulles Airport property, is approximately 0.4 mile south of the common alignment of the routes at their terminus at the Company's approved Mars Substation. The resource's southern runway and associated taxiways are closest to the routes, with grass directly surrounding the runway bordered by trees. Simulations indicate that the tops of transmission structures could be visible from portions of the district during leaf-off seasons and from the air as aircraft take off and land. The structures would only be visible from the westernmost runway and would not be visible from the district's terminal. In addition, the recorded boundary for the resource encompasses 1,300 acres, of which only a small portion (approximately 4.4 acres) is within the 0.5-mile study tier for the routes. Mature vegetation and distance between the district and transmission line would likely to block the view from vantage points throughout most of the district (i.e., except for the southern runway and associated taxiway). Thus, ERM recommends that the Golden-Mars Lines would have a minimal impact on 053-0008.

The W&OD Railroad Historic District (053-0275) traverses the common alignment of Routes 1 through 5 in an area where the alignment collocates with Dominion's existing Lines #2150/2081. The surrounding area is urban, with multiple commercial buildings. The routes would cross the resource in two locations where the 230 kV and 500 kV are separated exiting the future Golden Substation. Simulations indicate that the Golden-Mars Lines would be visible from other portions of the resource. Multiple existing Dominion transmission lines intersect the district and share its right-of-way, and these lines would be more prominent in the landscape than the Golden-Mars Lines, except where they cross the resource. Away from this crossing, the Project's new transmission infrastructure would be visible to viewers near the resource, but the visibility would be small in comparison to the resource as a whole. Thus, ERM recommends that the Golden-Mars Lines would have a minimal impact on 053-0275.

Guilford Baptist Church (053-0968) is approximately 0.5 mile southeast of the common alignment of the Golden-Mars Lines. Numerous commercial structures and modern townhouses are between the resource and routes. Simulations indicate that three transmission structures would be faintly visible in the distance when looking to the west from the resource, but existing Dominion transmission lines would be more prominent in the landscape. The route would not be visible to the northwest, due to intervening infrastructure. Because the Project would introduce an additional modern element to the landscape (albeit small), it constitutes a change in viewshed. Thus, ERM recommends that the Golden-Mars Lines would have a minimal impact on 053-0968.

Tippet's Hill Cemetery (053-6406) is approximately 0.5 mile southeast of the common alignment of where the Golden-Mars Lines intersect Dominion's existing Lines #2165/#2170 south Waxpool Road. The surrounding environment is urban, with large data centers directly between the routes

and resource. Simulations indicate that transmission structures installed along the alignment would be mostly screened by the data centers located directly adjacent to the resource. The tips of three structures near the intersection of Waxpool Road and Pacific Boulevard, would be visible when looking to the northwest from the resource's northwestern corner. It is important to note that Dominion's existing Lines #2165/2170 are approximately 160 feet south of the resource and are visible when looking from the resource's southern and eastern boundary. This, in addition to the data centers, has already added modern elements to the landscape. While the viewshed impact from the Golden-Mars Lines would be minor, it nonetheless constitutes a change, because it introduces an additional modern element into the landscape. Thus, ERM recommends that the Golden-Mars Lines would have a minimal impact on 053-6406.

Ox Road Trace (053-6416) is approximately 165 feet northwest of the common alignment of the routes where they are adjacent to Dominion's existing Lines #2149/#2203/#2214. The surrounding area mostly consists of data centers and wooded areas along Broad Run, which is directly south of the resource (the former alignment of Ox Road likely crossed the creek in this location). Simulations indicate that multiple sets of transmission structures would be visible to the east and south from inside the road trace. Existing data centers and transmission lines have compromised the resource's historic viewshed. In addition, Dominion's existing Line #2149/2203 currently intersects the resource. Other than the southern and eastern viewshed, viewsheds from the Ox Road Trace would remain unchanged. The new Project infrastructure would be visible from multiple vantage points within the resource and would add additional modern elements to the landscape but would not significantly change existing conditions. Thus, ERM recommends that the Golden-Mars Lines would have a minimal impact on 053-6416.

TABLE 5.4-2 HISTORIC RESOURCES IN VDHR TIERS FOR THE GOLDEN-MARS LINES

Buffer (miles)	Resource Category	Resource Number	Description	Impact
1.0 to 1.5	National Historic Landmarks	NA	None identified	NA
0.5 to 1.0	National Register Properties (listed)	NA	None identified	NA
	Locally Significant	053-0968	Guilford Baptist Church	Minimal
0.0 to 0.5	National Register—eligible	053-0008	Dulles International Airport Historic District	Minimal
	Locally Significant	053-6406	Tippet's Hill Cemetery	Minimal
		053-6416	Ox Road Trace	Minimal
0.0 (within ROW)	National Register—eligible	053-0276	Washington & Old Dominion Railroad	Minimal

NA = not applicable; ROW = right-of-way.

5.4.2.2 LOCKRIDGE 230 KV LOOP

ERM identified one resource—Ox Road Trace (053-6416)—within the study tiers for the Lockridge Loop (Table 5.4-4). The impacts of the Golden–Mars Routes on this resource are described in

Section 5.4.2.1. Simulations indicate that transmission infrastructure installed along the Lockridge Loop would not be visible from the resource; therefore, ERM recommends that the Lockridge Loop would have no impact 053-6416.

TABLE 5.4-3 HISTORIC RESOURCES IN VDHR TIERS FOR THE LOCKRIDGE LOOP

Buffer (miles)	Resource Category	Resource Number	Description	Impact
0.5 to 1.0	Locally Significant	053-6416	Ox Road Trace	No impact

5.4.2.3 SOJOURNER 230 KV LOOP

ERM identified one resource—Dulles International Airport Historic District (053-0008)—within the study tiers for the Sojourner Loop (Table 5.4-5). The impacts of the Golden–Mars Routes on this resource are described in Section 5.4.2.1. Simulations indicate that the Sojourner Loop would not be visible from the resource.; therefore, ERM recommends that the Sojourner Loop would have a no impact 053-0008.

TABLE 5.4-4 HISTORIC RESOURCES IN VDHR TIERS FOR SOJOURNER LOOP

Buffer (miles)	Resource Category	Resource Number	Description	Impact
0.0 to 0.5	National Register—eligible	053-0008	Dulles International Airport Historic District	No impact

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

Some portions of the route alternatives were previously surveyed for cultural resources. Research indicates that 86 prior Phase I cultural resource surveys have been conducted within 1.0 mile of the routes, including 31 that overlap portions of individual routes. Because the route alternatives share some common segments, many of the previous surveys have covered portions of multiple routes. The previous surveys relevant to the route alternatives are identified in Appendix H, Stage 1 Pre-Application Analysis (see Section 2.4, Table 11 and Attachment 2).

5.5 ENVIRONMENTAL JUSTICE

5.5.1 EXISTING CONDITIONS

5.5.1.1 IDENTIFICATION OF ENVIRONMENTAL JUSTICE POPULATIONS

State guidelines established in the Virginia Environmental Justice Act (VEJA) of 2021 (VA. Code §§ 2.2 234 through 235) are more stringent than previously applicable federal guidelines.[6] State guidelines form the basis of this study.

VEJA defines "Environmental Justice" and "Environmental Justice Community" as follows (Va. Code § 2.2-234):

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

Based on VEJA guidelines, this study identifies EJ communities using the criteria described below.

Racial/Ethnic Composition:

- The percent of individuals in an EJ analysis area who identify as a race or ethnicity other than "white alone, not Hispanic or Latino" is greater than 41% of the total population (the Commonwealth average) (i.e., a "community of color"); OR
- The percent of any racial or ethnic group that is not "white alone, not Hispanic or Latino" in the population for the analysis area is greater than the Commonwealth average for that racial or ethnic group (i.e., "population of color"); OR
- The percent of the population in the analysis area considered linguistically isolated (individual in households were nobody speaks English at least "very well") is greater than the Commonwealth average of 3%.

[6] Previous federal EJ guidelines, such as Executive Order 12898 (1994), Executive Order 14096 (2023), and subsequent guidance from federal agencies including (but not limited to) the Environmental Protection Agency were rescinded in 2025. These previous guidelines nonetheless established nationwide expectations regarding consideration of the EJ impacts of major capital projects. The VEJA guidelines are generally similar to and more stringent than this rescinded guidance.

Low-Income:

- The share of households with total earnings less than 200% of the Federal Poverty level and less than or equal to 80% of the median household income of the analysis area is greater than 30% (Va. Code § 2.2-234).

ERM used the Census Block Group (CBG) as the primary unit of analysis for this study because the CBG is the smallest unit for which U.S. Census Bureau demographic data are available. The EJ study area and analysis included CBGs entirely or partially within 1-mile of each route alternative. ERM collected demographic data from the U.S. Census Bureau American Community Survey, 5 Year Estimates (2019–2023) (U.S. Census Bureau 2023d and 2023e). Demographic and socioeconomic data for CBGs in the study area are depicted on Figure 5.5.1-1.

Based on the EJ criteria thresholds identified above, and as depicted in Figure 5.5.1-1, 29 of 32 CBGs within the analysis area contain EJ communities based on ethnicity/race, while the remainder have no permanent resident population. Table 5.5-1 provides population and demographic information for each of the CBGs in the study area, which are identified in the table by the census tract that contains them.

As shown in Table 5.5-1, every CBG with a permanent population that is crossed by a Project route alternative is a potential EJ community based on populations of color. Thus, the desktop review results suggest that construction of the proposed facilities would occur almost entirely within potential EJ communities, regardless of which Golden-Mars alternative route is chosen for the Project.

Regarding low-income communities, the 1-mile analysis area surrounding the route alternatives is more affluent than Virginia as a whole. One CBG within the EJ study area meets the criteria for a low-income population, but this CBG is not crossed by a route.

Of the 32 CBGs in the EJ study area, 12 have a significant linguistically isolated population. Four of these linguistically isolated populations are in CBGs crossed by at least one route alternative. Dominion has considered linguistic isolation in their community engagement, offering simultaneous Spanish translations of the July 30, 2024, virtual community meeting presentation.

5.5.1.2 OTHER SENSITIVE POPULATIONS

ERM used three other indicators to determine if additional socioeconomic burdens contribute to overall burdens in communities along the routes: education attainment (the percent of people over age 25 in a CBG with less than a high school education), and age-based vulnerabilities (i.e., the percent of people in a CBG under age 5 or over age 64). There is no equivalent VEJA definition for these groups; however, consistent with the methodology in routing studies for multiple projects previously approved by the SCC, age-based communities are identified using previously applicable federal guidance of a meaningfully greater threshold. A CBG is considered to contain a potential age-based vulnerable community (or community with low education attainment) when the percentage of the population either below age 5 or above age 64 (or with less than a high school education) exceeds twice the corresponding state averages.

Most of the residents within 1-mile of the routes have at least a high school education. Two of the 32 CBGs in the study area have populations that meet the criterion described above for

educational attainment (the percentage of the population with less than a high school education is more than twice the state average). No routes cross these CBGs.

There are no CBGs in the 1-mile analysis area where the percentage of the population under age 5 is twice the state average or greater. One CBG has a percentage of the population over age 64 that is twice the state average or greater, but this CBG is not crossed by the Project routes.

5.5.1.3 ROUTE SUMMARY

One or more of the route alternatives cross 13 CBGs in the analysis area are directly crossed by one or more route alternative. Due to the densely populated nature of the area, the shorter alternatives (Routes 3 and 4) cross the fewest CBGs while Route 5 (the longest alternative) crosses the most. The Lockridge Loop is contained within one CBG and the Sojourner Loop within two CBGs.

Table 5.5-1 details the demographic information for each of the CBGs crossed by and within the EJ study area. In summary:

- Route 1: 10 out of 11 CBGs crossed are potential EJ communities.
- Route 2: 9 out of 10 CBGs crossed are potential EJ communities.
- Route 3: 6 out of 7 CBGs crossed are potential EJ communities.
- Route 4: 4 out of 5 CBGs crossed are potential EJ communities.
- Route 5: 12 out of 13 CBGs crossed are potential EJ communities.
- Lockridge Loop Route: the CBG crossed is a potential EJ community.
- Sojourner Loop 1: 1 out 2 CBGs crossed are potential EJ communities.

5.5.2 IMPACT ASSESSMENT

Golden-Mars Routes 1 through 5 follow the same alignment from the future Golden Substation site to the Dulles Greenway. This segment of the routes crosses two CBGs, each of which contain a potential EJ community based on populations of color. This area also contains the Lockridge Loop. The lands crossed in the CBGs consist of either developed commercial or industrial land or undeveloped forested land, much of which is proposed to be developed for data centers. There are no residences or residential areas along or adjacent to this segment of the routes.

South of Dulles Greenway, the routes diverge. Routes 1 and 5 generally follow Loudoun County Parkway cross seven and eight CBGs, respectively, each with potential EJ communities based on populations of color. As discussed in Section 5.1.4, the routes run adjacent to neighborhoods and within 500 feet of hundreds of dwellings on both sides of Loudoun County Parkway in this area.

TABLE 5.5-1 ENVIRONMENTAL JUSTICE INDICATORS FOR CBGS WITHIN 1-MILE OF THE ROUTES

Geography	Population	Total Populations of Color (%)	White, non-Hispanic (%)	Black or African American (%)	American Indian and Alaska Native (%)	Asian (%)	Pacific Islander (%)	Some Other Race Alone (%)	Two or More Races (%)	Hispanic or Latino (%)	Low-Income Population (%)[b]	Limited English-Speaking Household(%)	Population with Less than High School Education (%)	Population Under Age 5 (%)	Population Over Age 64 (%)	Route or Site Crossing CBG
Virginia	8,657,499	41	59	18	0	7	0	1	4	11	23	3	9	6	16	-
Loudoun County	427,082	48	52	7	0.1	21	0.1	0.6	5	14	9	4	6	6	10	-
CT 6110.06 BG 1	1,958	56	44	17	0.0	28	0.3	0.7	4	7	3	3	5	4	7	GM 1–5
CT 6110.18 BG 2	1,886	9	91	0	0.4	7	0.0	0.0	1	0	15	7	2	0	99	
CT 6110.18 BG 3	600	48	52	6	0.0	20	0.0	5.2	2	16	12	12	6	3	7	
CT 6110.19 BG 3	1,540	53	47	4	0.0	42	0.0	0.0	3	4	3	2	6	4	11	
CT 6110.20 BG 2	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
CT 6110.20 BG 3	1,982	65	35	5	0.0	47	0.0	0.0	5	9	5	17	10	6	1	GM 1–5, LL
CT 6110.20 BG 6	462	51	49	32	0.0	0	0.0	0.0	11	8	46	0	0	0	0	
CT 6110.22 BG 1	1,809	52	48	24	0.0	12	0.0	0.0	0	15	13	0	2	4	12	
CT 6110.22 BG 2	1,648	68	32	0	0.0	52	0.0	0.0	0	17	3	5	4	3	17	
CT 6110.22 BG 4	2,261	52	48	2	0.0	36	0.0	0.0	6	8	11	3	4	4	5	
CT 6110.26 BG 1	7,239	58	42	6	0.2	42	0.2	0.0	3	6	7	2	2	7	6	GM 1, 2, 5
CT 6110.26 BG 2	6,916	59	41	10	0.0	40	0.0	1.1	3	5	5	1	2	7	5	
CT 6110.27 BG 1	2,498	54	46	19	0.0	20	0.0	0.0	6	8	15	5	7	8	5	
CT 6110.30 BG 1	3,266	61	39	6	0.4	39	0.0	0.0	6	9	8	3	7	6	6	GM 5

Geography	Population	Total Populations of Color (%)	White, non-Hispanic (%)	Black or African American (%)	American Indian and Alaska Native (%)	Asian (%)	Pacific Islander (%)	Some Other Race Alone (%)	Two or More Races (%)	Hispanic or Latino (%)	Low-Income Population (%)[b]	Limited English-Speaking Household(%)	Population with Less than High School Education (%)	Population Under Age 5 (%)	Population Over Age 64 (%)	Route or Site Crossing CBG
CT 6110.30 BG 2	3,671	81	19	8	0.3	62	0.0	1.0	2	8	1	0	15	4	10	GM 5
CT 6110.31 BG 1	2,707	54	46	12	0.0	21	0.0	0	5	16	0	1	0	7	2	GM 1, 5
CT 6110.31 BG 2	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
CT 6110.32 BG 1	1,635	54	46	9	2	35	0	0	8	0	9	10	6	6	10	GM 1–5
CT 6110.32 BG 2	1,173	79	21	10	0	42	0	4	1	23	19	2	0	7	8	
CT 6115.01 BG 1	819	62	38	11	2	45	0	0	1	3	18	19	3	2	4	
CT 6115.02 BG 1	1,940	69	31	15	0	36	0	0	2	15	10	11	9	10	12	
CT 6115.02 BG 2	3,393	65	35	6	0	11	0	1	2	46	9	7	26	9	16	
CT 6116.01 BG 1	1,638	64	36	2	0	21	0	1	1	39	4	5	13	4	5	
CT 6116.01 BG 2	2,421	53	47	6	0	12	0	2	3	30	10	2	15	13	10	
CT 6116.02 BG 1	1,368	80	20	0	0	11	0	1	1	67	11	34	42	4	10	
CT 6118.12 BG 2	1,951	69	31	7	0	38	0	0	3	21	20	8	8	13	2	
CT 6119.01 BG 1	1,151	64	36	0	0	61	0	0	4	0	0	0	2	1	11	GM 1, 2, 3, 5
CT 6119.01 BG 2	3,435	75	25	18	0	34	0	2	4	17	10	1	0	8	2	GM 1, 2, 3, 5
CT 6119.01 BG 3	2,411	75	25	0	0	70	0	0	3	1	6	7	6	4	11	GM 1–5, SL
CT 6119.02 BG 1	2,147	64	36	3	0	56	1	0	3	0	3	7	1	3	9	GM 1, 2, 5
CT 6119.02 BG 2	4,224	58	42	7	0	42	0	0	5	4	5	1	1	5	3	GM 1, 2, 5

Geography	Population	Total Populations of Color (%)	White, non-Hispanic (%)	Black or African American (%)	American Indian and Alaska Native (%)	Asian (%)	Pacific Islander (%)	Some Other Race Alone (%)	Two or More Races (%)	Hispanic or Latino (%)	Low-Income Population (%)[b]	Limited English-Speaking Household(%)	Population with Less than High School Education (%)	Population Under Age 5 (%)	Population Over Age 64 (%)	Route or Site Crossing CBG
CT 9801 BG 1	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	GM 1–5, SL

Sources: U.S. Census Bureau 2023a, 2023b, 2023c, 2023d, 2023e (Tables B03002, C17002, C16002, B15002, B01001)

CBG = Census Block Group; GM = Golden–Mars Route; LL = Lockridge 230 kV Loop; NA = not applicable (CBG has no population); SL = Sojourner 230 kV Loop.

[a] U.S. Census Bureau American Community Survey 5 Year Estimates (2019–2023), Table B03002.
[b] U.S. Census Bureau American Community Survey 5 Year Estimates (2019–2023), Table C17002.
[c] U.S. Census Bureau American Community Survey 5 Year Estimates (2019–2023), Table C16002.
[d] U.S. Census Bureau American Community Survey 5 Year Estimates (2019–2023), Table B15002.
[e] U.S. Census Bureau American Community Survey 5 Year Estimates (2019–2023), Table B01001.

Bold font indicates the CBG is crossed by a route or route variation.
Grey shaded cells include reference population.
Blue shaded cells indicate populations of color including community of color is composed primarily of one of the groups listed in the VEJA definition of "population of color" or the analysis area has a greater percentage of a community of color than the state as a whole.
Green shaded cells indicate low-income populations.
Yellow shaded cells indicate populations with language barriers.
Purple shaded cells indicate significant populations with less than a high school education, under age 5, or over age 64 population.

In contrast, Routes 2, 3, and 4 continue southeast across mostly forested land in the Broad Run floodplain to the parcel containing Rosa Lee Carter Elementary School and Rock Ridge High School. This segment of the routes is collocated with existing Lines #2095/#2218 and crosses two CBGs, both with potential EJ communities based on populations of color. This segment stays mostly on the southeast side of the floodplain abutting a commercial and industrial development. Residential subdivisions and dwellings on the northwest side of the floodplain, but the forested floodplain of Broad Run provides a buffer for most of these dwellings.

At the school parcel containing the schools, Route 2 heads west to Loudoun County Parkway where it joins Route 1 and follows the same alignment as Routes 1 and 5 for the remainder of its length. Routes 3 and 4 follow alternate alignments around the campus, then rejoin and continue south in a common same alignment along the Broad Run floodplain. This segment of the routes passes near dwellings in subdivisions on either side of the creek, crossing one CBG with a potential EJ community based on populations of color. There are fewer dwellings along this segment of the route than along the corresponding shared segment of Routes 1, 2, and 5 along Prince William Parkway. As with the northern shared segment of Routes 2, 3, and 4, the forested floodplain along this segment of Routes 3 and 4 provides some buffering from nearby dwellings.

Routes 1 through 5 intersect approximately at the crossing of Old Ox Road, then follow the same alignment south to the Mars Substation site across two CBGs. While one of these CBGs contains a potential EJ community based on populations of color, although the area crossed consists of either undeveloped forest or commercial land with no homes in the vicinity. The other CBG encompasses Dulles Airport and does not have a resident population. The Sojourner Loop is also in this CBG.

Based on the above discussion, substantial segments of Golden-Mars Routes 1, 2, and 5 pass through densely populated suburban areas south of the Dulles Greenway. Routes 3 and 4 also pass near suburban neighborhoods, but these routes generally cross industrial/commercial lands or woodland, particularly along Broad Run. As such, Routes 3 and 4 pass through fewer CBGs and pass near substantially fewer dwellings than Routes 1, 2, and 5, as documented in Section 5.1.4.

While all routes cross or pass near suburban neighborhoods in potential EJ communities, most of the CBGs crossed are more affluent than the Commonwealth’s average population, evidenced by low percentages of low-income residents, high levels of public amenities and parks, and large, new-build homes. This indicates an overall higher standard of living than the Commonwealth-average in the communities that would be directly crossed by the Project, regardless of route. The one CBG in the EJ study area with a significantly high percentage of low-income residents is not crossed and therefore is unlikely to be affected by the Project.

To ensure that stakeholder concerns regarding the potential direct and indirect impacts of the Project are understood and considered in routing decisions, Dominion designed and implemented a comprehensive outreach program early in the Project’s development phase to identify and engage with all community stakeholders, regardless of EJ community status, including federally recognized tribes. The outreach program was designed in line with the VEJA and the Company’s Environmental Justice Policy to share Project materials through written and in-person methods (e.g., letters and open houses), to document comments provided by stakeholders, and to respond to feedback by seeking ways to mitigate or avoid identified impacts, including potential

disproportionate impacts on vulnerable communities. As part of the outreach, the Company hosted virtual community meetings on July 30, 2024, and January 14, 2025, and an in-person open house on January 15, 2025.

In assessing whether a community would bear a disproportionately adverse impact from the Project, ERM considered construction impacts, visual impacts, property devaluation, and health impacts related to electromagnetic fields (EMF), as discussed below. The various route alternatives share many similarities. The subsections below provide general discussion of EJ impacts and call out instances where certain route alternatives may have different impacts.

From an EJ perspective, Routes 1, 2, and 5 are the least preferrable Golden-Mars routes, because they pass closer to more residences and in more communities than Routes 3 or 4. Routes 3 and 4 pass near fewer homes and subdivisions, primarily by crossing undeveloped forest land along Broad Run.

As discussed below, impacts on views, property values, and health from construction activities are not anticipated to be significantly adverse. Thus, while each Golden-Mars route alternative and the Lockridge and Sojourner Loops cross potential EJ communities, the Project would not have overall significantly adverse impacts on potential EJ communities, regardless of route.

5.5.2.1 CONSTRUCTION ACTIVITIES

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

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

Noise is generally defined as unwanted sound. The primary noise receptors in the study area would be residents along the route alternatives. Because Golden-Mars Routes 1, 2, and 5 follow Loudoun County Parkway, construction would introduce noise to residents along that roadway. Each of these routes has over 100 residences within 60-feet of their right-of-way. Routes 3 and 4 also pass by residential neighborhoods near Loudoun Reserve Drive and by Rock Ridge High School, but both routes have fewer than 10 residences within 60-feet of the Project right-of-way. As such, while Routes 3 and 4 pass fewer suburban neighborhoods, no route avoids passing close to residences.

During construction, temporary, localized noise from heavy equipment and increased vehicle traffic is expected to occur during daytime hours. Exceedances of daytime noise limits are not expected; if they occur, the exceedances would be temporary.

During construction, Dominion would minimize ground-disturbing activities to the extent practicable. Following construction, Dominion would remove construction-related equipment and debris from the right-of-way and restore the land within the right-of-way as closely as possible to

preconstruction conditions. Dominion would maintain the right-of-way with herbaceous cover during operations.

5.5.2.2 VISUAL IMPACTS

Section 5.3 (Visual Resources) assesses the Project's visual impacts. Because all the routes cross CBGs with sensitive populations and/or potential EJ communities, many of the KOPs used in the analysis of visual impacts are representative of views in potential EJ communities. Regardless of which Golden-Mars route alternative is chosen, the visual impact would be moderate to high and numerous residential areas within potential EJ communities would be impacted. Both the Lockridge and Sojourner Loops would have minor impacts on visual resources, due to their location away from populated areas.

5.5.2.3 PROPERTY VALUES

Affected communities and landowners often express concern that the presence of transmission lines in the viewshed of homes could adversely affect aesthetics, resulting in the reduction of property values and deterring potential buyers. Indirect impacts on property values caused by direct visual impacts from high-voltage transmission lines (i.e., lines carrying more than 69 kV) depend on proximity, visibility, size, and type of transmission structures; easement landscaping; and surrounding topography. Based on a review of industry research published in peer-reviewed journals and trade journals, residential property values and sales prices are primarily affected by factors unrelated to the presence of a transmission line. Other factors have been shown through research to have greater influence on the value of residential property than the presence of a transmission line, such as location, type, and condition of improvements to the property; neighborhood; and local real estate market conditions (Jackson and Pitts 2010; Anderson et al. 2017).

Table 5.1-7 includes the number of homes that are within 500 feet of the route centerlines. The landscapes that the routes pass through are predominantly suburban, though Routes 3 and 4 pass through more mixed-use industrial and commercial areas and wooded areas. No route completely avoids passing near centers of population.

5.5.2.4 HEALTH IMPACTS

The conclusions of multidisciplinary scientific review panels assembled by national and international scientific agencies during the past three decades are the foundation of Dominion's opinion that no adverse health impacts are anticipated to result from the operation of the transmission infrastructure.

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

expert panels assembled by agencies to identify, review, and summarize the results of this large and diverse research.

The reviews of EMF-related biological and health research have been conducted by numerous scientific and health agencies, including, for example, the European Health Risk Assessment Network on Electromagnetic Fields Exposure, the International Commission on Non-Ionizing Radiation Protection, the World Health Organization, the Institute of Electrical and Electronics Engineers International Committee on Electromagnetic Safety, the Scientific Committee on Emerging and Newly Identified Health Risks of the European Commission, and the Swedish Radiation Safety Authority (formerly the Swedish Radiation Protection Authority; WHO 2007; SCENIHR 2009, 2015; ICNIRP 2010; SSM 2015, 2016, 2018, 2019, 2020, 2021, 2022; ICES 2019). The general scientific consensus of the agencies that have reviewed this research, relying on generally accepted scientific methods, is that the scientific evidence does not confirm that common sources of EMF in the environment, including transmission lines and other parts of the electric system, appliances, etc., are not a cause of any adverse health impacts. More information on Dominion's opinion can be found at https://www.dominionenergy.com/projects-and-facilities/electric-projects/emf (Dominion Energy 2024).

5.6 GEOLOGICAL RESOURCES

The Project study area is within the Piedmont geologic province, which lies between the mountainous Blue Ridge province to the west and the terraced slopes of the Coastal Plain province to the east. The Piedmont is characterized by rolling topography, thick soils, and heavily weathered bedrock primarily caused by the region's humid climate. The geologic terranes of the province are relatively complex; many of the rock units are separated by faults and contain various igneous and metamorphic histories. Based on review of the Geologic Map of Virginia, the Project is within a Mesozoic basin situated between the Blue Ridge and Western Piedmont-Potomac Terranes (William and Mary Department of Geology 2024).

5.6.1 EXISTING CONDITIONS

Beginning at Golden Substation, Golden–Mars Routes 1 through 5 cross Triassic-age shale and siltstone belonging to the Newark Supergroup, prior to encountering a section of igneous mafic bedrock (diabase). Each route then re-encounters intervals of interbedded shale, siltstone, and sandstone, as well as the diabase unit. The routes terminate at Mars Substation within a bedrock unit consisting of intermixed shale and siltstone.

The Lockridge Loop begins and ends within sections of the Newark Supergroup shale and siltstone, with a crossing of diabase in the center of each route.

The Sojourner Loop is within a section of Newark Supergroup shale and siltstone.

5.6.2 MINERAL RESOURCES

ERM reviewed publicly available Virginia Energy datasets (2023), USGS topographic quadrangles (2025), and recent digital aerial photography (Loudoun County 2024) to identify mineral resources in the study area. Based on this review, there are no active mines within 0.25 mile of the Golden–Mars routes, Lockridge Loop, or Sojourner Loop. The closest active permitted mine lies

approximately 1.5 miles south of the Mars Substation site, with the closest inactive mine resource site approximately 0.4 mile southeast of the common alignment of Routes 1 through 5.

5.6.3 IMPACT ASSESSMENT

Because the closest active mineral resource site is lies approximately 1.5 miles from the nearest Project component, the Project would have no impact on mineral resources.

6 COMPARISONS, CONCLUSIONS, AND RECOMMENDATIONS

On behalf of Dominion, ERM identified, assessed, and compared five route alternatives (Routes 1 through 5) for the Golden–Mars 500-230 kV Lines, as well as the routes for the Lockridge 230 kV Loop and Sojourner 230 kV Loop. The routes were identified and evaluated based on multiple criteria, including the Project's purpose and need, engineering considerations, environmental impacts, land use planning, land ownership, and potential impacts to the community. Based on comparison of the advantages and disadvantages of each route alternative discussed in Section 4, Route Alternatives, and below, ERM and Dominion determined that either Route 3 or Route 4 would reasonably minimize adverse impacts to the greatest extent reasonably practicable on the scenic assets, historic and cultural resources, and environment, as well as on planned developments. Although Route 4 is superior to Route 3 when comparing metrics such as proximity to dwellings, crossings of park land, and waterbody crossings, LCSB has not consented to either route. Route 3 remains the second least impactful route overall, the County's secondary route preference, and the route that the Company believes to be least impactful to LCSB property. This study therefore recommends Route 3 as the preferred route alternative.

Routing the Golden-Mars Lines was an iterative process informed by information gathered by ERM over the past year through participation in the outreach and coordination efforts between Dominion and various stakeholders (including the Loudoun County BOS, and County staff, the LCSB, LCSB staff, residents, and other stakeholders). To help contextualize the data presented in the routing study, an explanation of how the Golden-Mars routes were characterized and discussed with stakeholders and community members is provided below.

During the community meetings and stakeholder outreach, the Golden-Mars route alternatives were often referred to as either a "Loudoun County Parkway route" or a "School route/Broad Run route," distinguishing between the two potential route corridors south of the Dulles Greenway. The first corridor consists of Routes 1 and 5, which are collocated with portions of Loudoun County Parkway. The routes in this corridor were generally referred to as the "Loudoun County Parkway routes". The second corridor consists of Routes 3 and 4, which cross portions of the Rock Ridge High School Campus and Rosa Lee Carter Elementary School campus—both Loudoun County Public Schools properties. The routes in this corridor were generally referred to as the "School routes" or "Broad Run routes". Route 2 collocates with Loudoun County Parkway and crosses Loudoun County Public Schools property but was generally considered to be among Loudoun County Parkway route, since Route 2 parallels that road for 1.5 miles. These characterizations summarize the main alignment or location differences between the Golden-Mars Lines route alternatives: those routes along Loudoun County Parkway versus those crossing portions of School Board property.

Golden-Mars Routes 1 and 5 (Loudoun County Parkway routes) are longer, require more right-of-way, and would be more visually impactful to neighborhoods and residents but avoid public lands—namely, the School Board property and County parklands—and are less environmentally impactful, due to their avoidance of the Broad Run stream corridor. Routes 1 and 5 are preferred by certain stakeholders, such as the Loudoun Wildlife Conservancy (Fergueson 2025). The relative benefits notwithstanding, by avoiding Broad Run, Routes 1 and 5 forgo the main collocation

opportunity in the southern half of the study area, specifically Dominion's existing 230 kV Lines #2218 and #2095 corridor, which already follows Broad Run.

Route 5 is further distinguished as the only "immediately buildable" route, in the sense that it is the only Golden-Mars route alternative that does not rely on crossing public lands except for <0.1 acre portion of a BOS-owned property that the County indicated verbally was acceptable to cross. By comparison, Routes 1, 2, 3, and 4 cross BOS open space easements, County-owned land, and/or Loudoun County School Board-owned land. Without consent from the Loudoun County Board of Supervisors and/or the Loudoun County School Board to cross their properties, Routes 1, 2, 3, and 4 are not buildable.

Golden-Mars Routes 3 and 4 (the School routes or Broad Run routes) follow Broad Run and the existing transmission line corridor and are shorter, less impactful to adjacent neighborhoods and residences, better collocated with existing transmission lines, and less visible, but are more environmentally impactful, because either route would adversely affect forests and natural resources in the Broad Run stream corridor. The advantages in collocation and avoidance of homes and residents are so significant, however, that on January 22, 2025, the Loudoun County Board of Supervisors voted (8 votes for, 0 against, and 1 abstention) to:

> "…affirm the County's position identifying Route 4 of the Golden to Mars Transmission Line alignment as the County's preferred route and Route 3 of the Golden to Mars Transmission Line alignment as the County's secondary route preference" and further "direct (County) staff to send a letter to the Loudoun County Public Schools requesting their support of either Routes 3 or 4 of the proposed Golden to Mars Transmission Line alignment" (BOS 2025).

Loudoun County customarily responds to agency letters only after a project filing. This is the first known instance of the Loudoun County BOS voting on a resolution in favor of specific routes prior to an SCC filing.

The complete Feature Crossing Table, provided as Appendix D, lists the potential impacts on resources by each route alternative. The following subsections provide a comparative analysis of relevant resource impacts for the Golden-Mars route alternatives. ERM determined there were no meaningful differences between the route alternatives with regards to land use and land cover, existing or planned transportation infrastructure, airport and heliports, cultural resources, or geological and mineral resources. As a result, these resources are either not discussed further in this section or they are incorporated into other relevant resource discussions.

Because no viable route alternatives were identified for the Lockridge 230 kV Loop and Sojourner 230 kV Loop, no further comparative analysis is provided for these Project components.

6.1 COMPARISONS OF ALTERNATIVES

This analysis compares Golden-Mars Routes 1 through 5 across key metrics, including length, right-of-way required, environmental considerations, and community effects. Each metric is quantified where possible to allow direct comparison. Table 6.1-1 summarizes the overall length, right-of-way requirements, and collocation information for each route. Table 6.1-2 summarizes the number of dwellings near each of the Golden–Mars routes. Table 6.1-3 summarizes the key

environmental impacts of the Golden–Mars routes, including wetland, waterbody, and forest impacts.

6.1.1 ROUTE LENGTH, RIGHT-OF-WAY AND COLLOCATION

Golden-Mars Routes 3 and 4 are the shortest routes, requiring the least new right-of-way—approximately 20% less than Routes 1, 2, and 5. Routes 3 and 4 also maximize collocation opportunities by following the Broad Run corridor, parallel to the Company's existing Lines #2095 and #2218.

6.1.2 NEIGHBORHOODS AND DWELLINGS

Golden-Mars Routes 3 and 4 would impact a significantly fewer number of dwellings and would be less visible from adjacent neighborhoods and would therefore have substantially lesser impacts on neighborhoods and residents.

6.1.3 WETLANDS, WATERBODIES, AND FORESTS

Notable findings related to these environmental resources include:

- Routes 1 and 5 minimize overall wetland impacts and especially impacts on forested wetlands.
- Routes 1 and 5 would have the smallest overall forest impacts.
- Route 2 would have the largest impacts on wetlands and the largest number of stream crossings.
- Routes 3 and 4 have the longest crossings of Broad Run Stream Valley Park and River and Stream Corridor Resource areas despite being collocated with existing utility corridors.
- Routes 1 and 5 minimize impacts to park lands but create new utility corridors within and adjacent to predominantly suburban residential neighborhoods as well encroaching on multi-use pedestrian paths along Loudoun County Boulevard.

TABLE 6.1-1 LENGTH AND RIGHT-OF-WAY REQUIREMENTS AND COLLOCATION, GOLDEN–MARS ROUTES

Route	Total Length (miles)	New Right-of-Way Required (acres)	Collocation with Existing Transmission Lines (miles)	Collocation with Existing Transmission Lines (percent)
Golden-Mars Route 1	9.4	123.5	2.8	30
Golden-Mars Route 2	9.3	121.7	4.0	43
Golden-Mars Route 3	8.3	108.6	4.0	48
Golden-Mars Route 4	8.3	109.3	4.4	53
Golden-Mars Route 5	9.8	129.3	2.8	29

TABLE 6.1-2 NEIGHBORHOODS AND DWELLINGS

Route Alternative	Dwellings within 100 Feet of Centerline	Dwellings within 250 Feet of Centerline	Dwellings within 500 Feet of Centerline
Golden–Mars Route 1	116	275	984
Golden–Mars Route 2	110	231	697
Golden–Mars Route 3	4	28	133
Golden–Mars Route 4	1	10	69
Golden–Mars Route 5	125	312	1,163

TABLE 6.1-3 COMPARISON OF ENVIRONMENTAL IMPACTS, GOLDEN–MARS ROUTES

Route	Total Wetland Impacts (acres)	Total Forested Wetland Impacts (acres)	Waterbody Crossings (number)	Total Forest Impacts (acres)
Golden-Mars Route 1	27.2	15.8	33	50.3
Golden-Mars Route 2	34.7	21.9	40	64.7
Golden-Mars Route 3	28.1	19.8	34	66.5
Golden-Mars Route 4	29.8	22.1	31	67.0
Golden-Mars Route 5	27.2	15.5	37	49.1

6.2 COMPARISON SUMMARY

This section summarizes the notable and significant differences between the Golden–Mars route alternatives as discussed in the preceding portions of this Routing Study.

Golden-Mars Route 1

Strengths:

- Second least wetland impacts (9.4 acres of new forested wetland impacts)
- Second least impacts to forests (50.3 acres)

Limitations:

- Second-greatest requirement for new right-of-way
- Limited collocation (30%) along existing transmission line corridors
- Second greatest proximity to neighborhoods and dwellings (984 homes within 500 feet)
- Significant conflict with planned developments
- High visibility through residential areas
- Not buildable without BOS consent to cross open space easements

Golden-Mars Route 2

Strengths:

- Moderate collocation (43% of route length) along existing transmission corridors
- Balances environmental and community impacts

Limitations:

- Moderate residential proximity (697 homes within 500 feet) compared to Route 1 and Route 5
- Significant wetland impacts (15.5 acres of new forested wetland impacts)
- Multiple crossings of Broad Run
- Not buildable without Loudoun County BOS and Loudoun County School Board consent to cross open space easements, parkland, and school property

Golden-Mars Route 3

Strengths:

- Shortest route (8.3 miles), equal to Route 4
- Good collocation (48% of route length) along existing transmission line corridors
- Relatively few residential impacts (133 homes within 500 feet) compared to Routes 1, 2, and 5
- Loudoun County BOS secondary route preference
- Reduced visual impacts to adjacent neighborhoods and homes

Limitations:

- Proximity to schools, requiring special consideration

- Relatively greater wetland impacts compared to Route 1 and Route 5 (13.4 acres of new forested wetlands)
- Relatively greater forest impacts (66.5 acres)
- Crosses sensitive environmental areas along Broad Run Stream Valley Park with direct impacts to Broad Run Trail
- Not buildable without Loudoun County BOS and Loudoun County School Board consent to cross open space easements, parkland, and School Board property

Golden-Mars Route 4

Strengths:

- Shortest route (8.3 miles), equal to Route 3
- Greatest collocation with existing transmission line corridors (53%)
- Minimal proximity to neighborhoods and dwellings (69 homes within 500 feet)
- Loudoun County BOS preferred route alternative
- Least potential for visual impacts to adjacent neighborhoods and homes

Limitations:

- Proximity to schools, requiring special consideration
- Greatest wetland impacts (15.8 acres new forested wetlands)
- Relatively greater existing forest impacts (67.0 acres)
- Not buildable without Loudoun County BOS and Loudoun County School Board consent to cross open space easements, parkland, and School property

Golden-Mars Route 5

Strengths:

- Avoids public lands and schools
- Least wetland impacts (9.1 acres of new forested wetlands)
- Reduced existing forest impacts (49.1 acres)
- Buildable without additional consent from Loudoun County BOS or Loudoun County School Board

Limitations:

- Longest route (9.8 miles)
- Requires the largest amount of new right-of-way (129.3 acres)
- Least collocation (29%) with existing transmission line corridors
- Greatest residential impacts (1,163 homes within 500 feet)
- Multiple conflicts with planned developments
- Greatest potential visual impacts to neighborhoods and residents

6.3 CONCLUSION AND RECOMMENDATIONS

Based on the evaluation of multiple routing criteria as outlined above, Route 3 is the preferred alternative for the Golden-Mars Lines for these reasons:

- Shortest route with smallest construction footprint;
- Best utilization of existing utility corridors (53% collocation);
- Second fewest number of dwellings within 500 ft (proximate to 1,030 fewer homes than Route 5);
- Strongly aligned with Loudoun County land use policies;
- Loudoun County BOS second route preference;
- Comparatively limited visual impacts on residential areas; and
- Avoids major conflicts with planned development.

While Route 3 has relatively greater environmental impacts than Routes 1 and 5 (Loudoun County Parkway routes), Routes 1 and 5 result in significantly greater impacts on residents and planned development. Additionally, the lack of collocation of Routes 1 and 5 with existing transmission rights-of-way contradicts sound routing principles. Route 3 provides the best balance of minimizing environmental and community impacts while meeting the Project's technical requirements and utilizing existing infrastructure corridors.

Route 4 represents a good alternative to Route 3, as it shares many of the same advantages of Route 3 with slightly different tradeoffs.

Because Routes 3 and 4 cross Loudoun County BOS and Loudoun County School Board lands, the preference depends entirely on obtaining right-of-way from these public entities. Without consent from the Loudoun County BOS and Loudoun County School Board, Route 5 is the only currently viable option for the Golden-Mars Lines and would become the preferred alternative.

The Lockridge 230 kV Loop and Sojourner 230 kV Loops have been appropriately sited to minimize impacts and represent the best route alternatives for those respective Project components.

Accordingly, ERM and the Company support the Golden-Mars Proposed Route (Route 3), the Lockridge Loop Proposed Route and the Sojourner Loop Proposed Route as the Project route alternatives that avoid or reasonably minimize adverse impact to the greatest extent reasonably practicable on the scenic assets, historical and cultural resources, and environment of the area concerned. Despite LCSB's current lack of consent, the Company continues to support the BOS's secondary route preference and is proceeding with Golden-Mars Route 3 as the Proposed Route pending continued discussion with LCSB to reiterate the infeasibility of an underground alternative and attempt to obtain timely consent from LCSB for Route 3. Without approvals from the BOS and/or LCSB allowing the construction of the Golden-Mars Proposed Route (Route 3), Golden-Mars Route 5 will become the Proposed Route for lack of any other constructable route options.

7 REFERENCES

1757 Golf Club. 2024. Welcome to 1757 Golf Club. Accessed November 2024. https://www.1757golfclub.com/.

Anderson, O.C., J. Williamson, and A. Wohl. 2017. "The Effect of High-Voltage Overhead Transmission Lines on Property Values: A Review of the Literature Since 2010." *The Appraisal Journal*, Summer 2017: 179–193.

BOS (Board of Supervisors). January 22, 2025. "Business Meeting Action Item #11." Accessed January 2025. https://lfportal.loudoun.gov/LFPortalinternet/Browse.aspx?dbid=0&startid=1948537&row=1&cr=1.

Bodor, Thomas and William Hoffman. 2004. VCRIS Archaeological Site Record, 44LD0335. On file, Virginia Department of Historic Resources, Richmond, Virginia.

BLM (Bureau of Land Management). 1984. Manual 8400—Visual Resource Management. Department of the Interior. Washington, D.C. Accessed December 2024. https://blmwyomingvisual.anl.gov/docs/BLM_VRM_8400.pdf

Cascardi, J.M., K. Hutchins-Keim, and J. Shellenhamer. 2020. Lockridge Road/Randolph Drive Intersection Improvements, Loudoun County, Virginia: Phase I Archaeological Survey Technical Report. Prepared by Rummel, Klepper & Kahl. Prepared for Dominion Energy.

CCB (Center for Conservation Biology). 2022. Eagle Nest Locator. Accessed December 2024. https://ccbbirds.org/what-we-do/research/species-of-concern/virginia-eagles/nest-locator/.

Commonwealth of Virginia. 2024. Code of Virginia: Agricultural and Forestal District Act. Accessed August 2024. https://law.lis.virginia.gov/vacodepopularnames/agricultural and forestal districts act/.

Digital Atlas of the Virginia Flora. 2024. Accessed December 2024. https://www.vaplantatlas.org/index.php?do=plant&plant=3609&search=Search.

EHT Traceries. 2024. Loudoun County African American Historic Resources Survey: Historic Context and Survey Report. Prepared for the Loudoun County Department of Planning and the Black History Committee, Friends of the Thomas Balch Library. Sponsored by Loudoun County Board of Supervisors. Accessed December 2024. https://www.loudoun.gov/DocumentCenter/View/196070/2024-Loudoun-County-AAHAR-Survey-Report.

ESRI (Environmental Systems Research Institute, Inc.), Maxar, Earthstar Geographics, and the GIS User Community. 2024. World Elevation Terrain. Accessed December 2024. https://elevation.arcgis.com/arcgis/rest/services/WorldElevation/Terrain/ImageServer.

FHWA (Federal Highway Administration). 2015. Guidelines for the Visual Impact Assessment of Highway Projects. US Department of Transportation. Washington, D.C. Accessed December 2024. https://www.environment.fhwa.dot.gov/env_topics/other_topics/VIA_Guidelines_for_Highway_Projects.aspx.

FAA (Federal Aviation Administration). No date-a. Circle Search for Airports. Accessed April 2024. https://oeaaa.faa.gov/oeaaa/external/searchAction.jsp?action=showCircleSearchAirportsForm.

FAA. No date-b. Airport Data and Information Portal. Accessed April 2024. https://adip.faa.gov/agis/public/#/public.

Fergueson, S. January 28, 2025. *Dominion Energy Project: Mars to Golden*. Loudoun Wildlife Conservancy. Accessed February 2025. https://loudounwildlife.org/2025/01/dominion-transmission-line/.

Find a Grave. 2025. World's largest gravesite collection. Accessed November 2024. https://www.findagrave.com/.

Goode, Charles. 2002. VCRIS Archaeological Site Record, 44LD0945. On file, Virginia Department of Historic Resources, Richmond, Virginia.

Google Earth LLC. 2025. Google Earth Pro, Version 7.3.6. Aerial Imagery in Virginia. Accessed January 2025.

Gustafson, N. 2024. VDCR e-mail message to ERM. Received May 23, 2024.

Haynes, John H., Jr. 1990. Dulles Toll Road Extension: Phase I Archaeological Survey Report for the Selected Alignment. Prepared by WAPORA, Inc. Prepared for the Toll Road Corporation of Virginia.

History of Loudoun County, Virginia. 2024. Early Transportation in Loudoun County from the Department of the Interior Report, "Linking the Past to the Future, A Landscape Conservation Strategy for Waterford, Virginia." Accessed September 2024. https://www.loudounhistory.org/history/loudoun-transportation/.

ICES (International Committee on Electromagnetic Safety). 2019. 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.

ICNIRP (International Commission on Non-ionizing Radiation Protection). 2010. Guidelines for Limiting Exposure to Time-varying Electric and Magnetic Fields (1 Hz to 100 kHz). Health Phys, 99: 818.

Jackson, T., and J. Pitts. 2010. "The Effects of Electric Transmission Lines on Property Values: A Literature Review." *Journal of Real Estate Literature*, 18(2): 239–259.

Jockel, K. 2022. VCRIS Archaeological Site Record, 44LD1978. On file, Virginia Department of Historic Resources, Richmond, Virginia.

Loudoun County. No date. Loudoun County Conservation Easement Stewardship Program. Accessed December 2024. https://www.loudoun.gov/5132/Conservation-Easement-Stewardship-Progra.

Loudoun County. 2021. "Linear Parks and Trails System: A Countywide Plan". Approved July 6, 2021, Revised October 29, 2021. Accessed January 2025. https://www.loudoun.gov/DocumentCenter/View/167395/LPAT-Plan_211029_Full-Appendices-4.

Loudoun County. 2023a. "Loudoun County 2019 Countywide Transportation Plan." Amended February 7, 2023. Accessed January 2025. https://www.loudoun.gov/DocumentCenter/View/152287/CTP---Combined-with-small-maps-bookmarked.

Loudoun County. 2023b. Loudoun County 2019 General Plan. Accessed October 2024. loudoun.gov/DocumentCenter/View/152285/General-Plan---Combined-with-small-maps-bookmarked.

Loudoun County. 2023c. Loudoun County Zoning Ordinance. Accessed October 2024. https://www.loudoun.gov/DocumentCenter/View/180078/Combined-Zoning-Ordinance.

Loudoun County. 2023d. Loudoun Existing and Approved Development Mapping Tool. Updated July 1, 2023. Accessed September 2024. https://arcgis.com.

Loudoun County. 2023e. "Chapter 6: Natural and Environmental Resources." *Loudoun County Zone Ordinance*. Accessed August 2024. https://www.loudoun.gov/DocumentCenter/View/180072/Chapter-6-Natural-and-Environmental-Resources.

Loudoun County. 2024a. Loudoun County Aerial Archive. Accessed December 2024. https://logis.loudoun.gov/archive/.

Loudoun County. 2024b. Land Management, Applications, Research, Coordination (LandMARC). Accessed July 2024. https://www.loudoun.gov/5823/LandMARC-Land-Management-Applications-Re.

Loudoun County. 2024c. Loudoun Geohub. Accessed July 2024. https://geohub-loudoungis.opendata.arcgis.com/.

Loudoun County. 2024d. Property Search. Accessed July 2024. https://reparcelasmt.loudoun.gov/pt/search/commonsearch.aspx?mode=parid.

Loudoun County. 2024e. WebLogis—Online Mapping System. Accessed January 2025. https://logis.loudoun.gov/weblogis/.

Loudoun County. 2024f. Loudoun County Parks, Recreation, and Community Service Website. Accessed December 2024. https://www.loudoun.gov/4119/Parks-Recreation-Community-Services.

Loudoun County. 2024g. Residential Communities of Loudoun County. Accessed February 2025.

Loudoun County Heritage Commission. 2024. Boards and Commissions—Heritage Commission. https://loudouncoalition.org/. Accessed September 2024. https://loudoungis.maps.arcgis.com/apps/webappviewer/index.html?id=94b96c482957462a9060823828fe38ff.

LCPCC (Loudoun County Preservation and Conservation Coalition). 2024. Loudoun County Preservation and Conservation Coalition. Accessed September 2024. https://loudouncoalition.org/.

Loudoun County Preservation Society. 2024. Loudoun Preservation Society. Accessed September 2024. https://preserveloudoun.org/.

LCPS (Loudoun County Public Schools). 2025. Loudoun County Public Schools. Accessed January 2025. https://www.lcps.org/.

Loudoun County. 2024h. Transportation Projects & Programs. Accessed December 2024. https://www.loudoun.gov/5789/Transportation-Projects-Programs

Monroe, Elizabeth. 2014. VCRIS Archaeological Site Record, 44LD0170. On file, Virginia Department of Historic Resources, Richmond, Virginia.

MWAA (Metropolitan Washington Airports Authority). n.d. MWAA History and Facts. Accessed January 2025. https://www.mwaa.com/about-authority/mwaa-history-and-facts.

NAIP (National Agricultural Imagery Program). 2023. Aerial imagery flown over Loudoun County, Virginia October 11, 2023. Accessed January 2024. https://naip-usdaonline.hub.arcgis.com/.

NCED (National Conservation Easements Database). 2025. NCED: National Conservation Easement Database. Accessed January 2025. https://www.natureserve.org/projects/nced-national-conservation-easement database.

NatureServe. 2024. NatureServe Global Conservation Status Ranks. Accessed December 2024. https://explorer.natureserve.org/AboutTheData/DataTypes/ConservationStatusCategories.

NOAA (National Oceanic and Atmospheric Administration). 2025. NOAA in Your State and Territory. Accessed January 2025. https://www.noaa.gov/legislative-and-intergovernmental-affairs/noaa-in-your-state-territory.

NOVA Parks. 2024. Washington and Old Dominion Railroad Regional Park. Accessed August 2024. https://www.novaparks.com/parks/washington-and-old-dominion-railroad-regional-park.

Nubgaard, A. 2021. VCRIS Archaeological Site Record, 44LD1922. On file, Virginia Department of Historic Resources, Richmond, Virginia.

Rextag. 2025. Power and Renewables GIS Database. Accessed January 2025. https://rextag.com/

Richards, L. 2003. VCRIS Archaeological Site Record, 44LD0334. On file, Virginia Department of Historic Resources, Richmond, Virginia.

Rust, W. 1981. VCRIS Archaeological Site Record, 44LD0330. On file, Virginia Department of Historic Resources, Richmond, Virginia.

Rust, W., and Randi Wilson. 1981a. Broad Run 7979 (BR7979). Archaeology Form, 44LD332. On file, Virginia Department of Historic Resources, Richmond, Virginia.

Rust, W., and Randi Wilson. 1981b. Broad Run 8080 (BR8080). Archaeology Form, 44LD333. On file, Virginia Department of Historic Resources, Richmond, Virginia.

SCENIHR (Scientific Committee on Emerging and Newly Identified Health Risks). 2009. Health Effects of Exposure to EMF. Brussels, Belgium: European Commission. Accessed October 2023. https://ec.europa.eu/health/scientific_committees/emerging/docs/scenihr_o_041.pdf.

SCENIHR. 2015. Opinion on Potential Health Effects of Exposure to Electromagnetic Fields (EMF). Brussels, Belgium: European Commission. Accessed October 2023. https://ec.europa.eu/health/scientific_committees/emerging/docs/scenihr_o_041.pdf.

Smith, H. 2020. VCRIS Archaeological Site Record, 44LD1244. On file, Virginia Department of Historic Resources, Richmond, Virginia.

Smith, H., and L. Gryctko. 2021. Phase I Cultural Resource Survey of the ±16.11 Hectares (±39.82 Acre) Dulles 28 Project Area, Loudoun County, Virginia. Prepared by Dutton & Associates. Prepared for Dominion Energy.

Smith, J., and A. Maas. 2016. Roundtable Property, Loudoun County, Virginia: Phase I Cultural Resources Investigation. Prepared by Thunderbird Research Corp. Prepared for Dominion Energy.

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

SSM. 2016. 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.

SSM. 2018. Research 2018:09. Recent Research on EMF and Health Risk—Twelfth report from SSM's Scientific Council on Electromagnetic Fields, 2017. Stockholm, Sweden.

SSM. 2019. Research 2019:08. Recent Research on EMF and Health Risk—Thirteenth Report from SSM's Scientific Council on Electromagnetic Fields, 2018. Stockholm, Sweden.

SSM. 2020. Research 2020:04. Recent Research on EMF and Health Risk—Fourteenth Report from SSM's Scientific Council on Electromagnetic Fields, 2019. Stockholm, Sweden.

SSM. 2021. Research 2021:08. Recent Research on EMF and Health Risk—Fifteenth report from SSM's Scientific Council on Electromagnetic Fields, 2020. Stockholm, Sweden.

SSM. 2022. Research 2022:16. Recent Research on EMF and Health Risk—Sixteenth report from SSM's Scientific Council on Electromagnetic Fields, 2021. Stockholm, Sweden.

Thunderbird Archaeology. 2005. VCRIS Archaeological Site Record, 44LD1311. On file, Virginia Department of Historic Resources, Richmond, Virginia.

USACE (U.S. Army Corps of Engineers). 2022. National Inventory of Dams. Accessed November 20, 2024. https://nid.sec.usace.army.mil/#/dams/system/VA107007/inspections.

U.S. Census Bureau. 2023a. *American Community Survey 5-year Estimates Census Data (2018–2022)*. File No. B03002, Hispanic or Latino Origin by Race. Accessed December 2024. https://data.census.gov/cedsci/.

U.S. Census Bureau. 2023b. *American Community Survey 5-year Estimates Census Data (2018–2022)*. File No. C17002, Ratio of Income to Poverty Level in the Past 12 Months. Accessed December 2024.https://data.census.gov/cedsci/.

U.S. Census Bureau. 2023c. *American Community Survey 5-year Estimates Census Data (2018–2022)*. File No. C16002, Household Language by Household Limited English Speaking Status. Accessed December 2024. https://data.census.gov/cedsci/.

U.S. Census Bureau. 2023d. *American Community Survey 5-year Estimates Census Data (2018–2022)*. File No. B15002, Sex by Educational Attainment for the Population 25 Years and Over. Accessed December 2024. https://data.census.gov/cedsci/.

U.S. Census Bureau. 2022e. *American Community Survey 5-year Estimates Census Data (2018–2022)*. File No. B01001, Sex by Age. Accessed December 2024. https://data.census.gov/cedsci/.

USDA-NRCS (U.S. Department of Agriculture—Natural Resources Conservation Service). Soil Survey Geographic Data (SSURGO). 2024. Accessed December 2024. https://www.nrcs.usda.gov/resources/data-and-reports/soil-survey-geographic-database-ssurgo.

USFS (U.S. Forest Service). 1995. Landscape Aesthetics: A Handbook for Scenery Management. Agricultural Handbook Number 701. US Department of Agriculture. Washington, D.C. Accessed December 2024. https://blmwyomingvisual.anl.gov/docs/Landscape%20Aesthetics%20(AH-701).pdf

USFWS (U.S. Fish and Wildlife Service). No date. *Information for Planning and Consultation (IPaC)*. Online System. Accessed December 2024. https://ecos.fws.gov/ipac/.

USFWS. 2013. Classification of Wetlands and Deepwater Habitats of the United States. Accessed December 2024. https://www.fws.gov/program/national-wetlands-inventory/classification-codes.

USFWS. 2022. Tricolored Bat. Accessed December 2024. https://www.fws.gov/species/tricolored-bat-perimyotis-subflavus.

USFWS. 2024a. National Wetlands Inventory. Accessed December 2024. https://www.fws.gov/program/national-wetlands-inventory/wetlands-data.

USFWS. 2024b. Monarch Butterfly Proposed for Endangered Species Act Protection. Accessed February 2025. https://www.fws.gov/press-release/2024-12/monarch-butterfly-proposed-endangered-species-act-protection.

USGS (U.S. Geological Survey). 2023. Boundary Descriptions and Names of Regions, Subregions, Accounting Units and Cataloging Units from the 1987 USGS Water-Supply Paper 2294. Accessed December 2024. https://water.usgs.gov/GIS/huc_name.html.

USGS. 2024. The National Hydrography Dataset Plus High Resolution. Accessed December 2024. Retrieved from: https://hydro.nationalmap.gov/arcgis/rest/services/nhd/MapServer.

USGS. 2025. Topographic Maps. Accessed January 2025. https://www.usgs.gov/programs/national-geospatial-program/topographic-maps.

VDCR (Virginia Department of Conservation and Recreation). 2018. 2018 Virginia Outdoors Plan Chapter 10 Scenic Resources. Accessed December 2024. https://www.dcr.virginia.gov/recreational-planning/document/vopchapt10.pdf

VDCR. 2021a. Definitions of Abbreviations used on Natural Heritage Resource Lists. Accessed December 2024. https://www.dcr.virginia.gov/natural-heritage/help.

VDCR. 2021b. Overview of the Physiography and Vegetation of Virginia. Accessed December 2024. https://www.dcr.virginia.gov/natural-heritage/natural-communities/document/ncoverviewphys-veg.pdf.

VDCR. 2023a. Virginia Natural Landscape Assessment. Accessed December 2024. https://www.dcr.virginia.gov/natural-heritage/vaconvisvnla.

VDCR. 2023b. Forest Conservation Value. Model last updated 2020. Accessed December 2024. https://www.dcr.virginia.gov/natural-heritage/vaconvisforest.

VDCR. 2024a. Department of Conservation and Recreation's Virginia Conservation Lands Database. Accessed December 2024. https://www.dcr.virginia.gov/natural-heritage/clinfo.

VDCR. 2024b. *Virginia Natural Heritage Database Search*. Accessed December 2024. https://vanhde.org/species-search.

VDCR. 2024c. Project Review. Received March 15, 2024.

VDHR (Virginia Department of Historic Resources). 2008. Guidelines for Assessing Impacts of Proposed Electric Transmission Lines and Associated Facilities on Historic Resources in the Commonwealth of Virginia. Accessed June 2022. https://www.dhr.virginia.gov/wp-content/uploads/2018/08/DHR_Guidelines_for_Transmission_Line_Assessment.pdf.

VDHR. 2025. Virginia Cultural Resources Information System. Accessed January 2025. https://www.dhr.virginia.gov/programs/vcris/.

VDOF (Virginia Department of Forestry). Forest Conservation Value. 2020. Accessed December 2024. https://dof.virginia.gov/forest-management-health/forestland-conservation/#:~:text=The%20Forest%20Conservation%20Value%20(FCV,value%20conservation%20forests%20across%20Virginia.

Virginia Department of Game and Inland Fisheries, Center for Conservation Biology at the College of William and Mary, and Virginia Commonwealth University. 2012. *Management of Bald Eagle Nests, Concentration Areas, and Communal Roosts in Virginia: A Guide for Landowners*. Accessed December 2024.

VDOT (Virginia Department of Transportation). 2022. Six-Year Improvement Program Projects. Accessed December 2024. https://www.virginiaroads.org/maps/VDOT::syip-approved-projects-2/about

VDOT. 2024. *Traffic Counts.* Accessed January 2025.https://www.vdot.virginia.gov/doing-business/technical-guidance-and-support/traffic-operations/traffic-counts/

VDOT. 2025. *Northern Virginia District projects*. Accessed January 2025. https://www.vdot.virginia.gov/projects/northern-virginia-district/.

VDWR (Virginia Department of Wildlife Resources). 2025a. *Virginia's 2015 Wildlife Action Plan*. Accessed January 2025. https://dwr.virginia.gov/wildlife/wildlife-action-plan/wildlife-action-plan-2015/.

VDWR. 2025b. *Wildlife Environmental Review Map Service (WERMS)*. Accessed January 2025. https://dwr.virginia.gov/gis/werms/.

VDWR. 2025c. *Virginia Fish and Wildlife Information Service*. Accessed January 2025. https://services.dwr.virginia.gov/fwis/index.asp.

VDWR. 2025d. *Little Brown Bat and Tri-colored Bat Winter Habitat and Roosts Application*. Accessed January 2025. https://dwr.virginia.gov/wildlife/bats/little-brown-bat-tri-colored-bat-winter-habitat-roosts-application/.

VDWR. 2025e. *NLEB Winter Habitat & Roost Tree Application*. Virginia Department of Game and Inland Fisheries. Accessed January 2025. https://dwr.virginia.gov/wildlife/bats/northern-long-eared-bat-application/.

VGIN (Virgina Geographic Information Network). 2024. *Virginia GIS Clearinghouse*. Accessed January 2025. https://vgin.vdem.virginia.gov/pages/clearinghouse/.

VOF (Virginia Outdoors Foundation). No date. Virginia Outdoors Foundation—Our Work. Accessed August 2024.

Wanner, R. 2016. VCRIS Archaeological Site Record, 44LD1737. On file, Virginia Department of Historic Resources, Richmond, Virginia.

Ward, H., E. Read, R. Wanner, and J. Seiter. 2016. Phase I and Phase II Archeological Investigations for Western Lands Area, Washington Dulles International Airport, Loudoun County, Virginia. Prepared by EAC/A, Inc. for the Metropolitan Washington Airports Authority. Baltimore, Maryland.

WHO (World Health Organization). 2007. *WHO Research Agenda for Extremely Low Frequency Fields*. Accessed January 2025. https://www.who.int/teams/environment-climate-change-and-health/radiation-and-health/non-ionizing/emf/research-agenda.

William and Mary Department of Geology. 2024. *Geology of Virginia*. Accessed October 2024. http://geology.blogs.wm.edu/.

APPENDIX A FIGURES

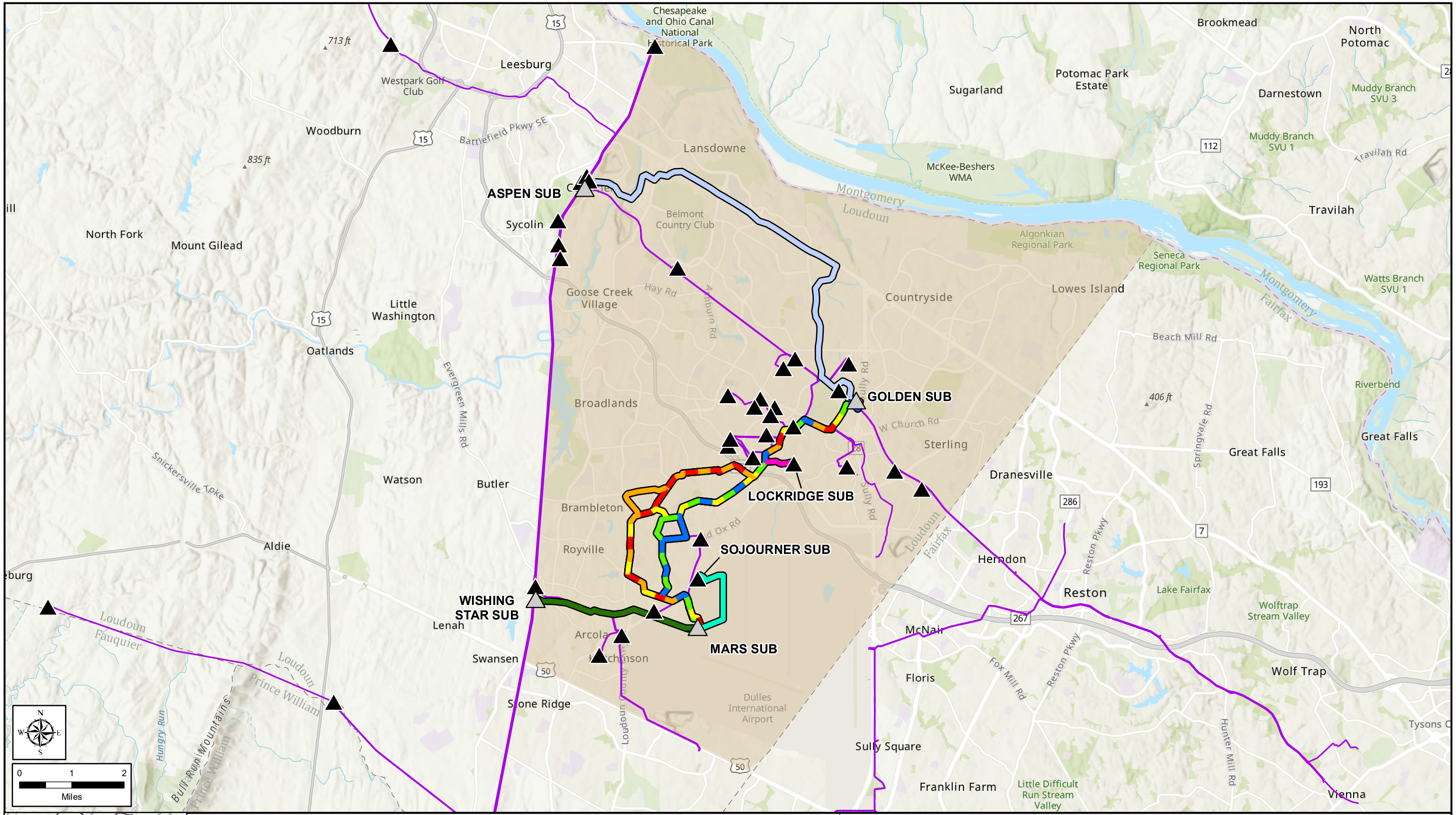

Figure 1-1
Project Overview
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

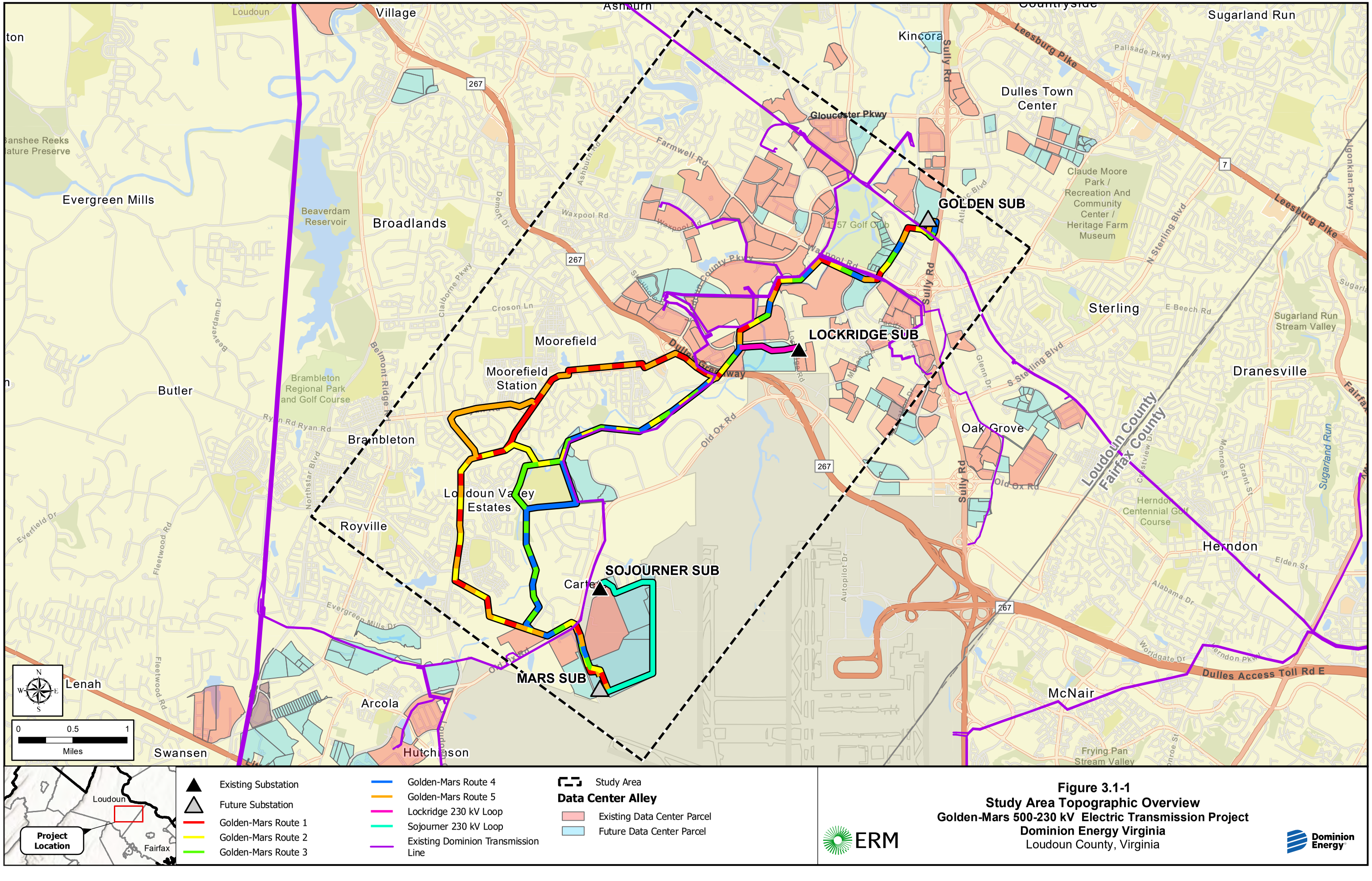

Figure 3.1-1
Study Area Topographic Overview
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

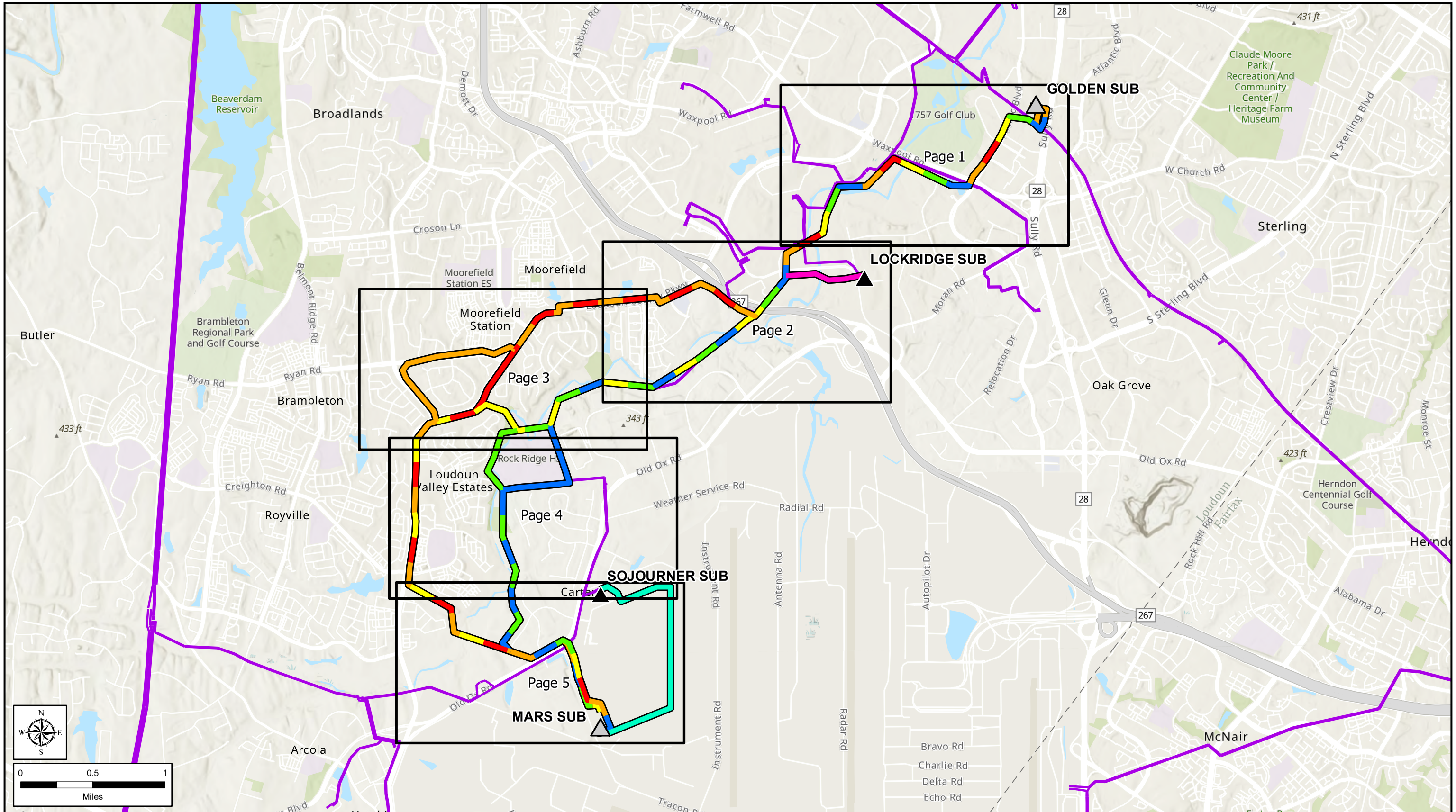

Figure 3.2-1
Routing Constraints and Opportunities
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia
Page Index

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Dominion Energy

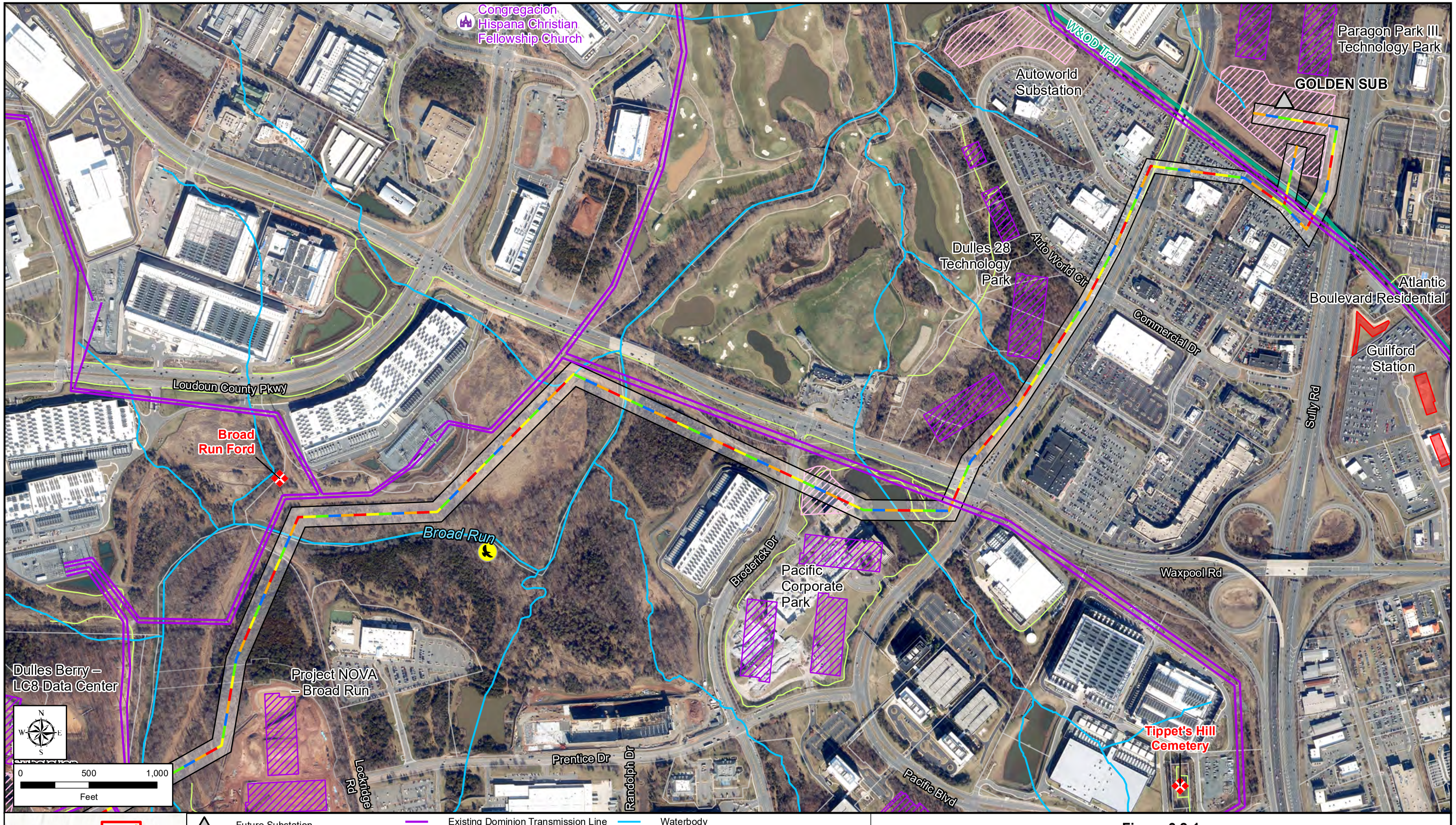
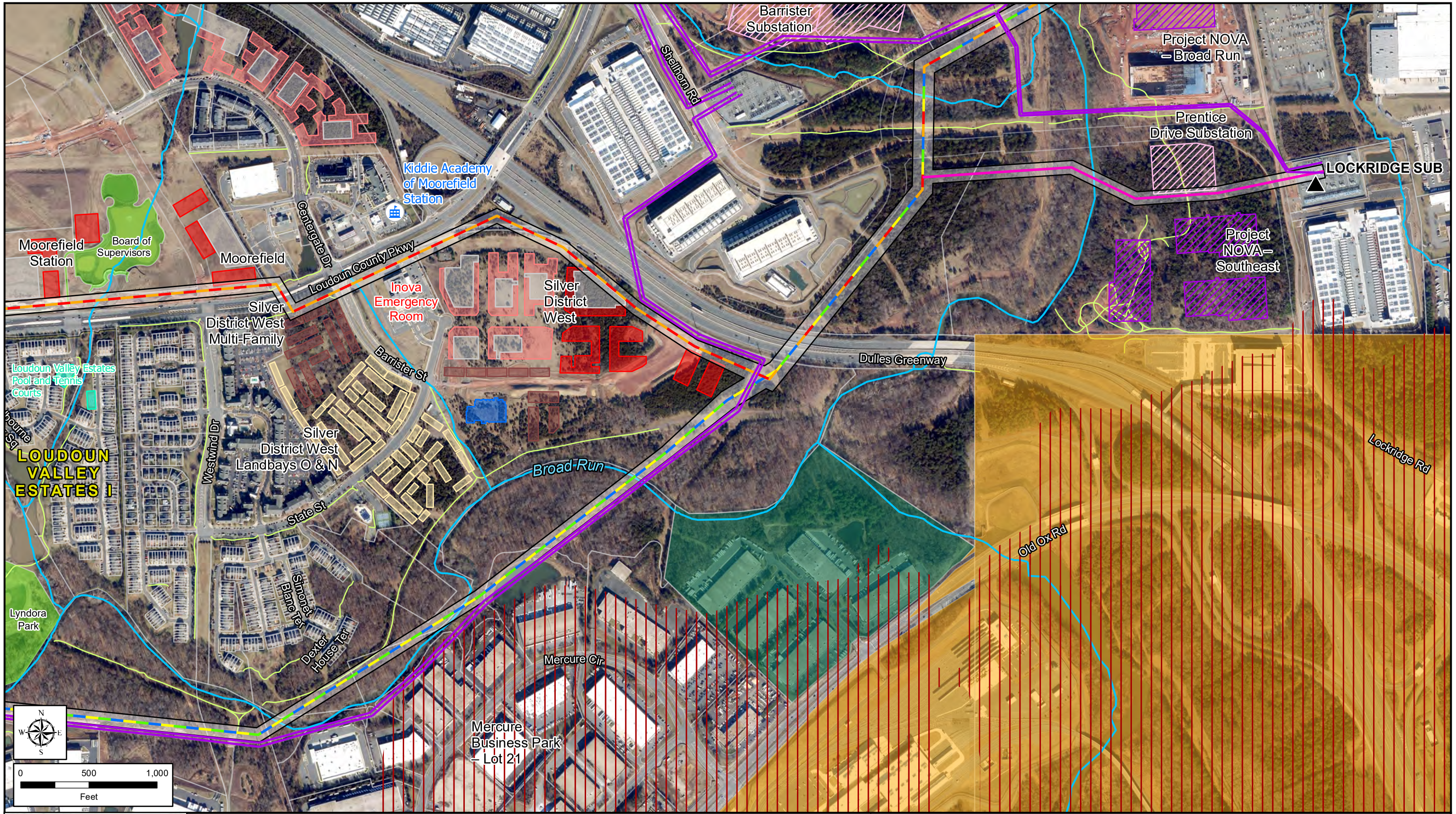


Figure 3.2-1
Routing Constraints and Opportunities
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia



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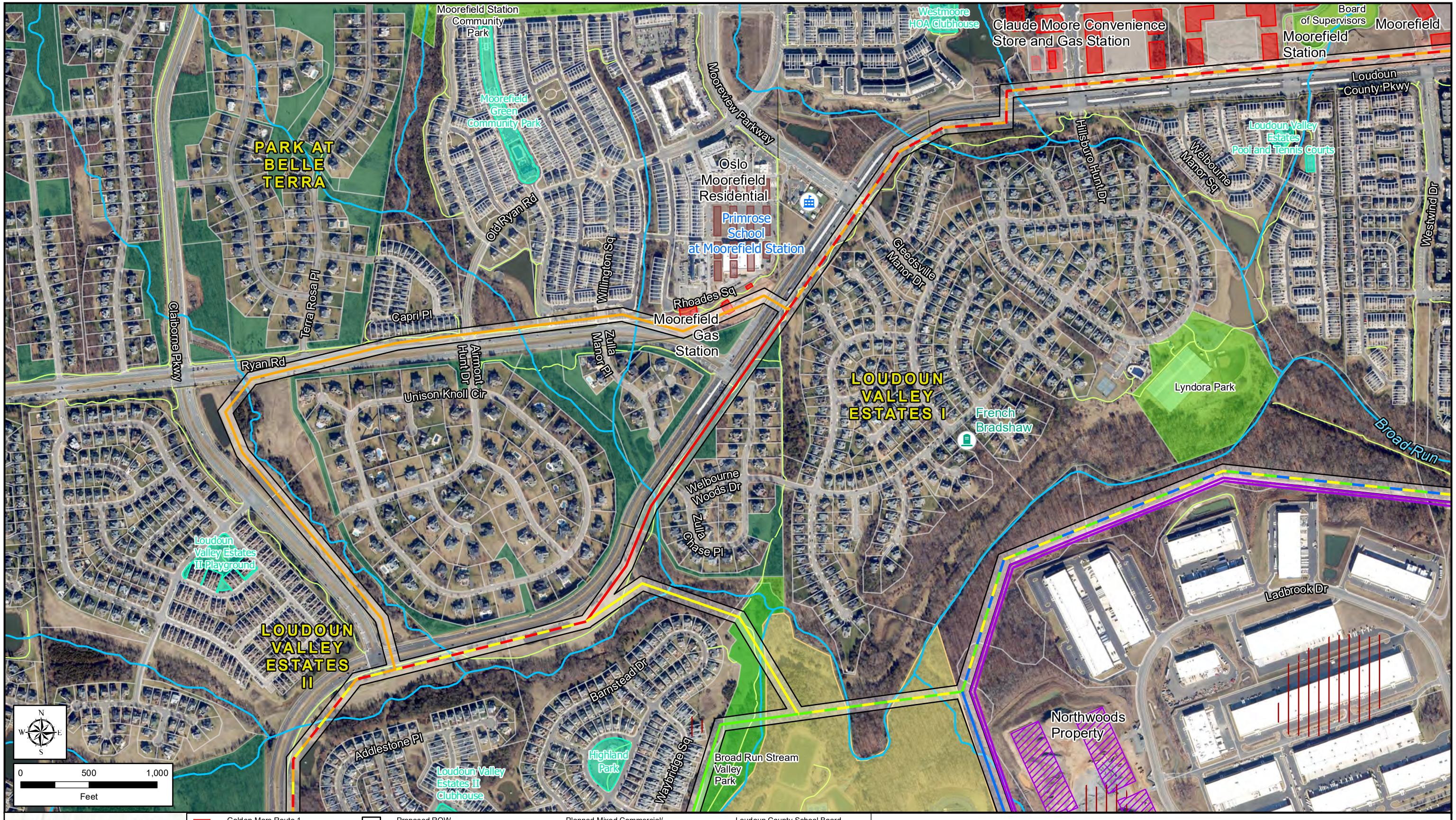
Routing Constraints and Opportunities
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy



- Golden-Mars Route 1
- Golden-Mars Route 2
- Golden-Mars Route 3
- Golden-Mars Route 4
- Golden-Mars Route 5
- Existing Dominion Transmission Line
- Proposed ROW
- School
- Cemetery
- Loudoun County Trail
- Waterbody
- Planned Multi Family Dwelling
- Planned Mixed Commercial/ Residential Building
- Planned Commercial/Office Building
- Planned Data Center
- Planned Parking
- Parcel Boundary
- Loudoun County School Board Property
- BOS Open Space Easement
- HOA Park
- Loudoun County Park
- FAA Max Heights < 150'

Figure 3.2-1
Routing Constraints and Opportunities
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

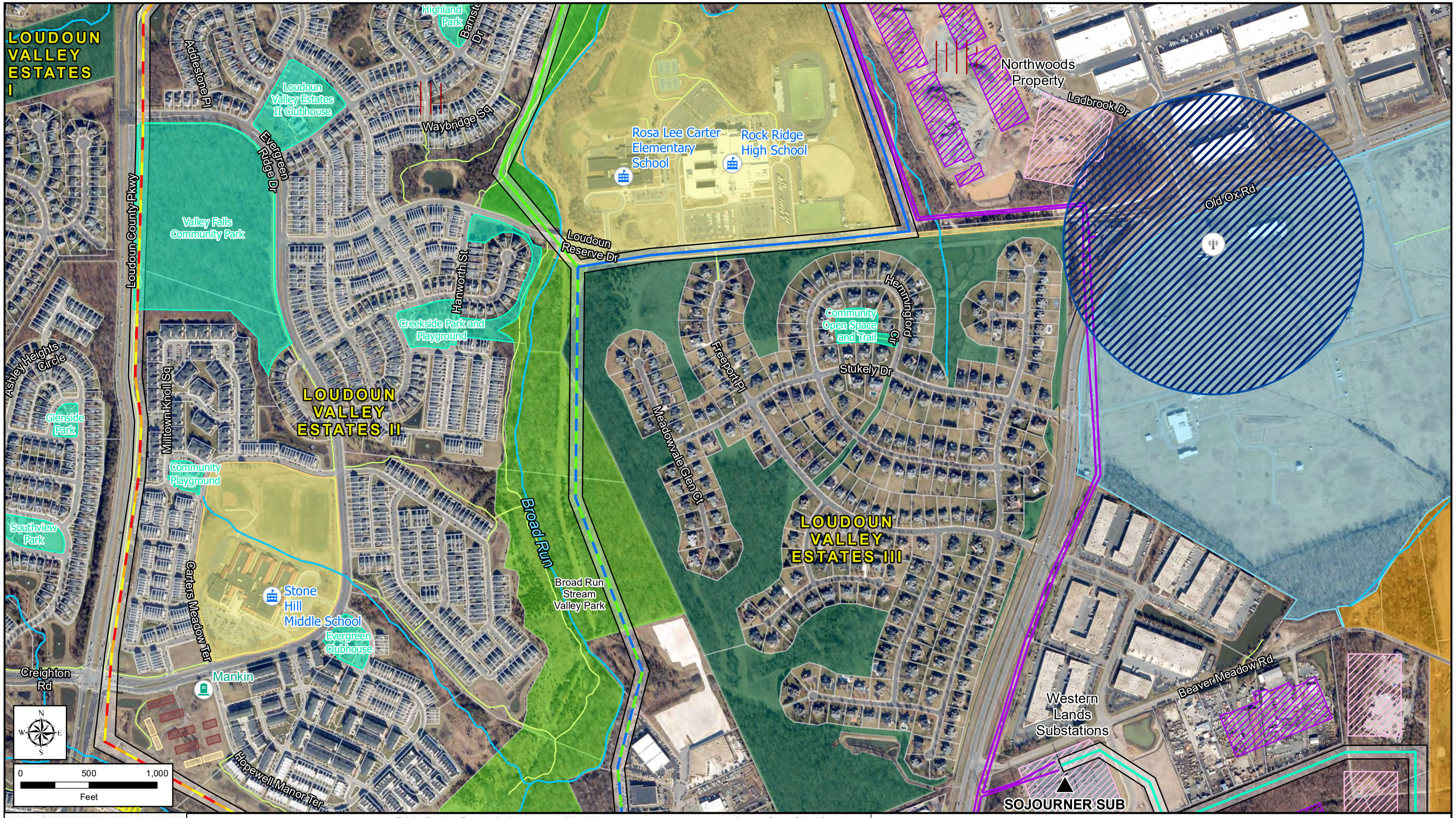


Figure 3.2-1
Routing Constraints and Opportunities
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

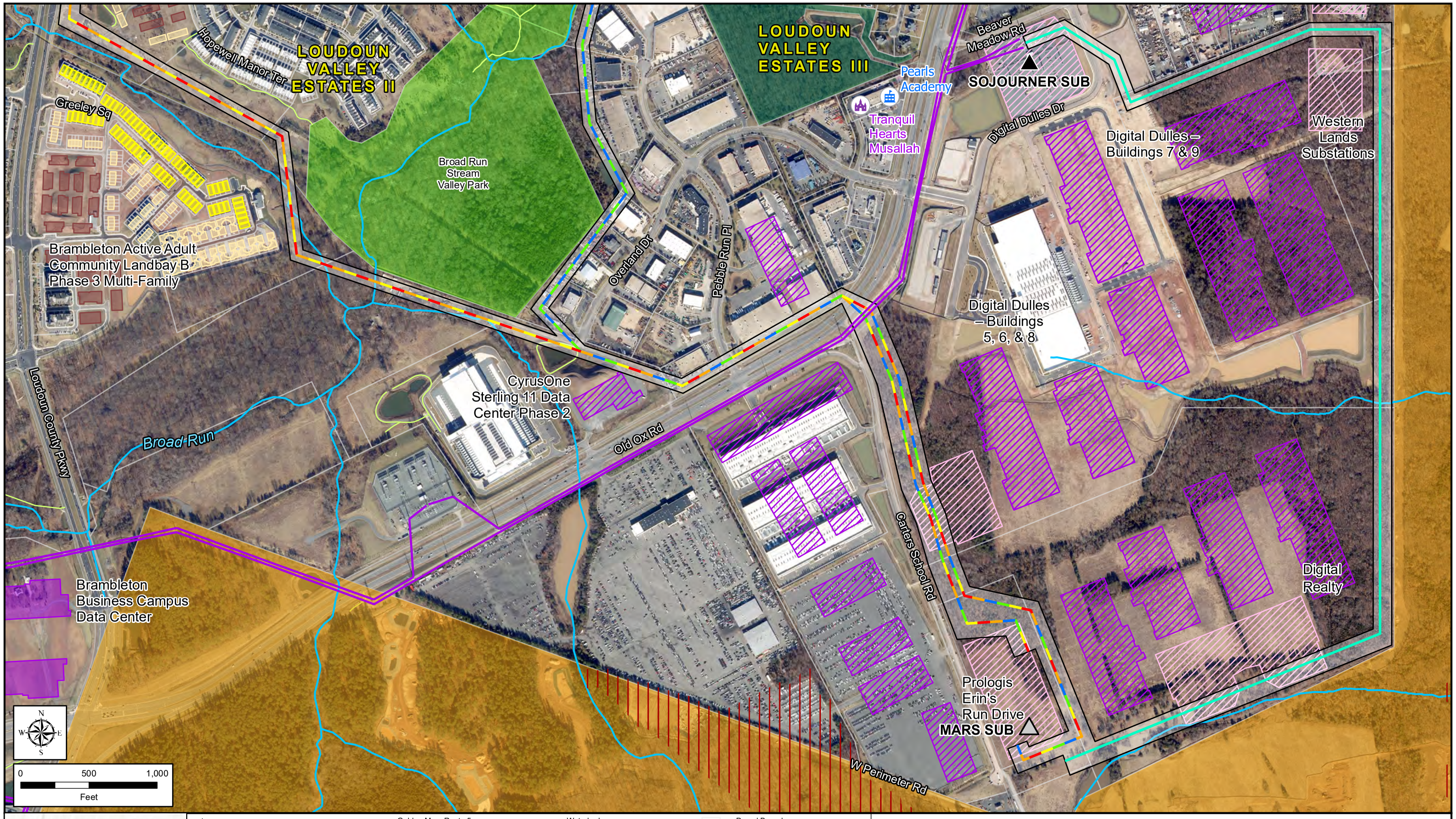


Figure 3.2-1
Routing Constraints and Opportunities
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

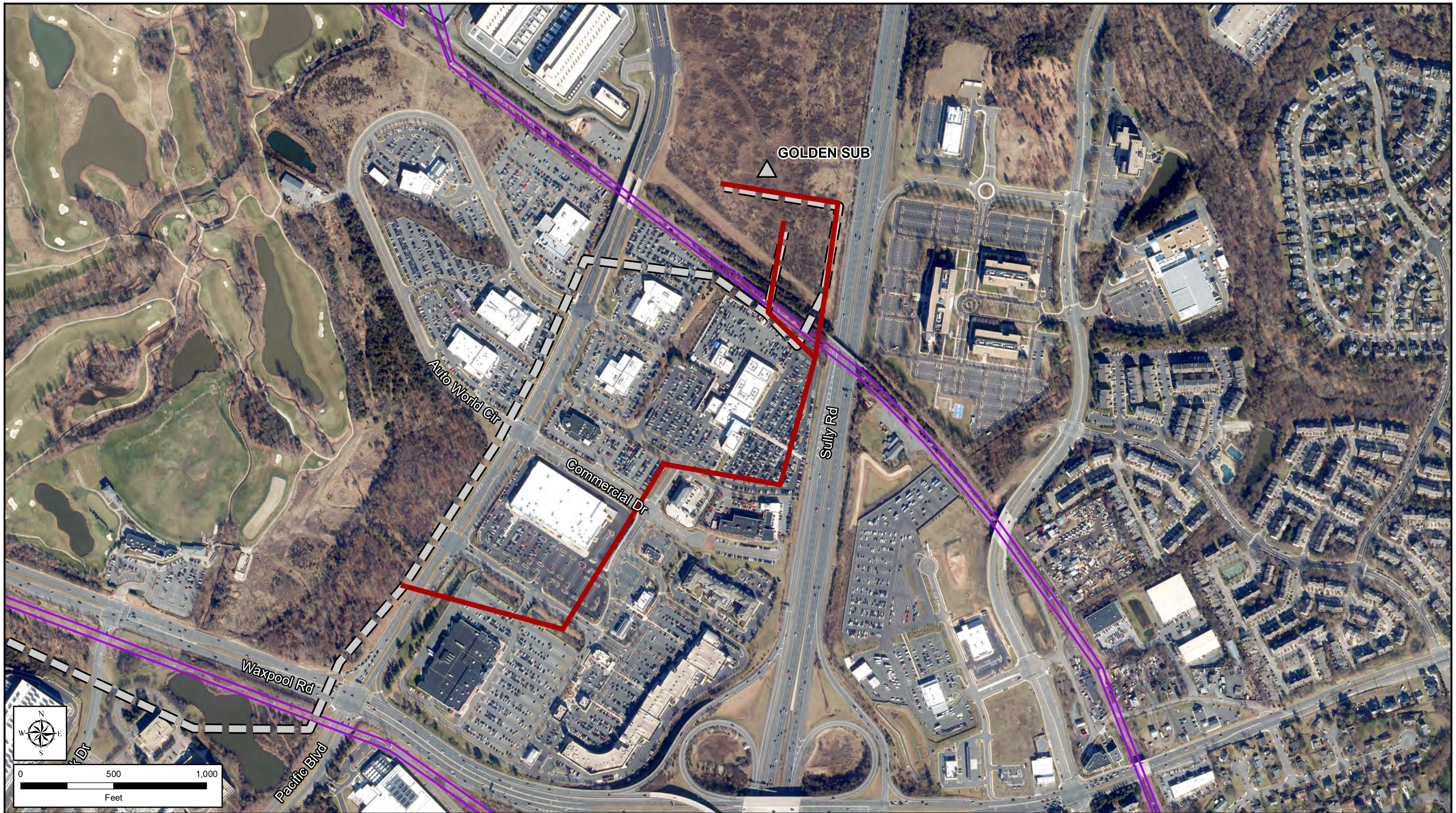


Figure 4.1-3
Rejected Route - Dulles Center Variation
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

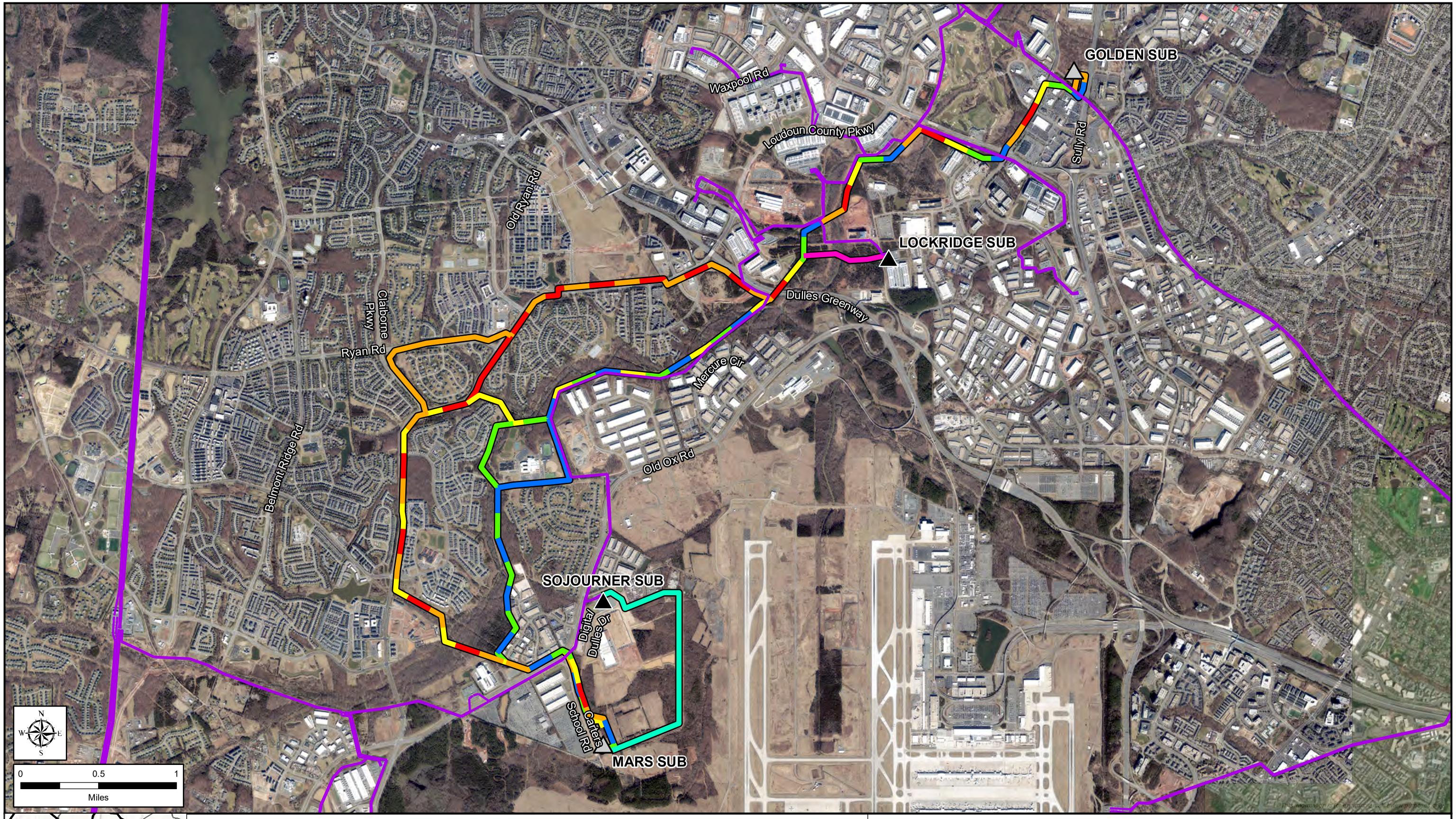


Figure 4.2-1
Project Route Alternatives (Aerial)
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

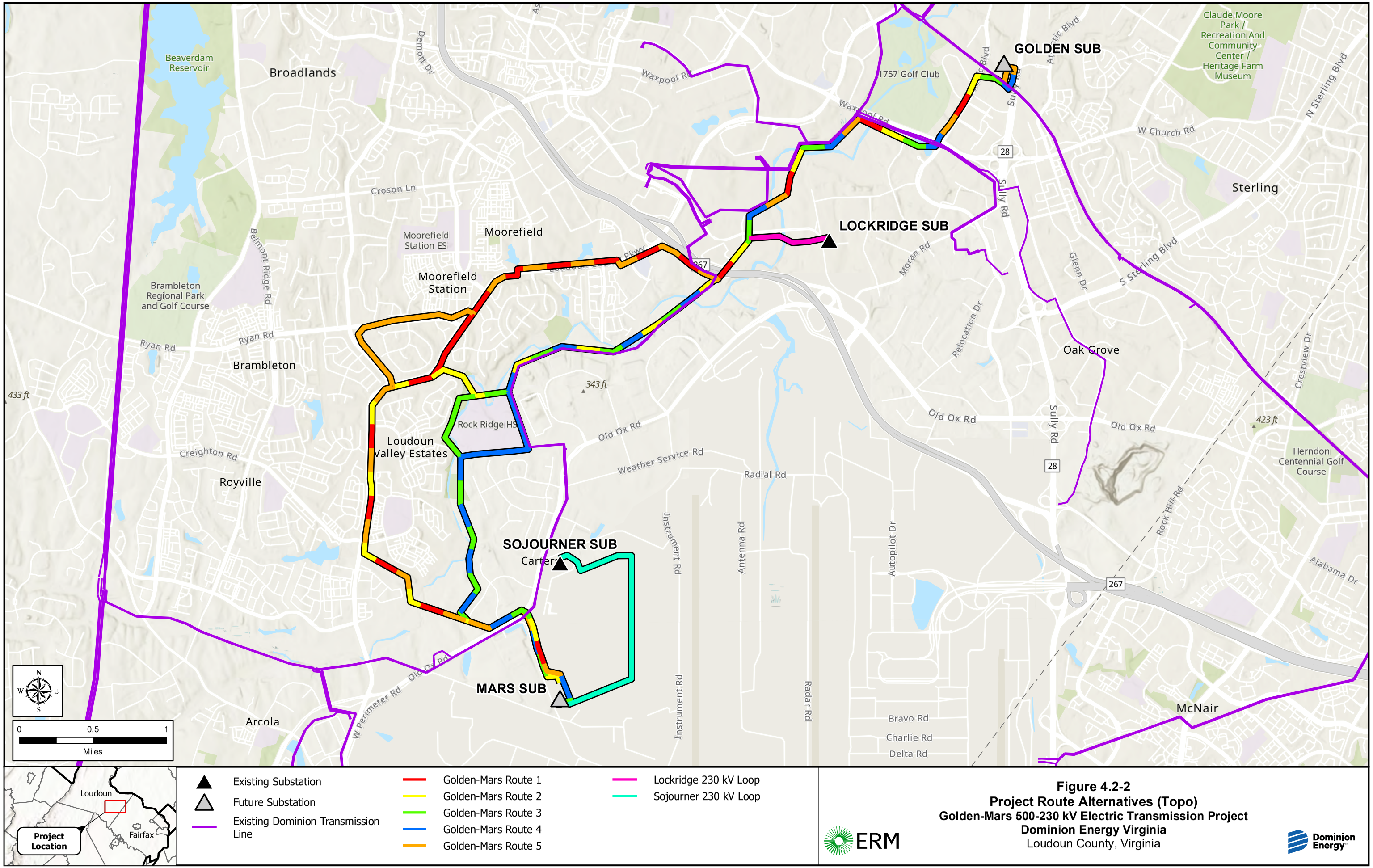
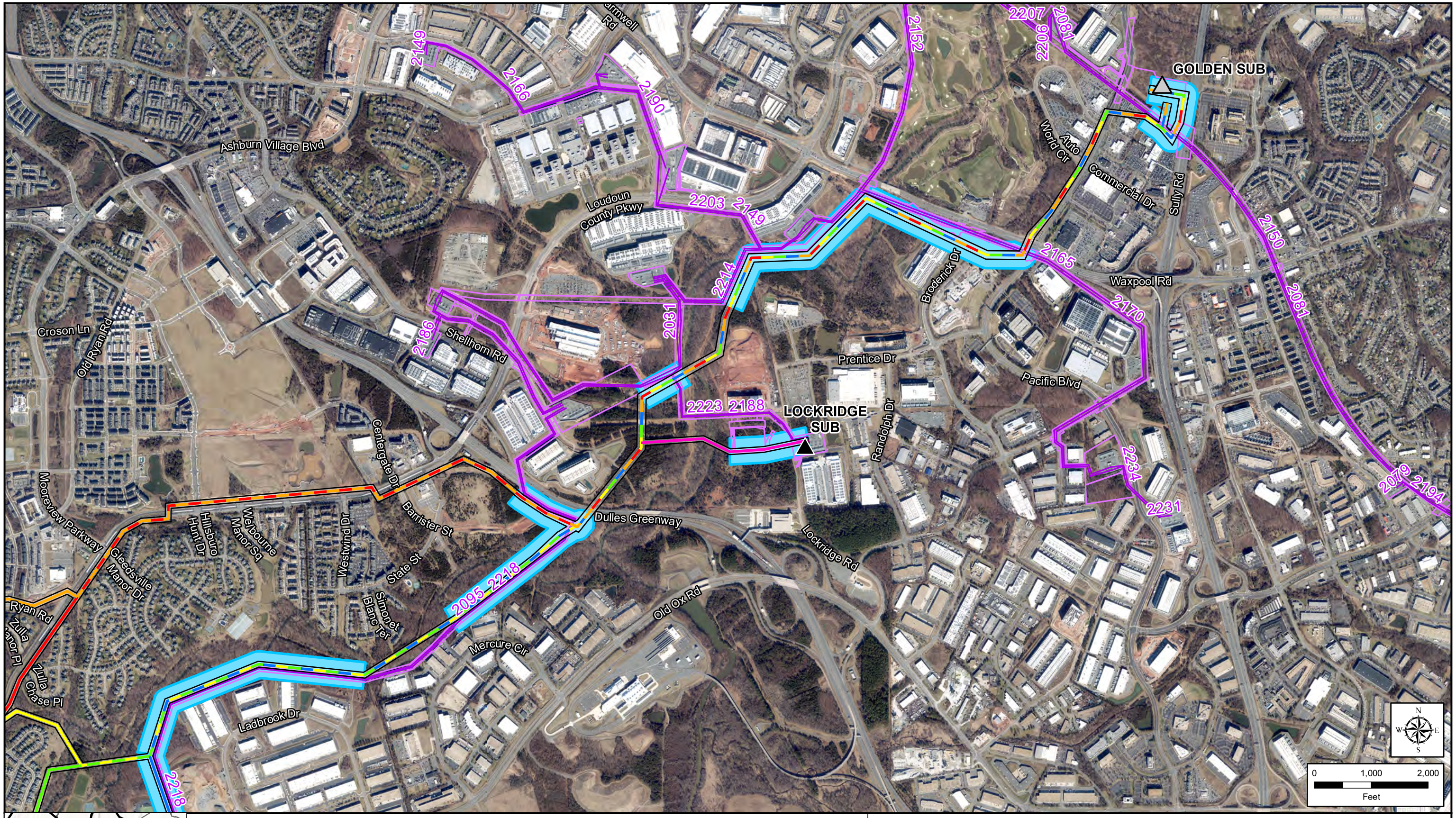
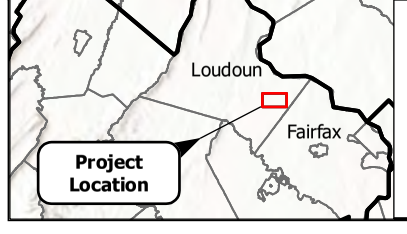


Figure 4.2-2
Project Route Alternatives (Topo)
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy





- Existing Substation
- Future Substation
- Existing Dominion Transmission Line
- Golden-Mars Route 1
- Golden-Mars Route 2
- Golden-Mars Route 3
- Golden-Mars Route 4
- Golden-Mars Route 5
- Lockridge 230 kV Loop
- Collocation Area

Figure 4.5-1
Collocation with Existing Dominion Transmission Rights-of-Way
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

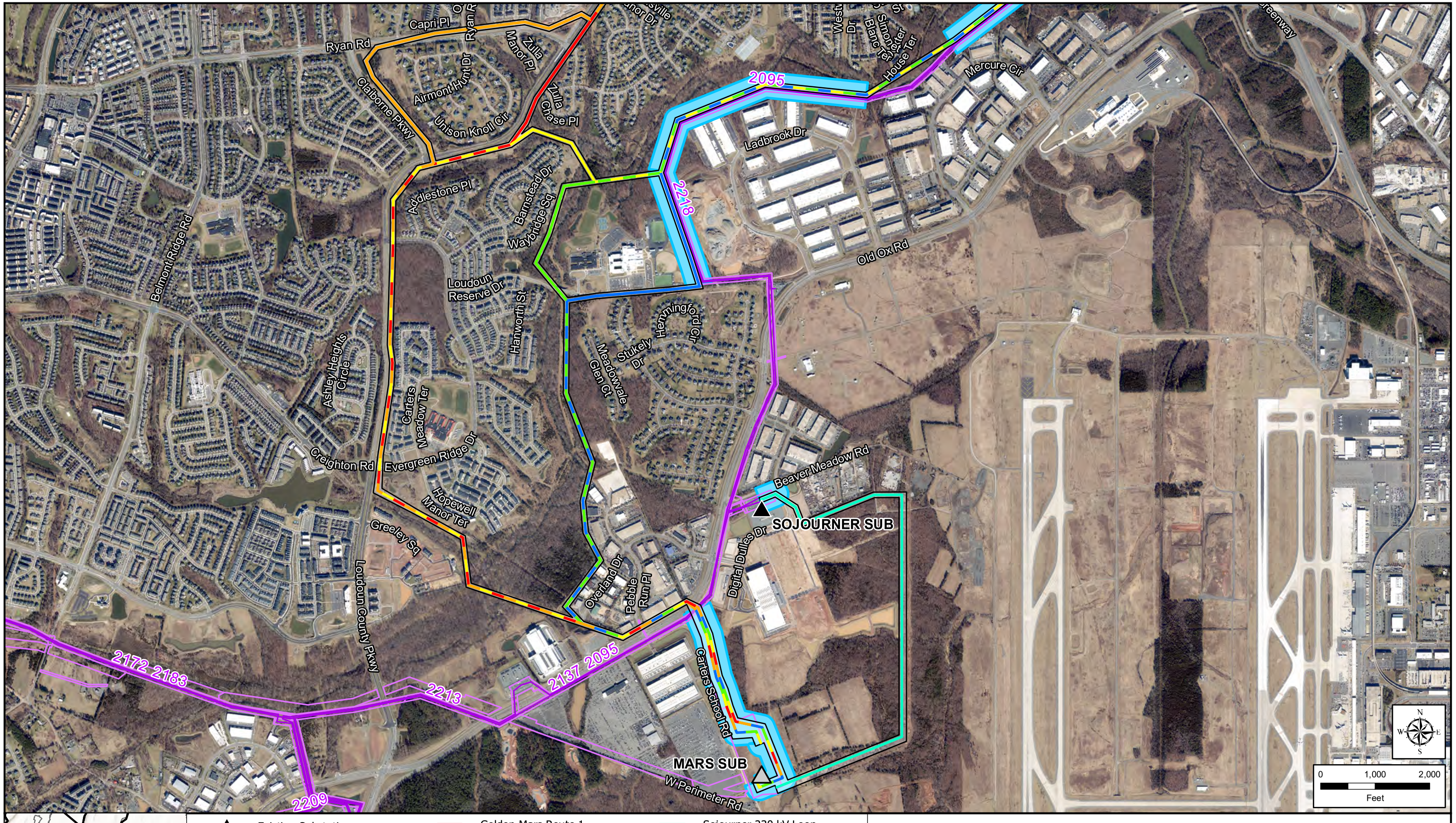


Figure 4.5-1
Collocation with Existing Dominion Transmission Rights-of-Way
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia
Page 2

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Dominion Energy

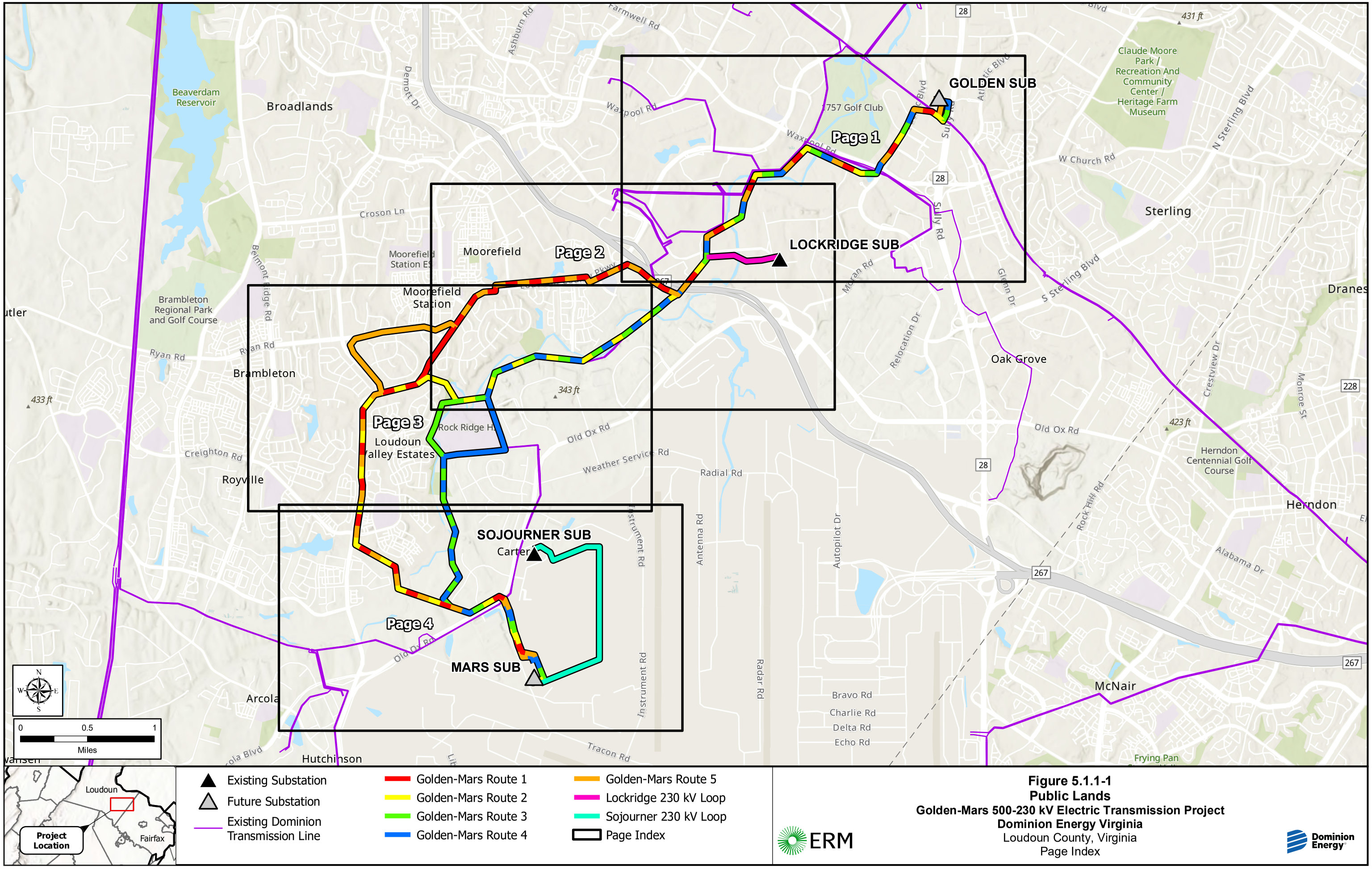

Figure 5.1.1-1
Public Lands
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia
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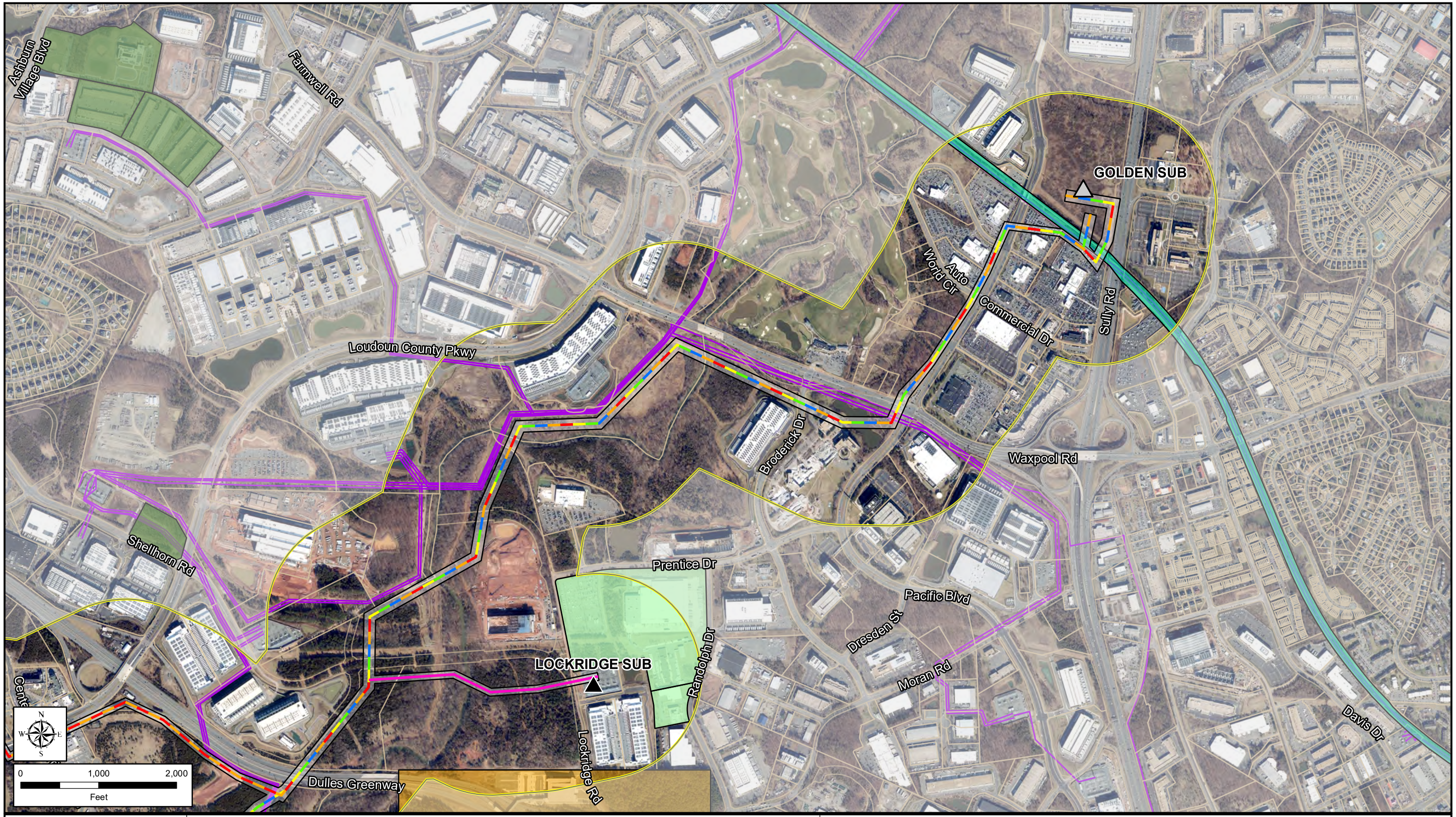
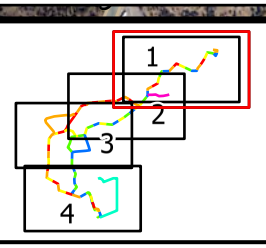
Dominion Energy





- Existing Substation
- Future Substation
- Golden-Mars Route 1
- Golden-Mars Route 2
- Golden-Mars Route 3
- Golden-Mars Route 4
- Golden-Mars Route 5
- Lockridge 230 kV Loop
- 0.25 Mile Centerline Buffer
- Existing Dominion Transmission Line

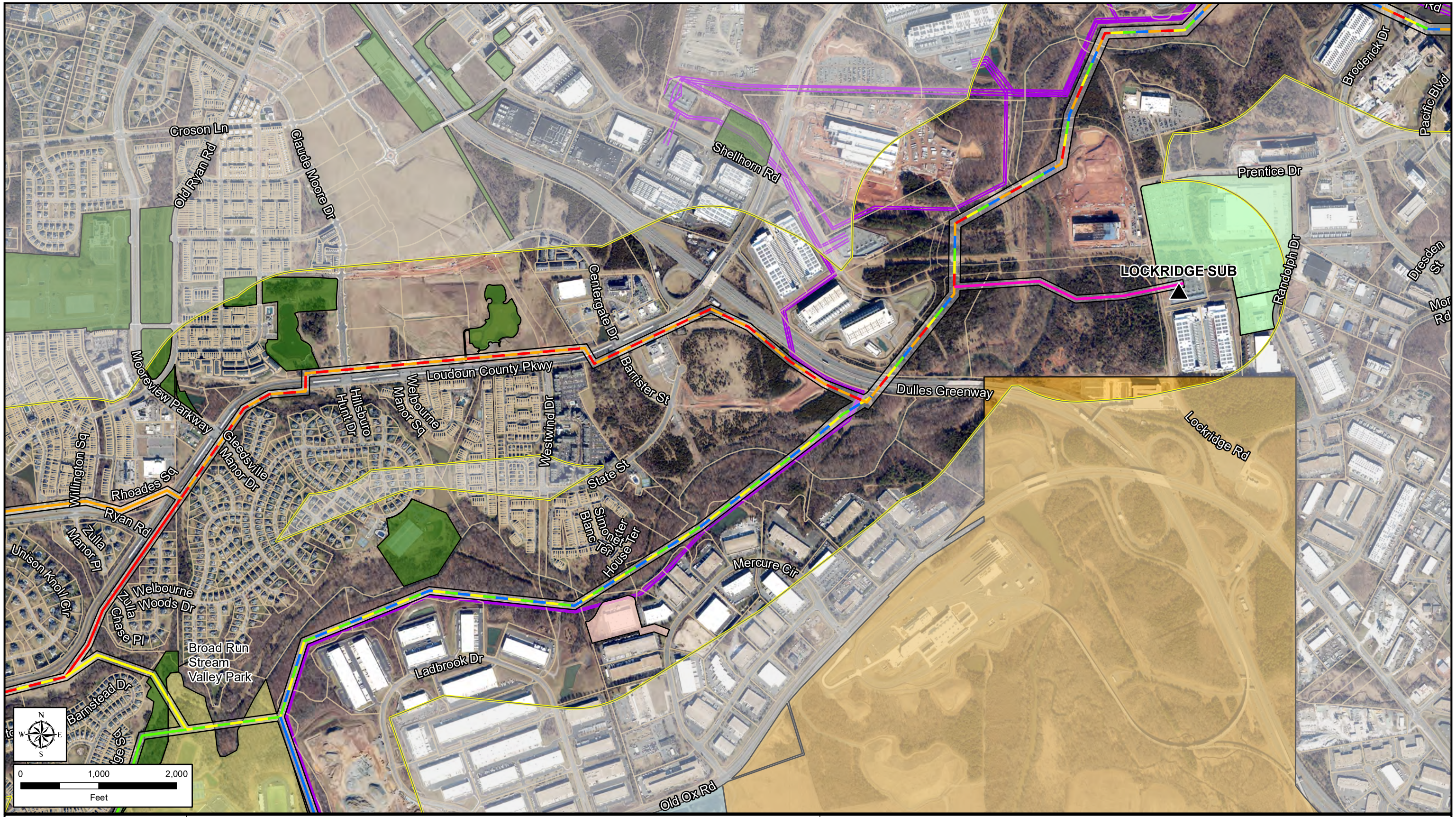
Land Ownership

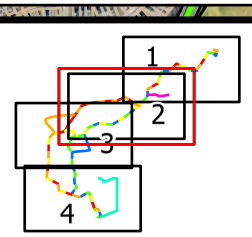
- Loudoun County Board of Supervisors
- MWAA
- U.S. Postal Service
- NOVA Parks
- Parcel Boundary

Figure 5.1.1-1
Public Lands
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy





- Existing Substation
- Golden-Mars Route 1
- Golden-Mars Route 2
- Golden-Mars Route 3
- Golden-Mars Route 4
- Golden-Mars Route 5
- Lockridge 230 kV Loop
- 0.25 Mile Centerline Buffer
- Existing Dominion Transmission Line

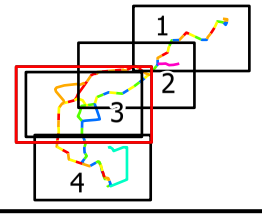
Land Ownership

- Loudoun County School Board
- Loudoun County Board of Supervisors
- NOAA
- MWAA
- Department of State
- U.S. Postal Service
- Parcel Boundary

Figure 5.1.1-1
Public Lands
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy



- Golden-Mars Route 1
- Golden-Mars Route 2
- Golden-Mars Route 3
- Golden-Mars Route 4
- Golden-Mars Route 5
- 0.25 Mile Centerline Buffer
- Existing Dominion Transmission Line

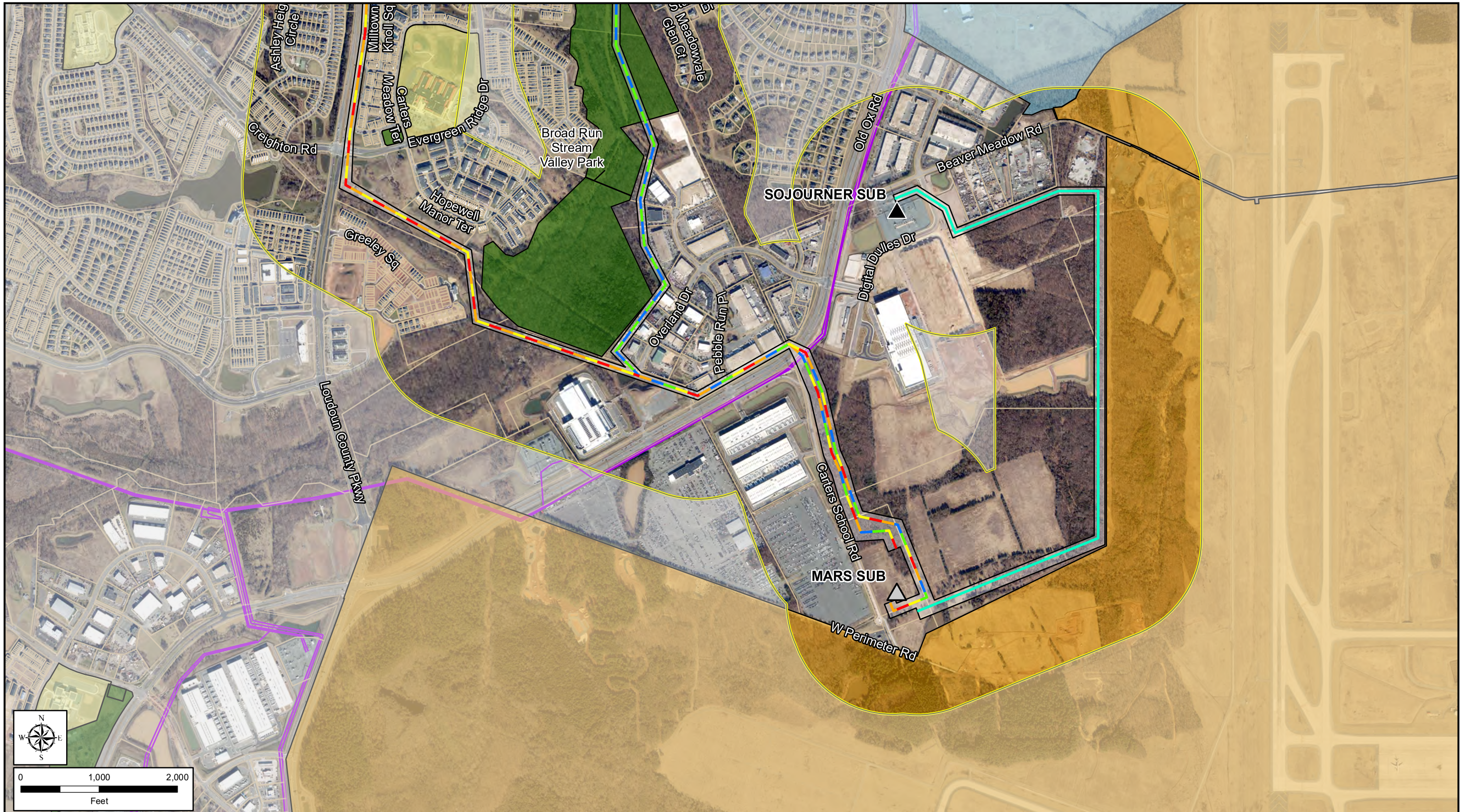
Land Ownership

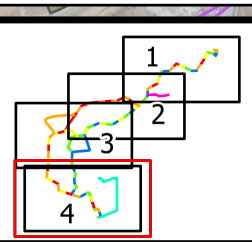
- Loudoun County School Board
- Loudoun Water
- Loudoun County Board of Supervisors
- NOAA
- MWAA
- Department of State
- NOVA Parks
- Parcel Boundary

Figure 5.1.1-1
Public Lands
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy





- Existing Substation
- Future Substation
- Golden-Mars Route 1
- Golden-Mars Route 2
- Golden-Mars Route 3
- Golden-Mars Route 4
- Golden-Mars Route 5
- Sojourner 230 kV Loop
- 0.25 Mile Centerline Buffer
- Existing Dominion Transmission Line

Land Ownership

- Loudoun County School Board
- Loudoun County Board of Supervisors
- NOAA
- MWAA
- Parcel Boundary

Figure 5.1.1-1
Public Lands
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

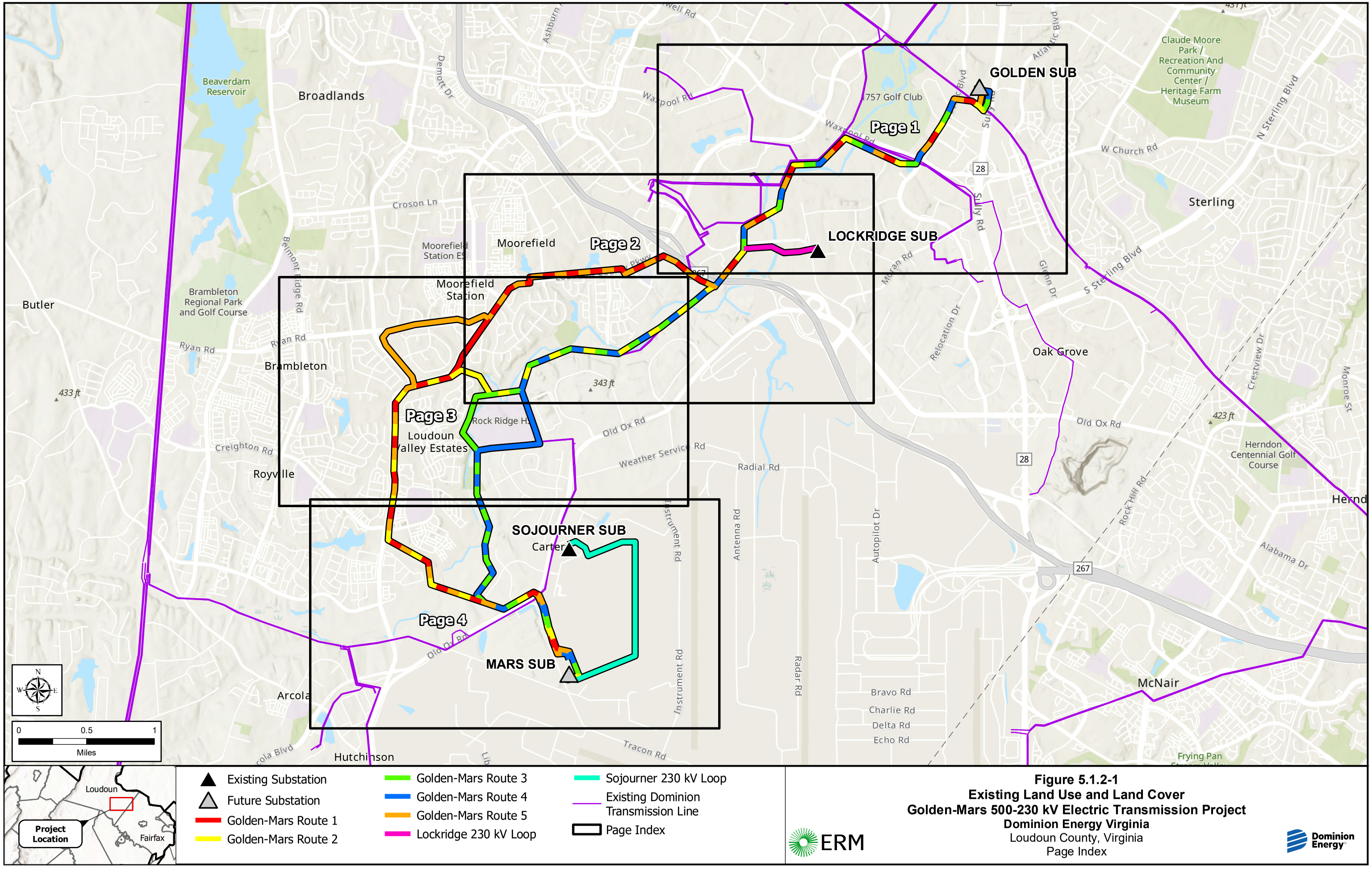


Figure 5.1.2-1
Existing Land Use and Land Cover
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia
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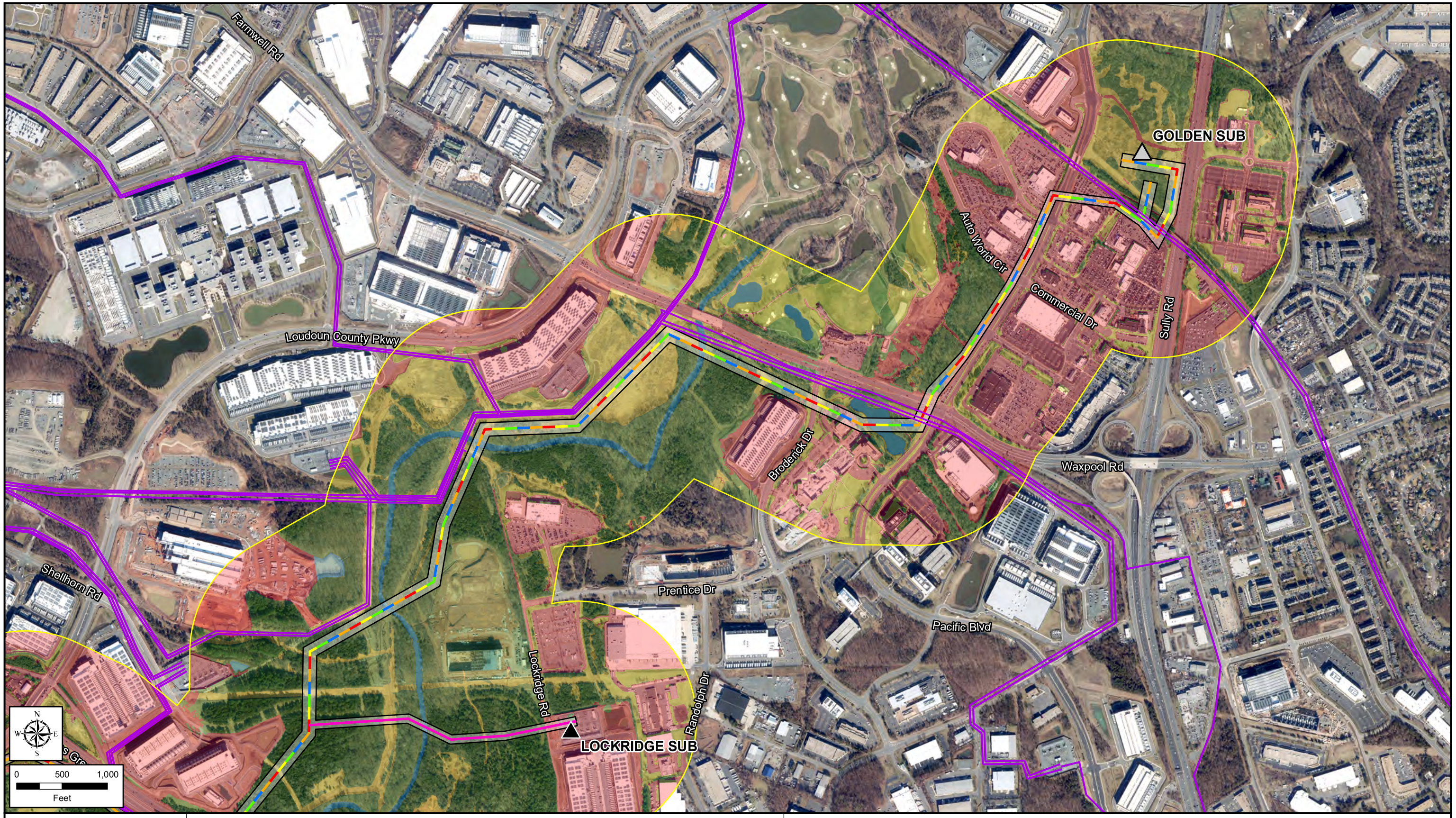
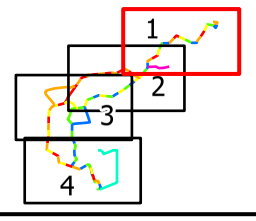
ERM

Dominion Energy





- Existing Substation
- Future Substation
- Golden-Mars Route 1
- Golden-Mars Route 2
- Golden-Mars Route 3
- Golden-Mars Route 4
- Golden-Mars Route 5
- Lockridge 230 kV Loop
- Existing Dominion Transmission Line
- 0.25 Mile Centerline Buffer

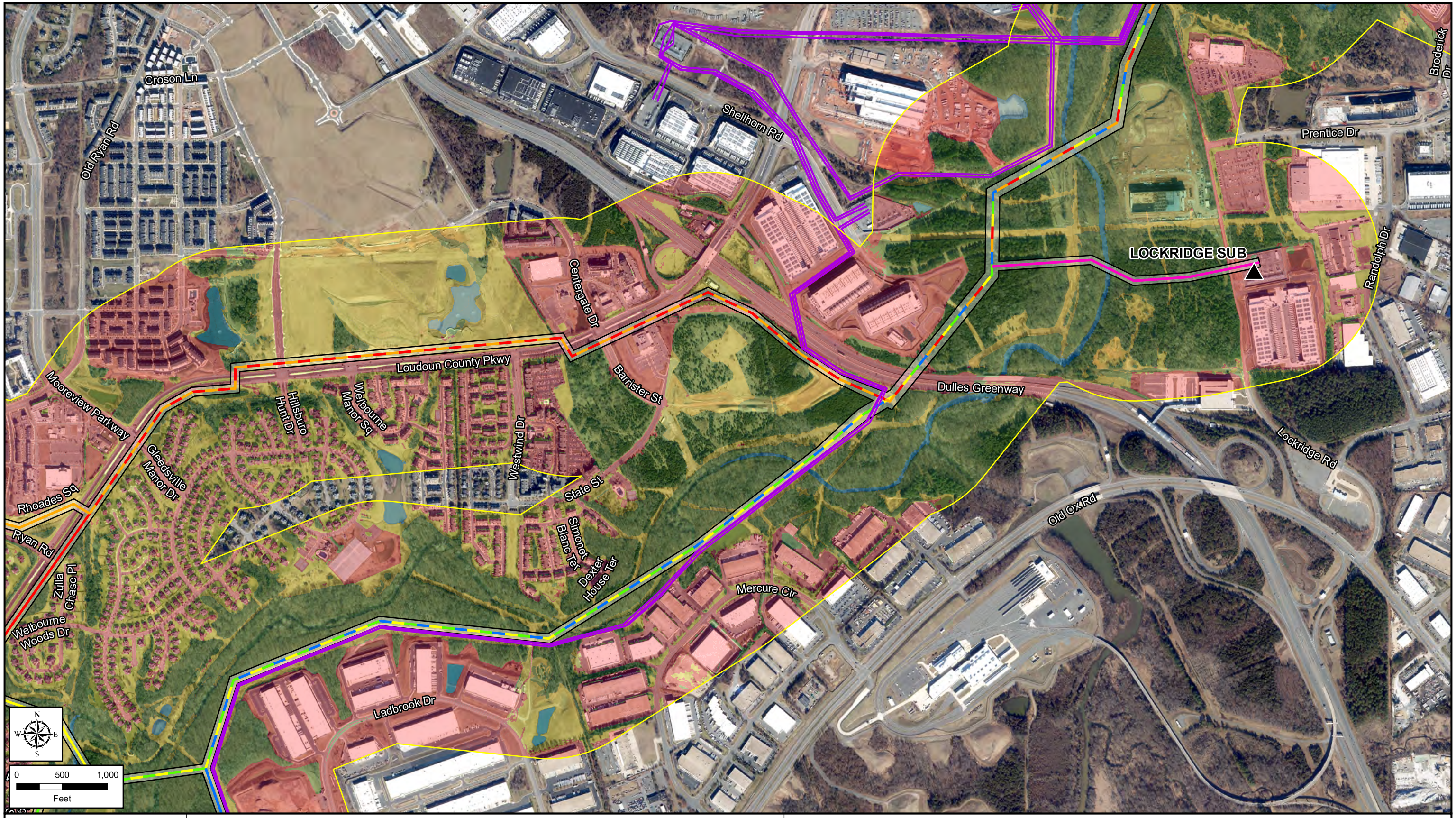
Land Use/Land Cover

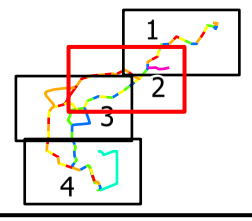
- Developed
- Forest
- Open Space
- Water

Figure 5.1.2-1
Existing Land Use and Land Cover
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy





- Existing Substation
- Golden-Mars Route 1
- Golden-Mars Route 2
- Golden-Mars Route 3
- Golden-Mars Route 4
- Golden-Mars Route 5
- Lockridge 230 kV Loop
- Existing Dominion Transmission Line
- 0.25 Mile Centerline Buffer

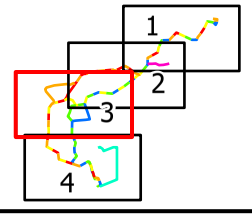
Land Use/Land Cover

- Developed
- Forest
- Open Space
- Water

Figure 5.1.2-1
Existing Land Use and Land Cover
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy



Golden-Mars Route 1
Golden-Mars Route 2
Golden-Mars Route 3
Golden-Mars Route 4
Golden-Mars Route 5

Existing Dominion Transmission Line
0.25 Mile Centerline Buffer

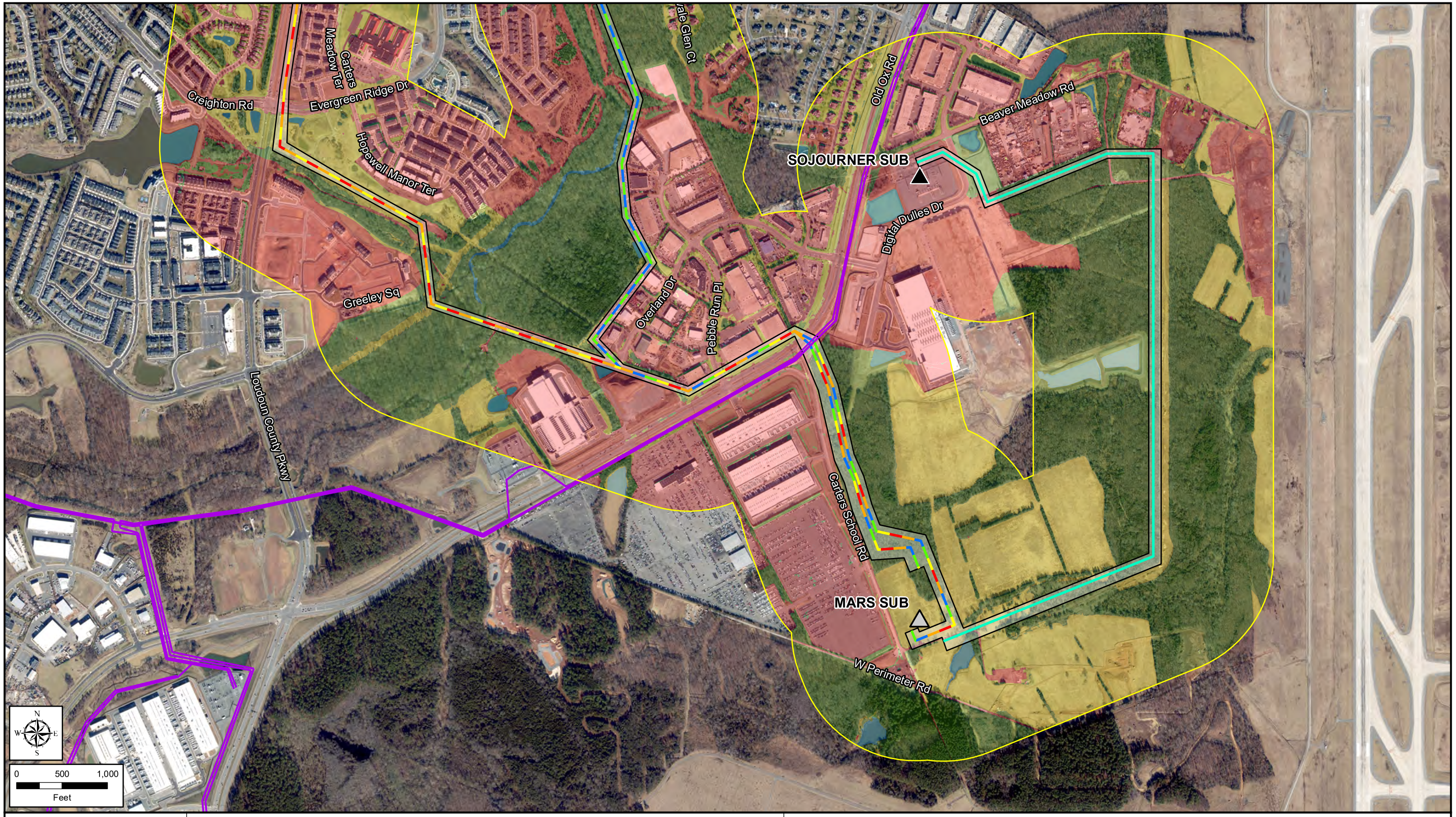
Land Use/Land Cover

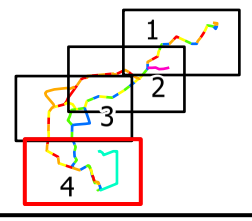
Developed
Forest
Open Space
Water

Figure 5.1.2-1
Existing Land Use and Land Cover
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy





- Existing Substation
- Future Substation
- Golden-Mars Route 1
- Golden-Mars Route 2
- Golden-Mars Route 3
- Golden-Mars Route 4
- Golden-Mars Route 5
- Sojourner 230 kV Loop
- Existing Dominion Transmission Line
- 0.25 Mile Centerline Buffer

Land Use/Land Cover

- Developed
- Forest
- Open Space
- Water

Figure 5.1.2-1
Existing Land Use and Land Cover
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

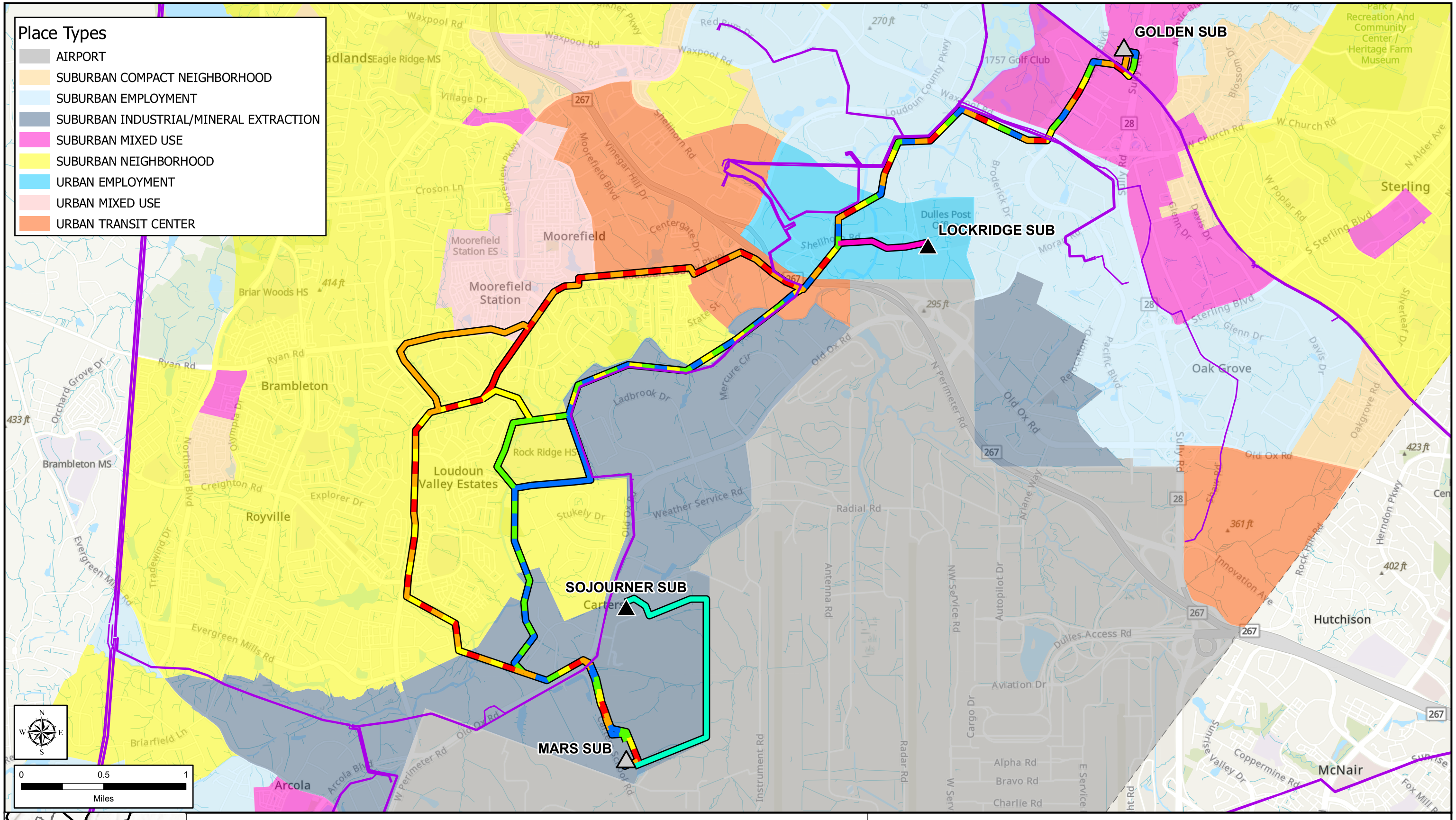


Figure 5.1.3-1
Loudoun County Place Types
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

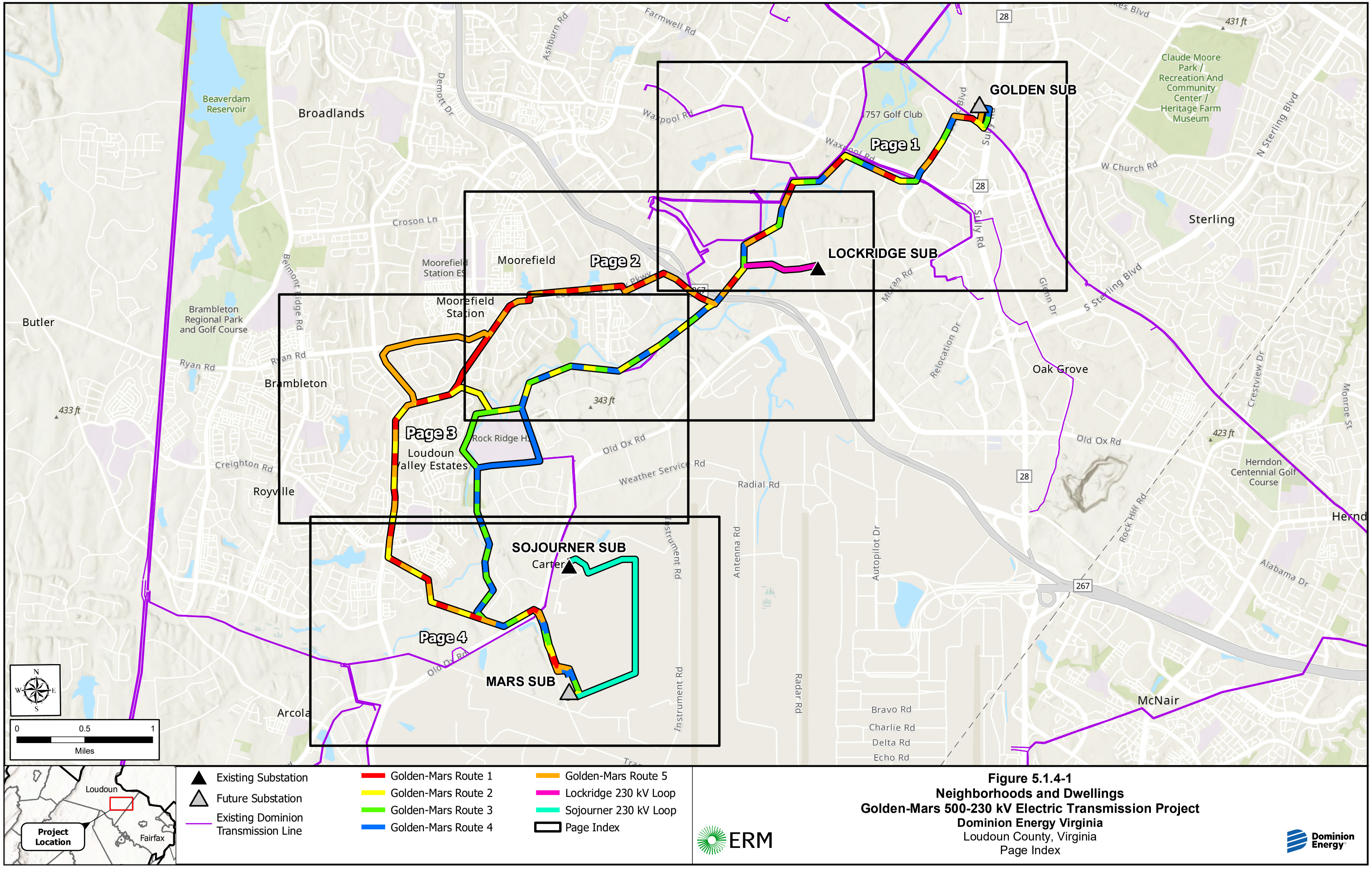


Figure 5.1.4-1
Neighborhoods and Dwellings
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia
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ERM

Dominion Energy

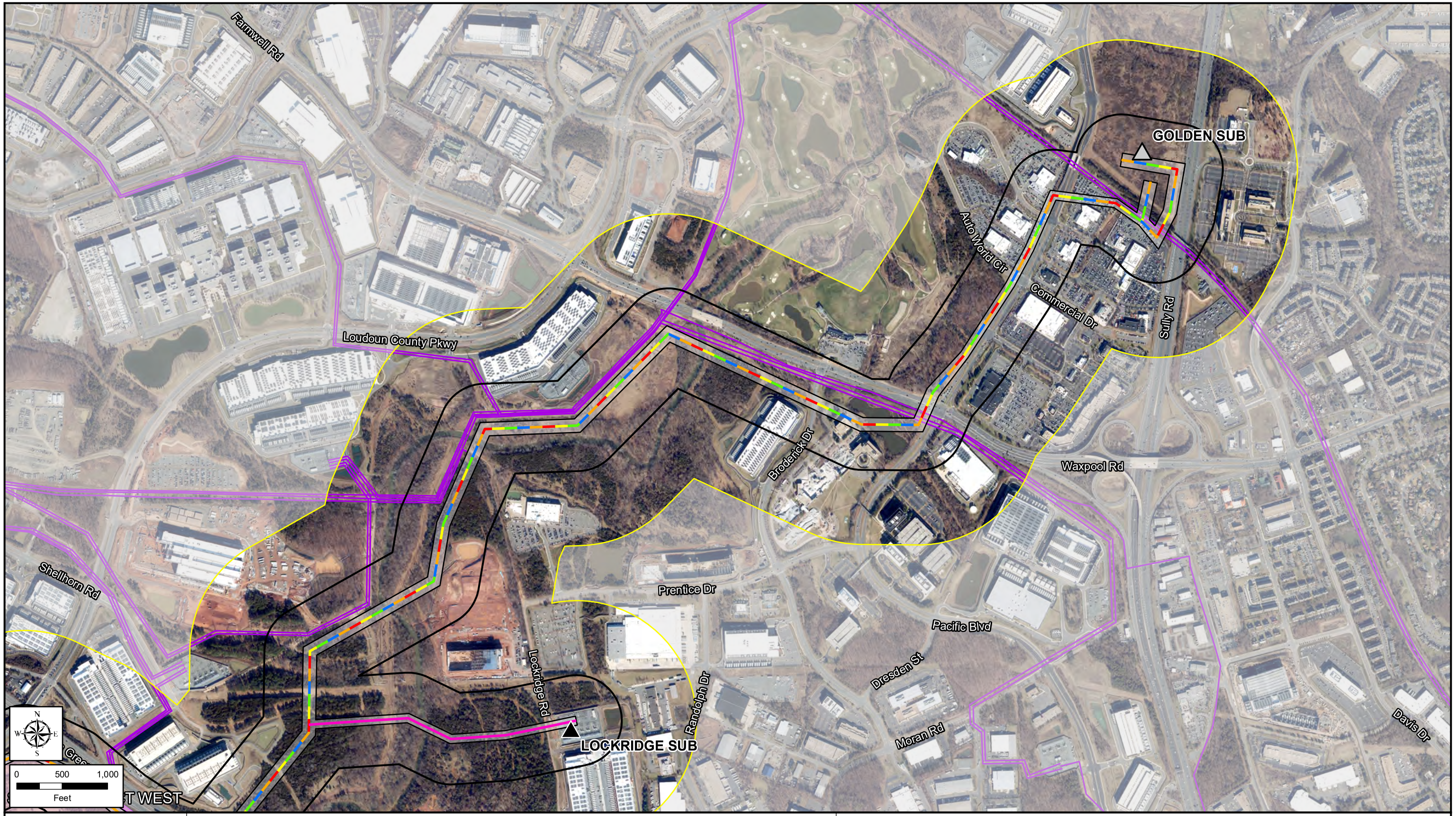
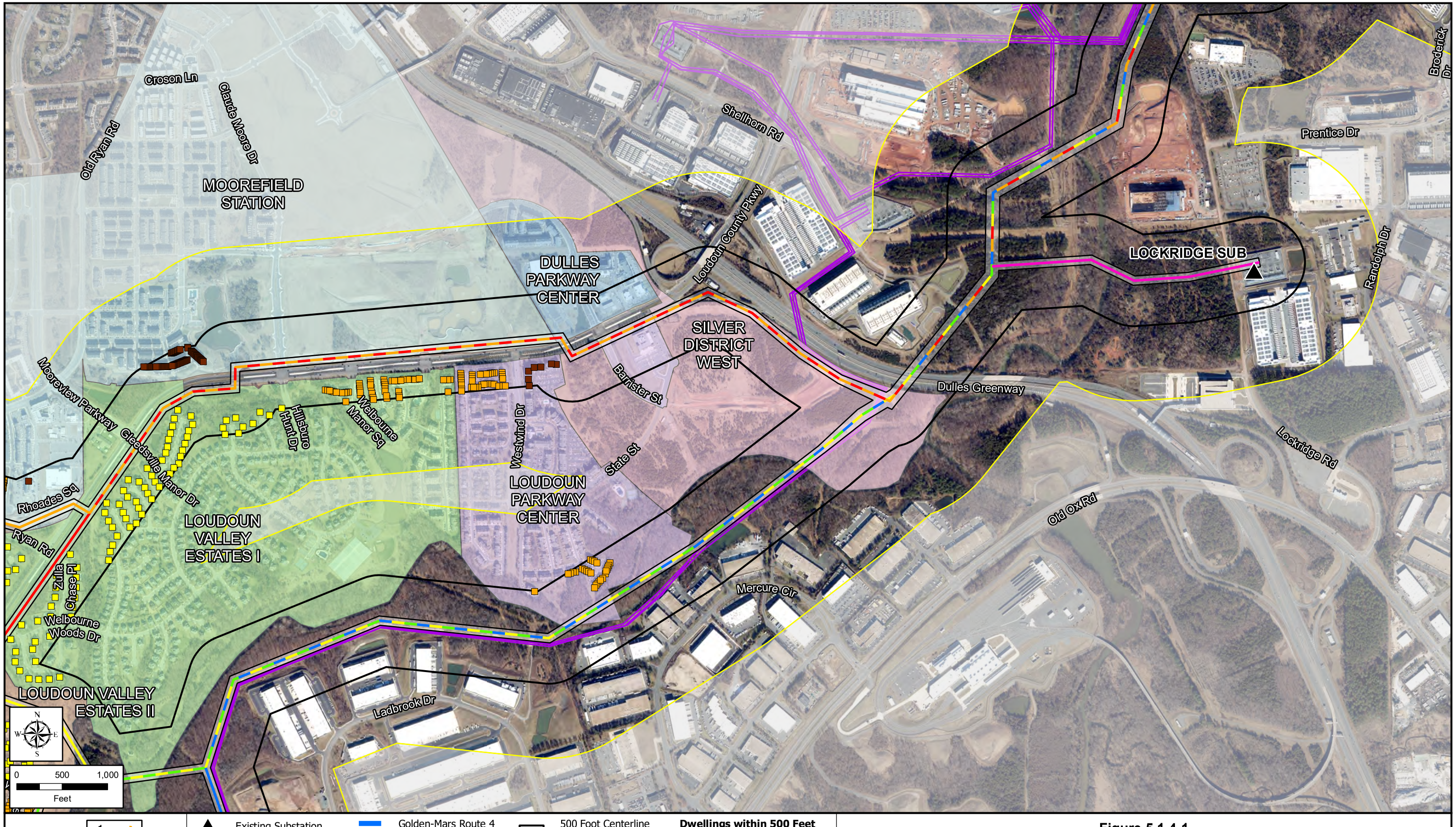
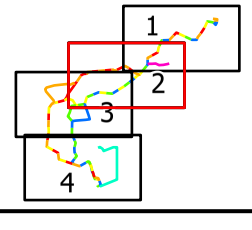


Figure 5.1.4-1
Neighborhoods and Dwellings
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy





- Existing Substation
- Golden-Mars Route 1
- Golden-Mars Route 2
- Golden-Mars Route 3
- Golden-Mars Route 4
- Golden-Mars Route 5
- Lockridge 230 kV Loop
- Existing Dominion Transmission Line
- 500 Foot Centerline Buffer
- 0.25 Mile Centerline Buffer

Dwellings within 500 Feet

- Multi-Family Building
- Single-Family Attached
- Single-Family Detached

Figure 5.1.4-1
Neighborhoods and Dwellings
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

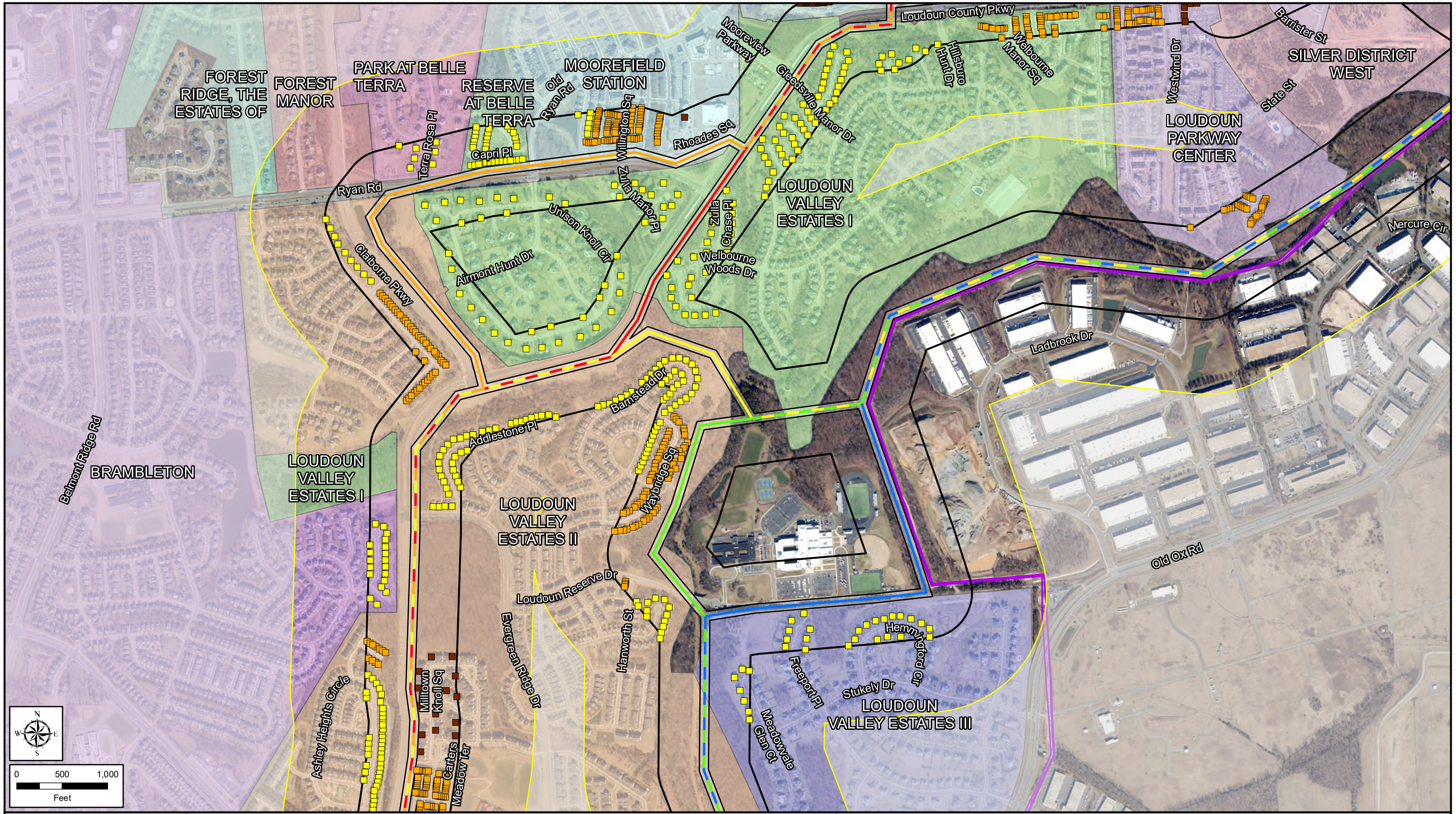
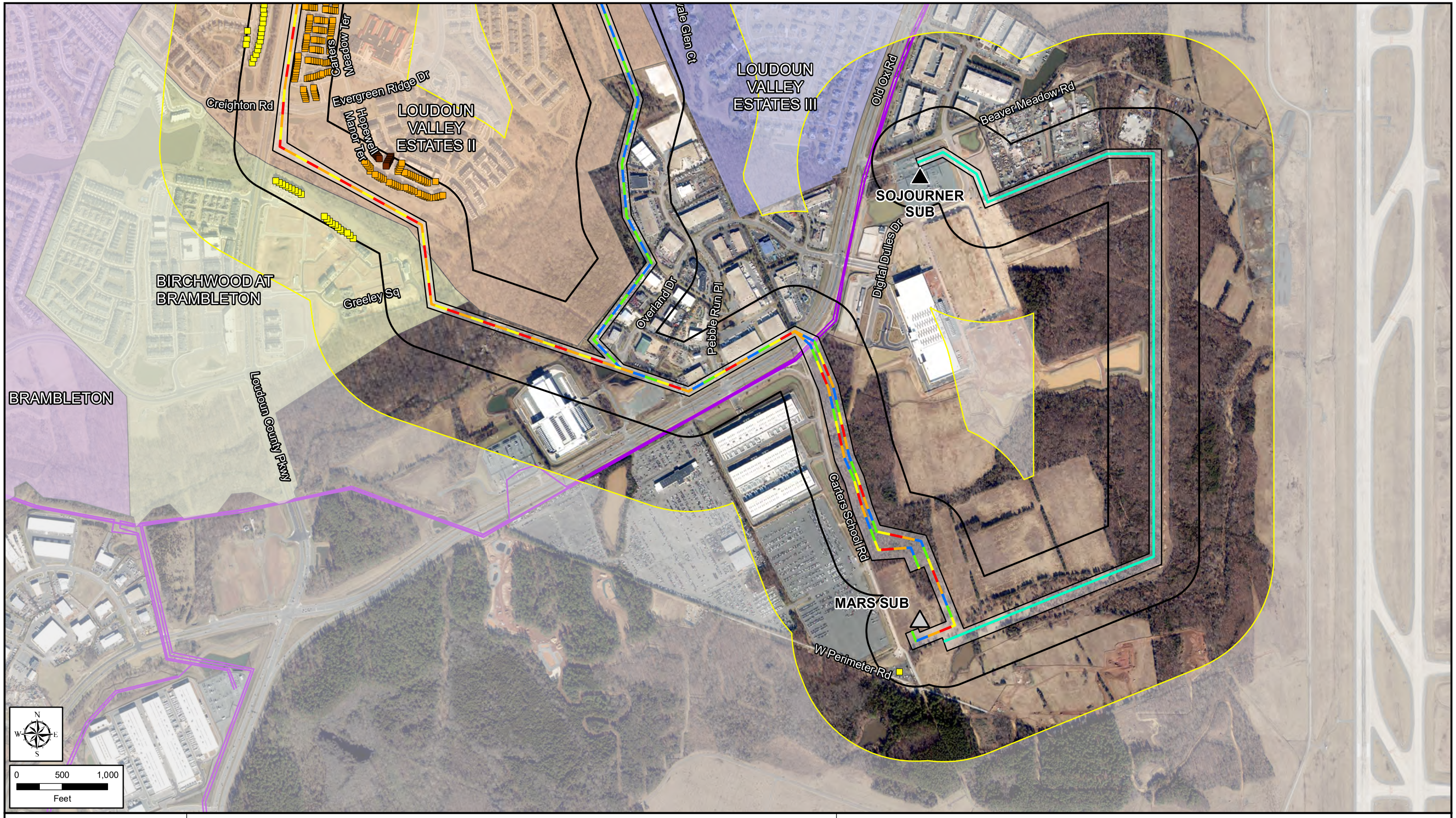
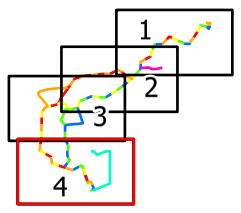


Figure 5.1.4-1
Neighborhoods and Dwellings
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy





- Existing Substation
- Future Substation
- Golden-Mars Route 1
- Golden-Mars Route 2
- Golden-Mars Route 3
- Golden-Mars Route 4
- Golden-Mars Route 5
- Sojourner 230 kV Loop
- Existing Dominion Transmission Line
- 500 Foot Centerline Buffer
- 0.25 Mile Centerline Buffer

Dwellings within 500 Feet

- Multi-Family Building
- Single-Family Attached
- Single-Family Detached

Figure 5.1.4-1
Neighborhoods and Dwellings
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

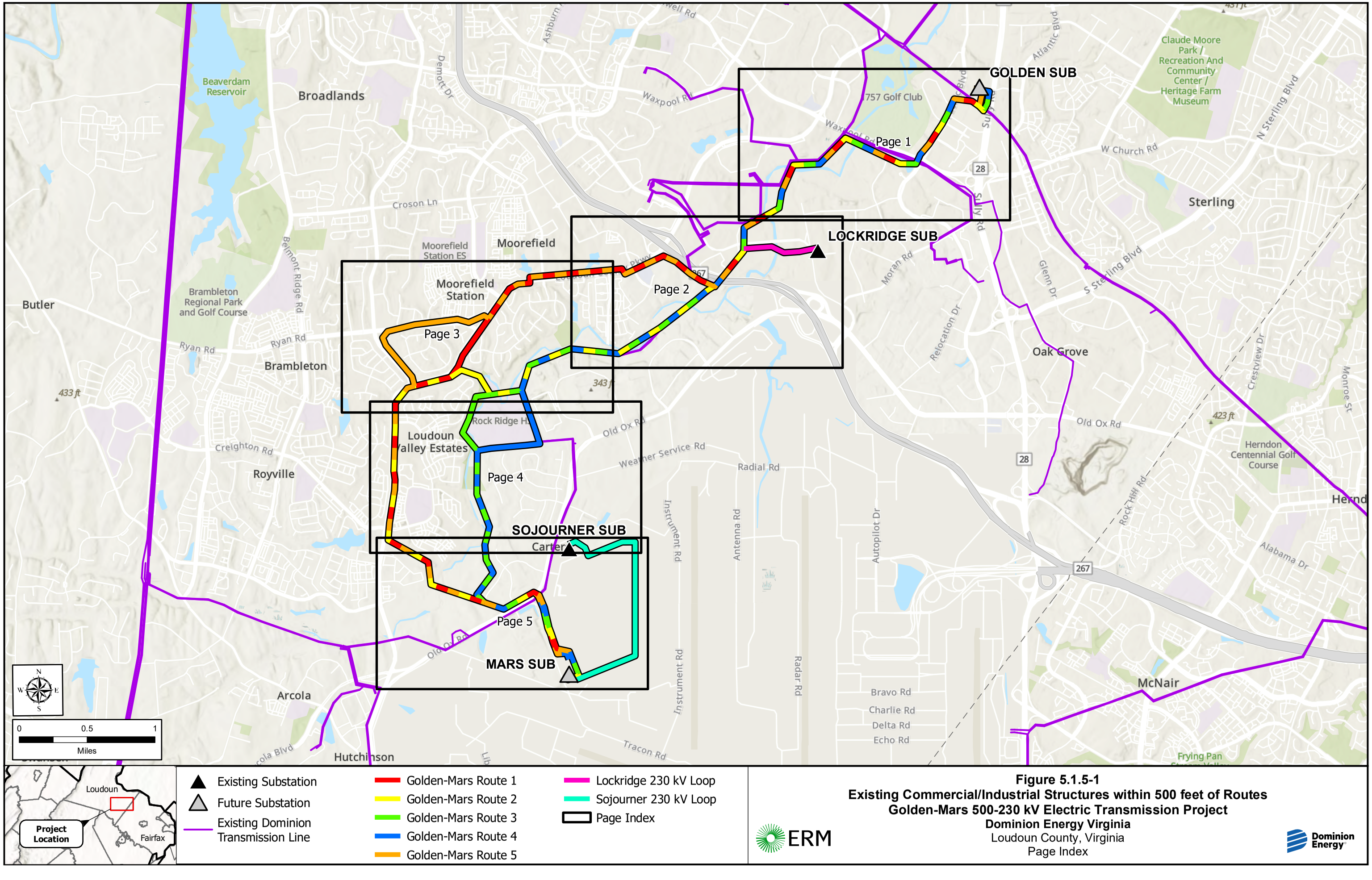


Figure 5.1.5-1
Existing Commercial/Industrial Structures within 500 feet of Routes
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia
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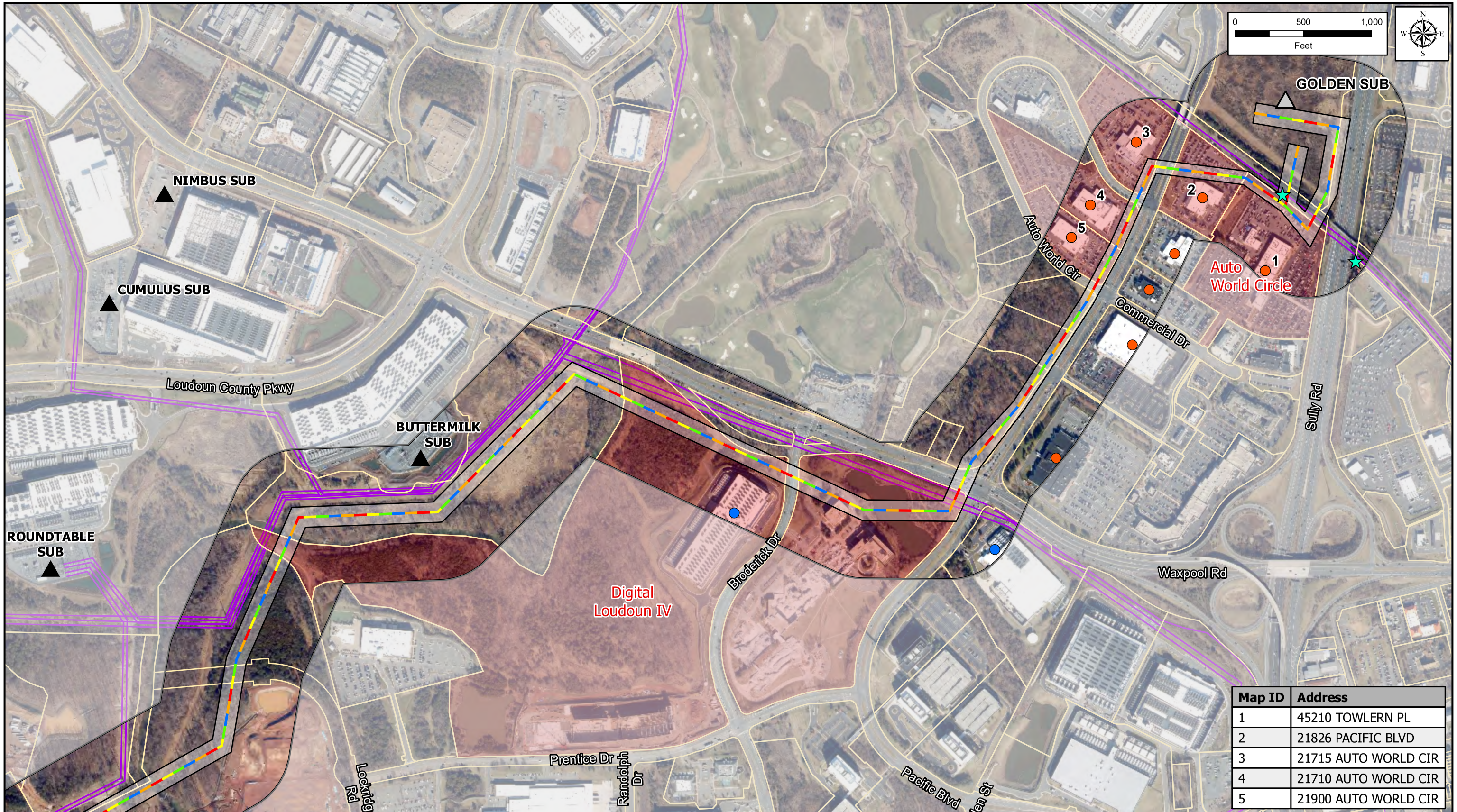

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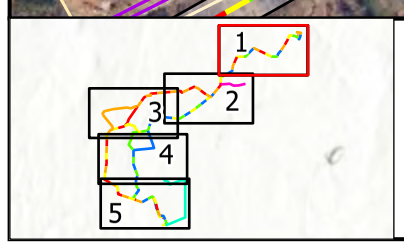
2	21826 PACIFIC BLVD
3	21715 AUTO WORLD CIR
4	21710 AUTO WORLD CIR
5	21900 AUTO WORLD CIR



- Existing Substation
- Future Substation
- Golden-Mars Route 1
- Golden-Mars Route 2
- Golden-Mars Route 3
- Golden-Mars Route 4
- Golden-Mars Route 5
- Data Center
- Miscellaneous
- Commercial
- Existing Dominion Transmission Line
- 500 Foot Centerline Buffer
- Commercial/Industrial
- Parcel Boundary

Figure 5.1.5-1
Existing Commercial/Industrial Structures within 500 feet of Routes
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

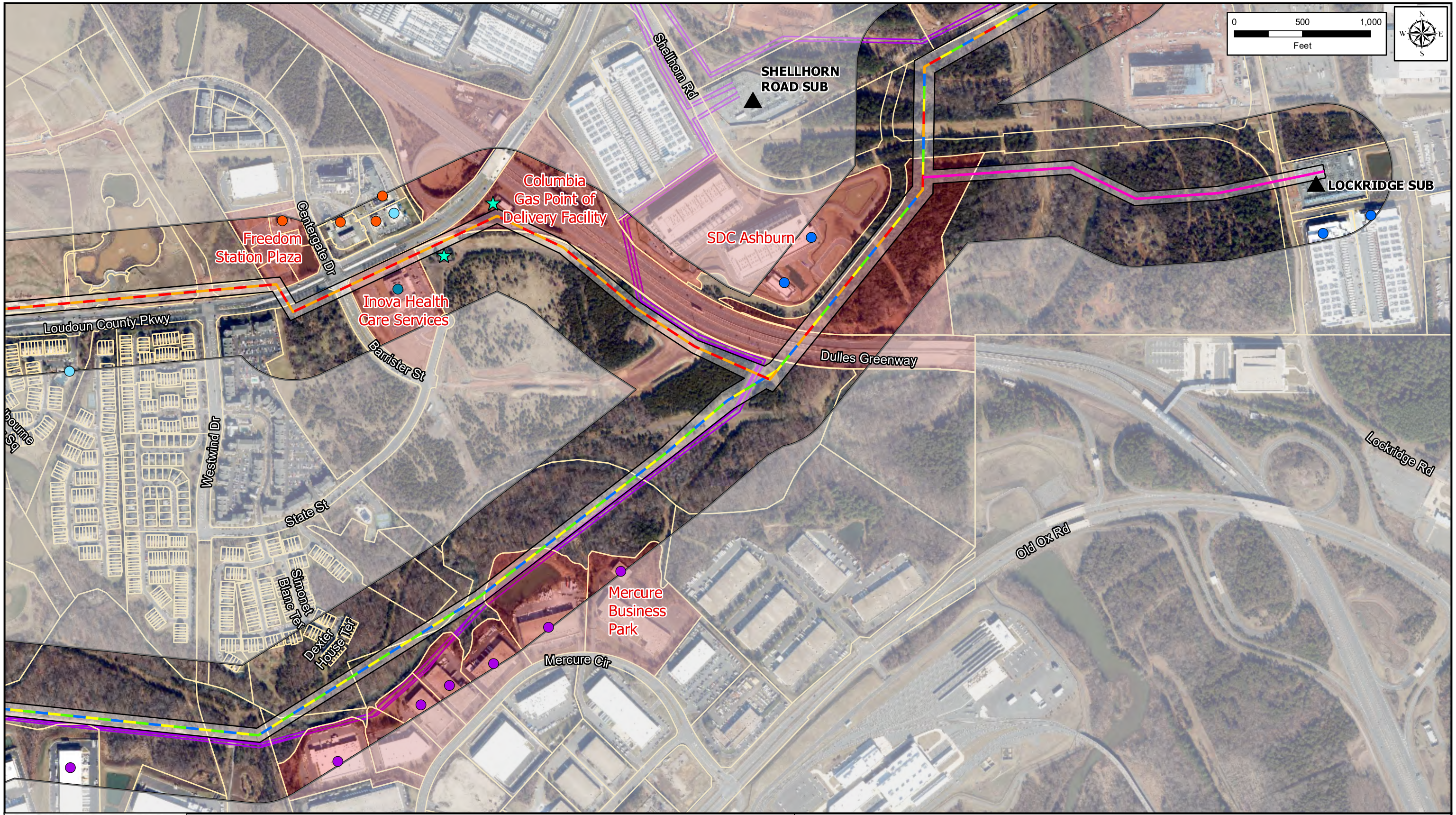
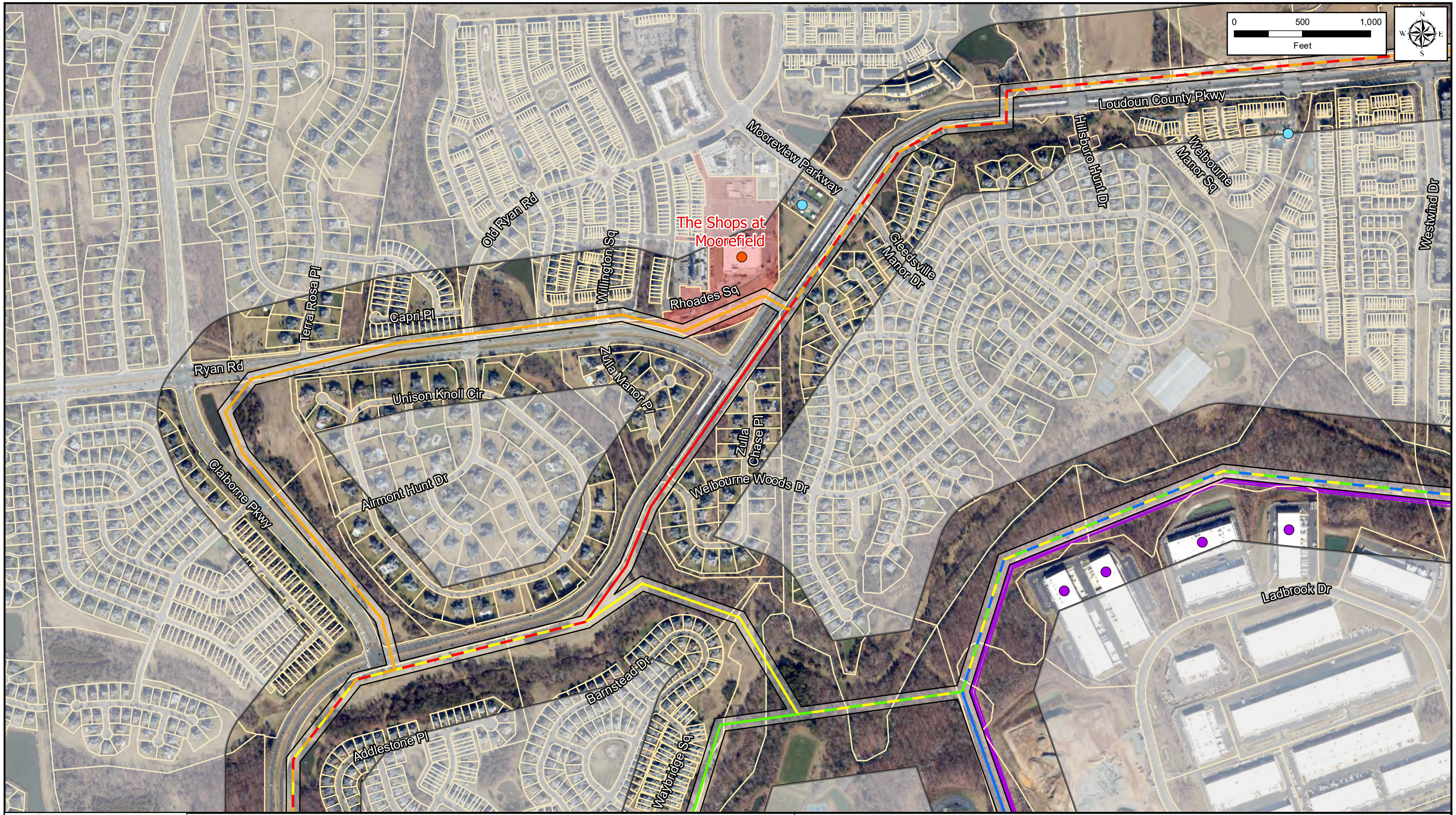
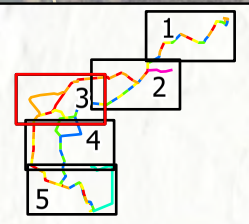


Figure 5.1.5-1
Existing Commercial/Industrial Structures within 500 feet of Routes
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy



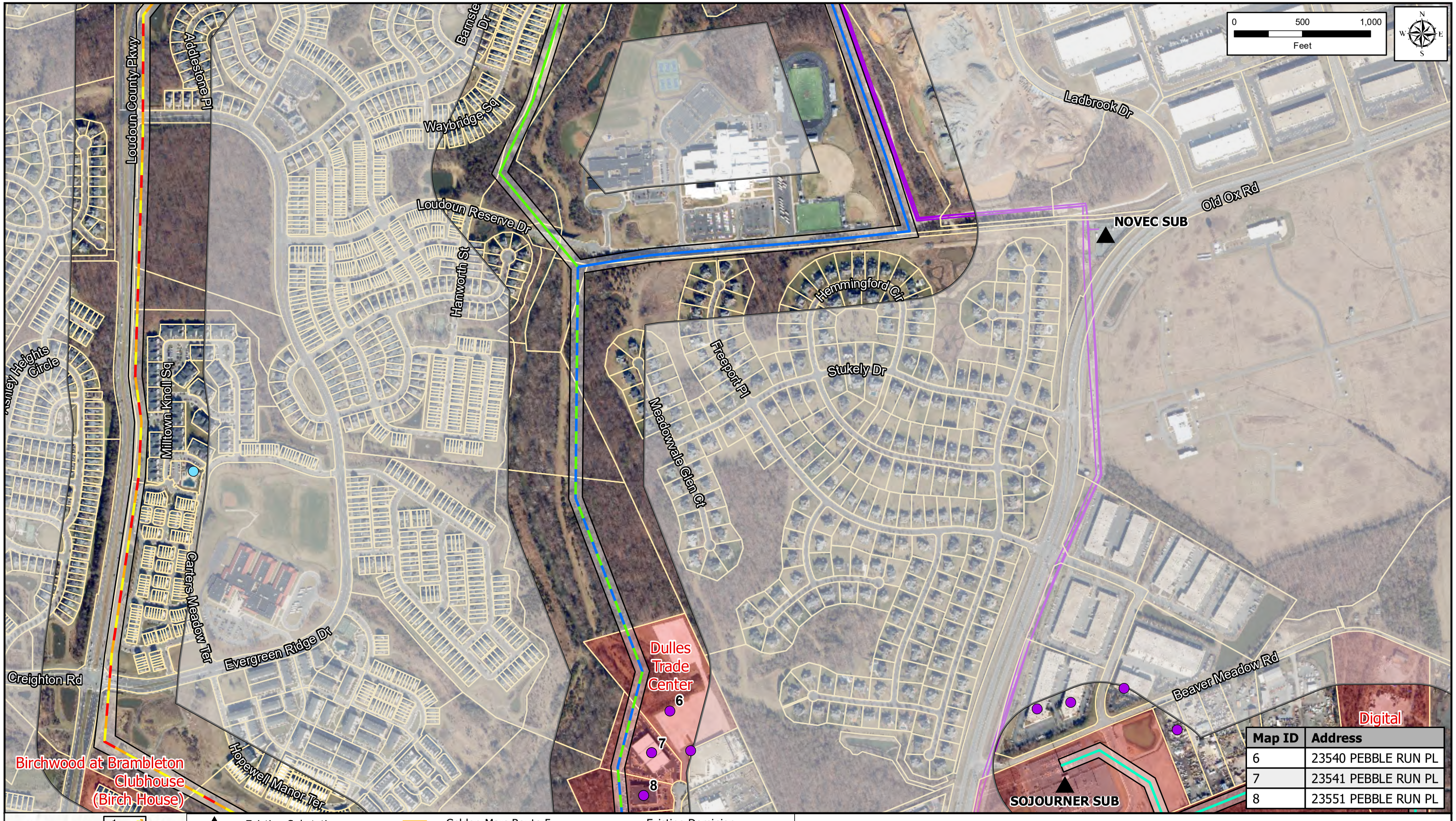


- Golden-Mars Route 1
- Golden-Mars Route 2
- Golden-Mars Route 3
- Golden-Mars Route 4
- Golden-Mars Route 5
- Commercial
- Industrial
- Other: Non-Public
- Existing Dominion Transmission Line
- 500 Foot Centerline Buffer
- Commercial/Industrial
- Parcel Boundary

Figure 5.1.5-1
Existing Commercial/Industrial Structures within 500 feet of Routes
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

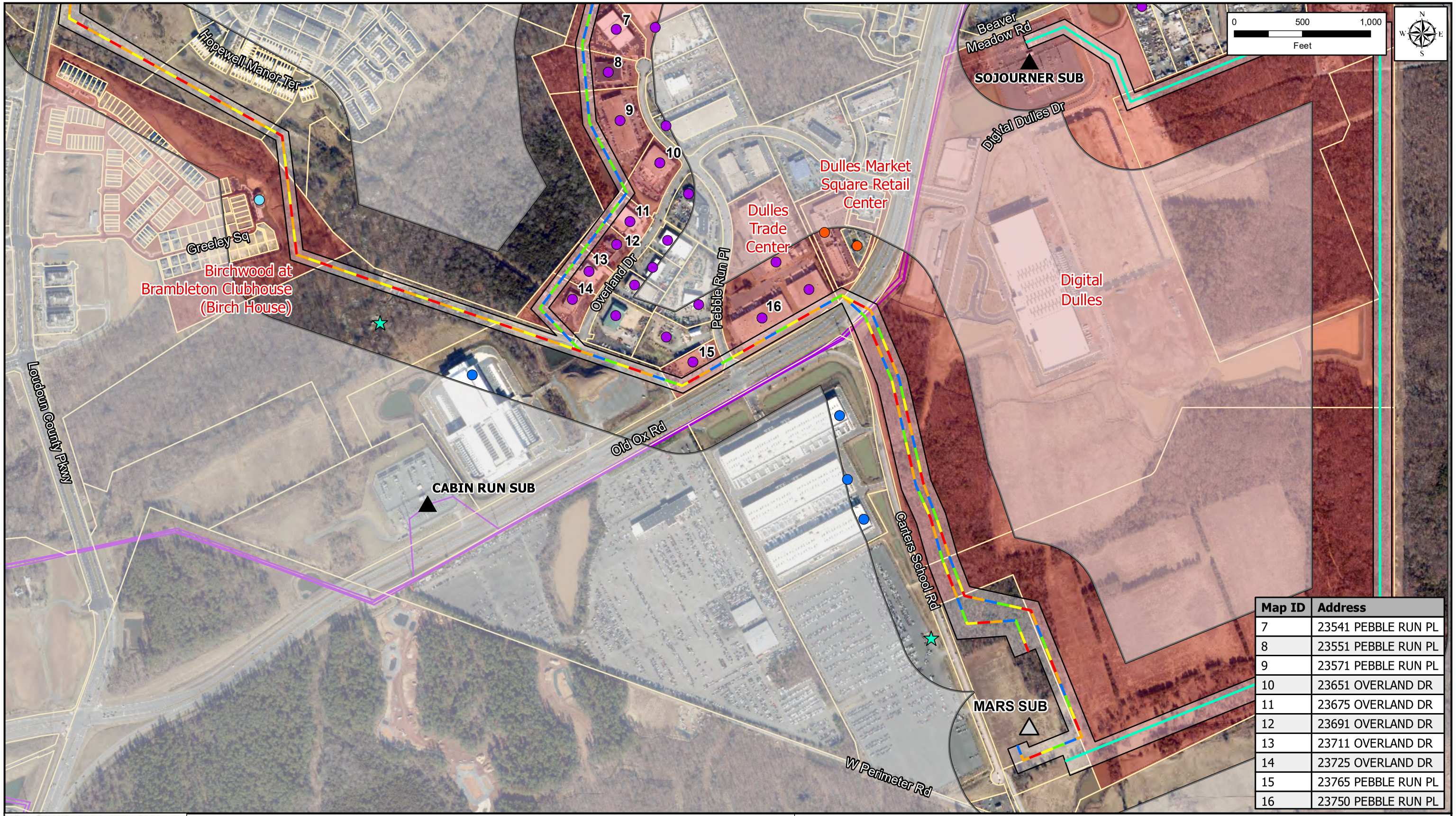
ERM

Dominion Energy

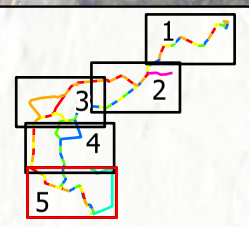


Map ID	Address
6	23540 PEBBLE RUN PL
7	23541 PEBBLE RUN PL
8	23551 PEBBLE RUN PL

Figure 5.1.5-1
Existing Commercial/Industrial Structures within 500 feet of Routes
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia



Map ID	Address
7	23541 PEBBLE RUN PL
8	23551 PEBBLE RUN PL
9	23571 PEBBLE RUN PL
10	23651 OVERLAND DR
11	23675 OVERLAND DR
12	23691 OVERLAND DR
13	23711 OVERLAND DR
14	23725 OVERLAND DR
15	23765 PEBBLE RUN PL
16	23750 PEBBLE RUN PL



- Existing Substation
- Future Substation
- Golden-Mars Route 1
- Golden-Mars Route 2
- Golden-Mars Route 3
- Golden-Mars Route 4
- Golden-Mars Route 5
- Sojourner 230 kV Loop
- Data Center
- Miscellaneous
- Commercial
- Industrial
- Other: Non-Public
- Existing Dominion Transmission Line
- 500 Foot Centerline Buffer
- Commercial/Industrial
- Parcel Boundary

Figure 5.1.5-1
Existing Commercial/Industrial Structures within 500 feet of Routes
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

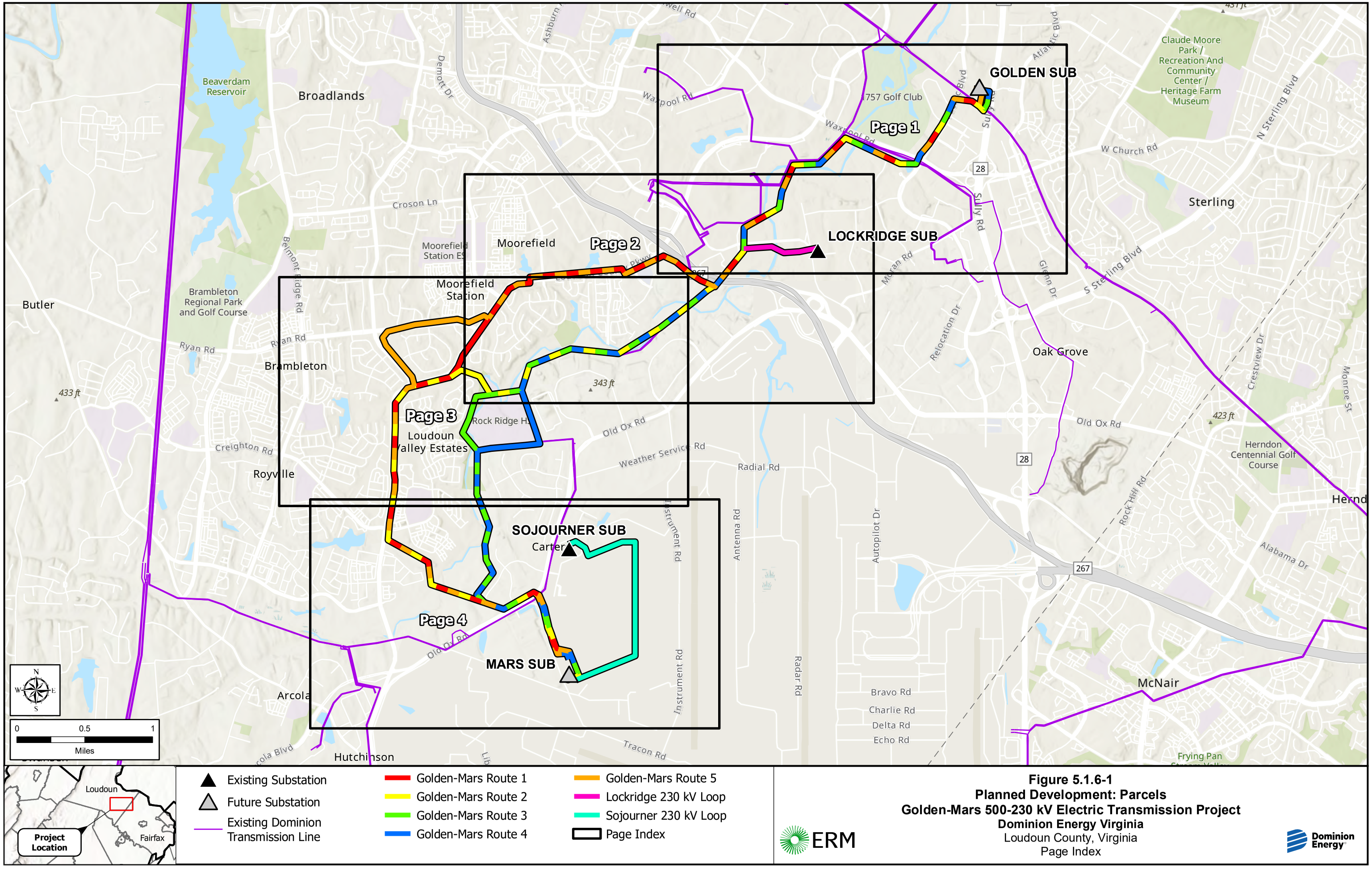


Figure 5.1.6-1
Planned Development: Parcels
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia
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ERM

Dominion Energy

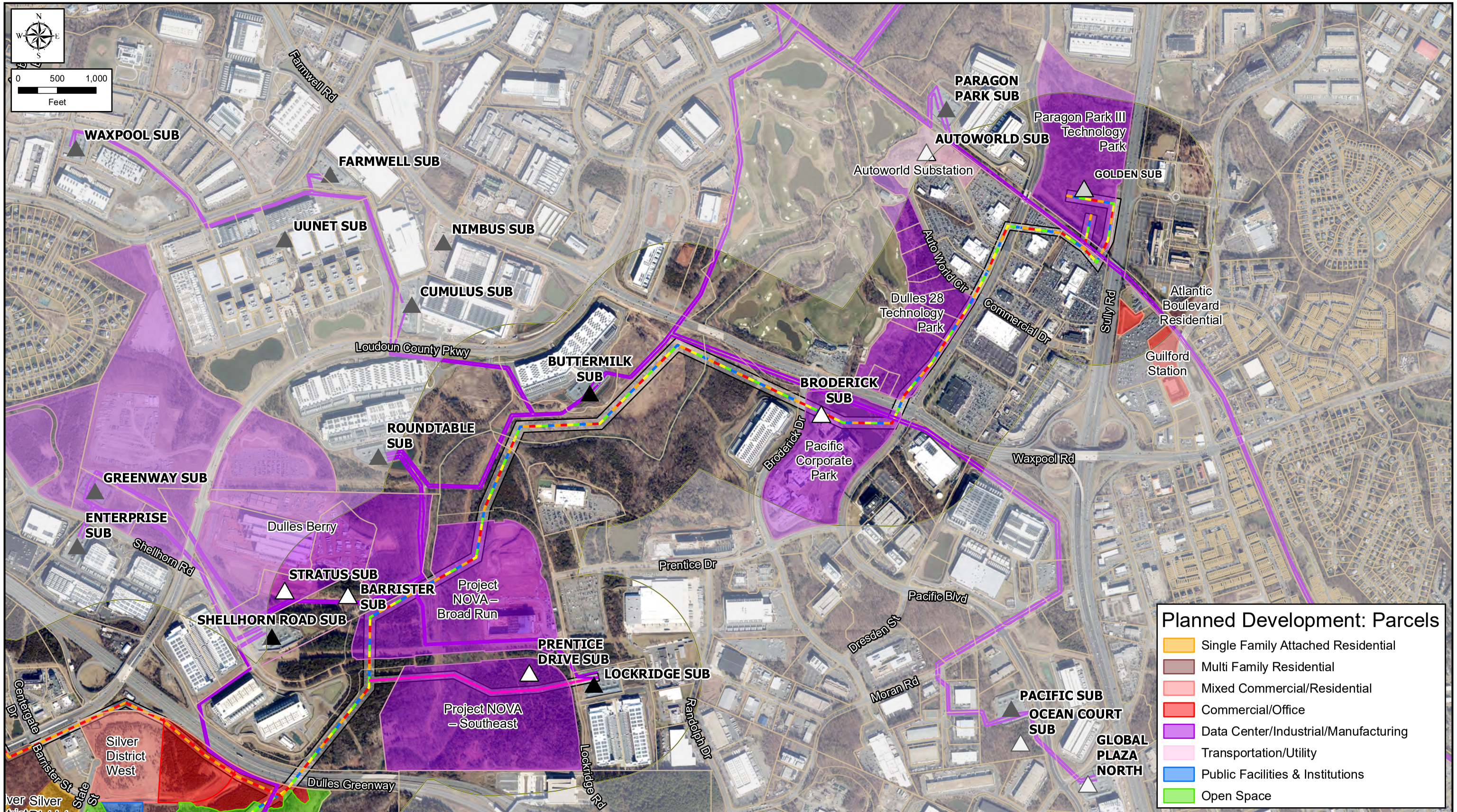


Figure 5.1.6-1
Planned Development: Parcels
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

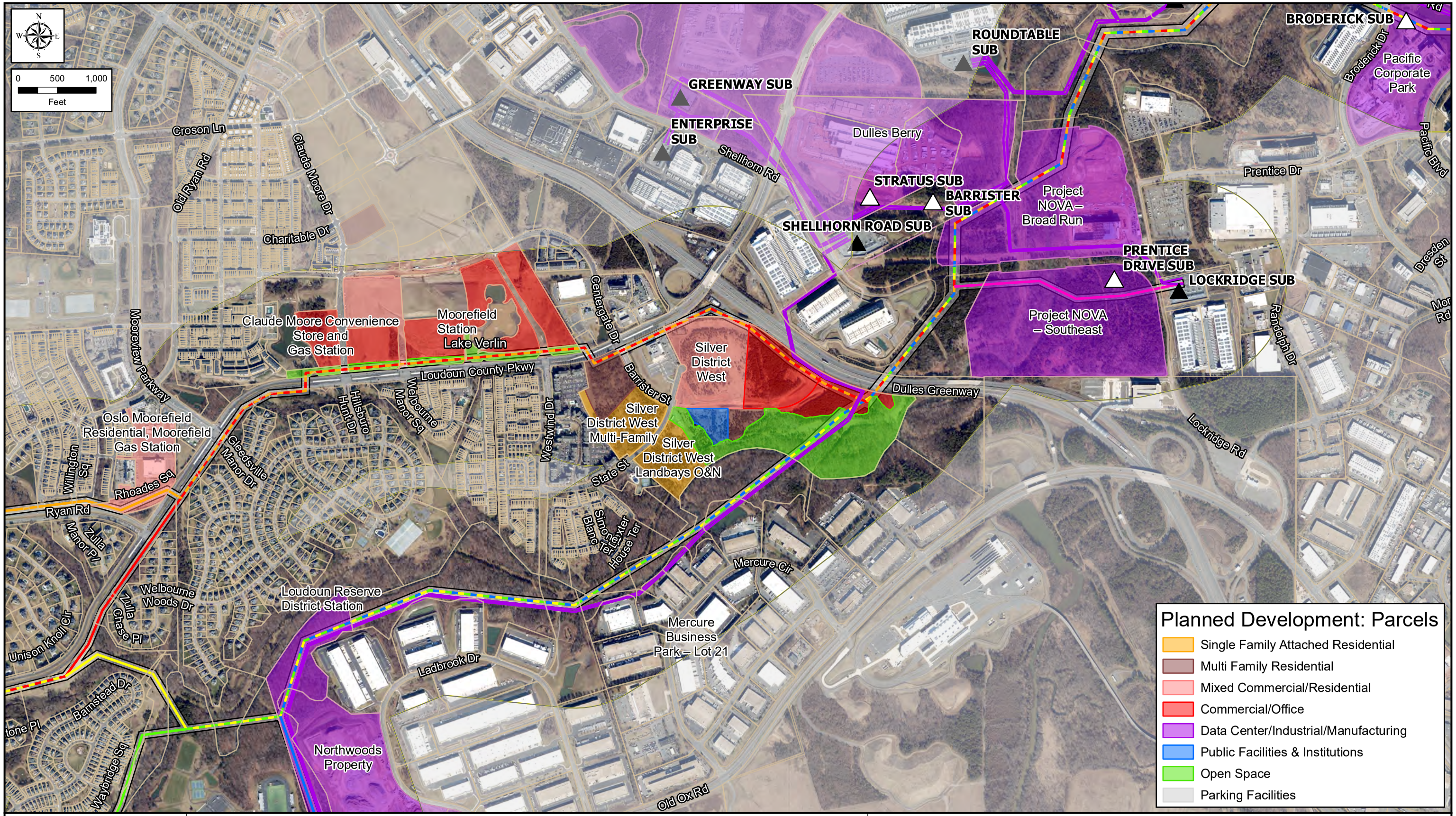


Figure 5.1.6-1
Planned Development: Parcels
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

Figure 5.1.6-1
Planned Development: Parcels
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

N
W E
S

0 500 1,000
Feet

Ashley Height Circle
Millstown Knoll Sq
Carters Meadow Ter
Meadowvale Dr
Glen Ct
Old Ox Rd
Beaver Meadow Rd
Stone Hill Residential
Hopewell Manor Ter
SOJOURNER SUB
Greeley Sq
Digital Dulles Dr
Dulles Commerce Center/West Dulles
Overland Dr
Pebble Run Pl
Birchwood at Brambleton Landbay B
Digital Dulles and Western Lands Substations
Loudoun County Pkwy
CyrusOne Sterling 11 Data Center Phase 2
CABIN RUN SUB
Dulles Commerce Center/West Dulles
Carters School Rd
Brambleton Business Campus Data Center
Prologis Erin's Run Drive
MARS SUB
YARDLEY RIDGE SUB
W Perimeter Rd
EVERGREEN MILLS SUB

Planned Development: Parcels
- Single Family Residential
- Multi Family Residential
- Data Center/Industrial/Manufacturing
- Transportation/Utility
- Open Space

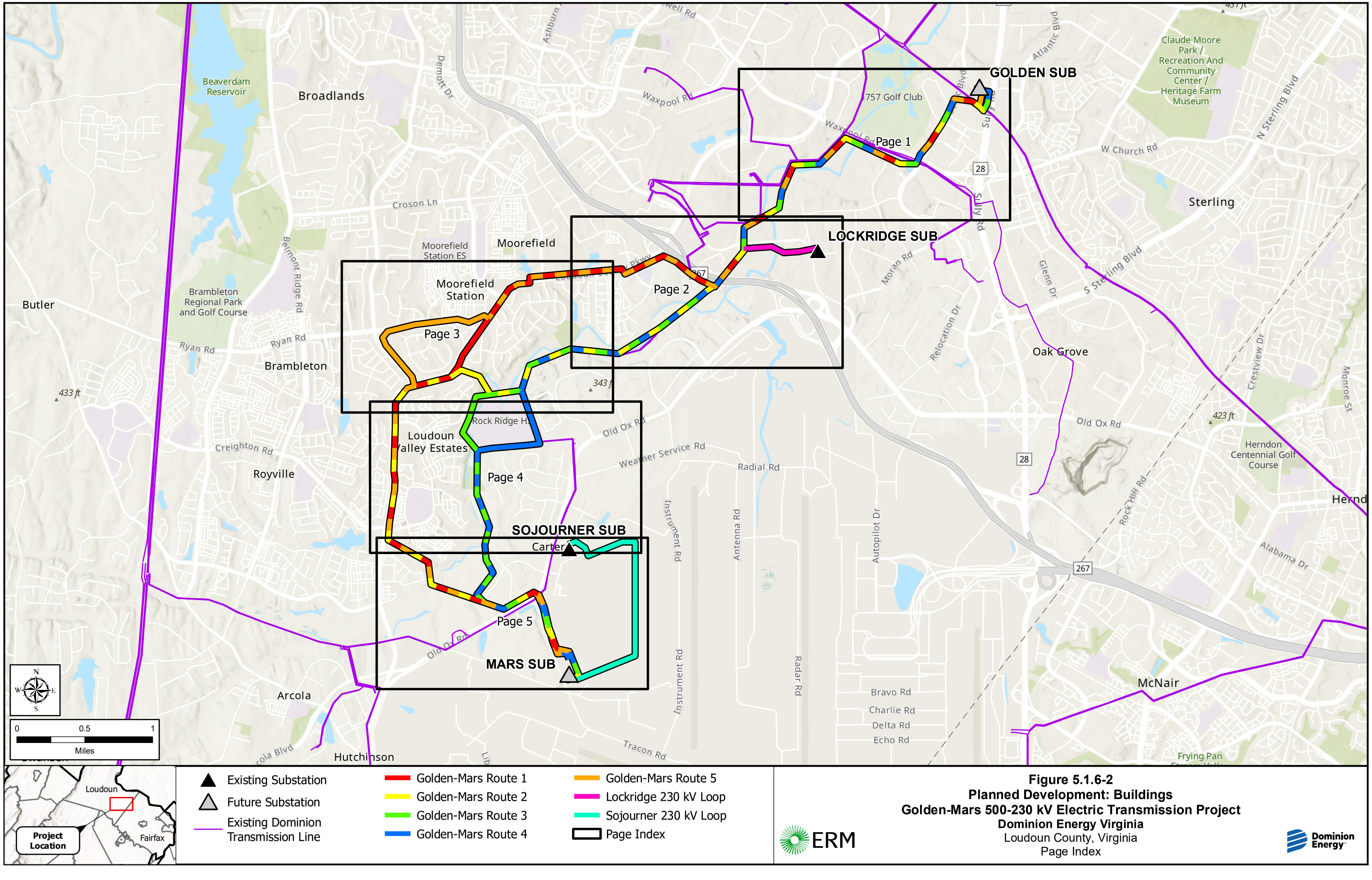
1
2
3
4

- Future Substation
- Existing Substation
- Golden-Mars Route 1
- Golden-Mars Route 2
- Golden-Mars Route 3
- Golden-Mars Route 4
- Golden-Mars Route 5
- Sojourner 230 kV Loop
- Existing Dominion Transmission Lines
- 0.25 Mile Centerline Buffer
- Parcel Boundary

Figure 5.1.6-1
Planned Development: Parcels
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

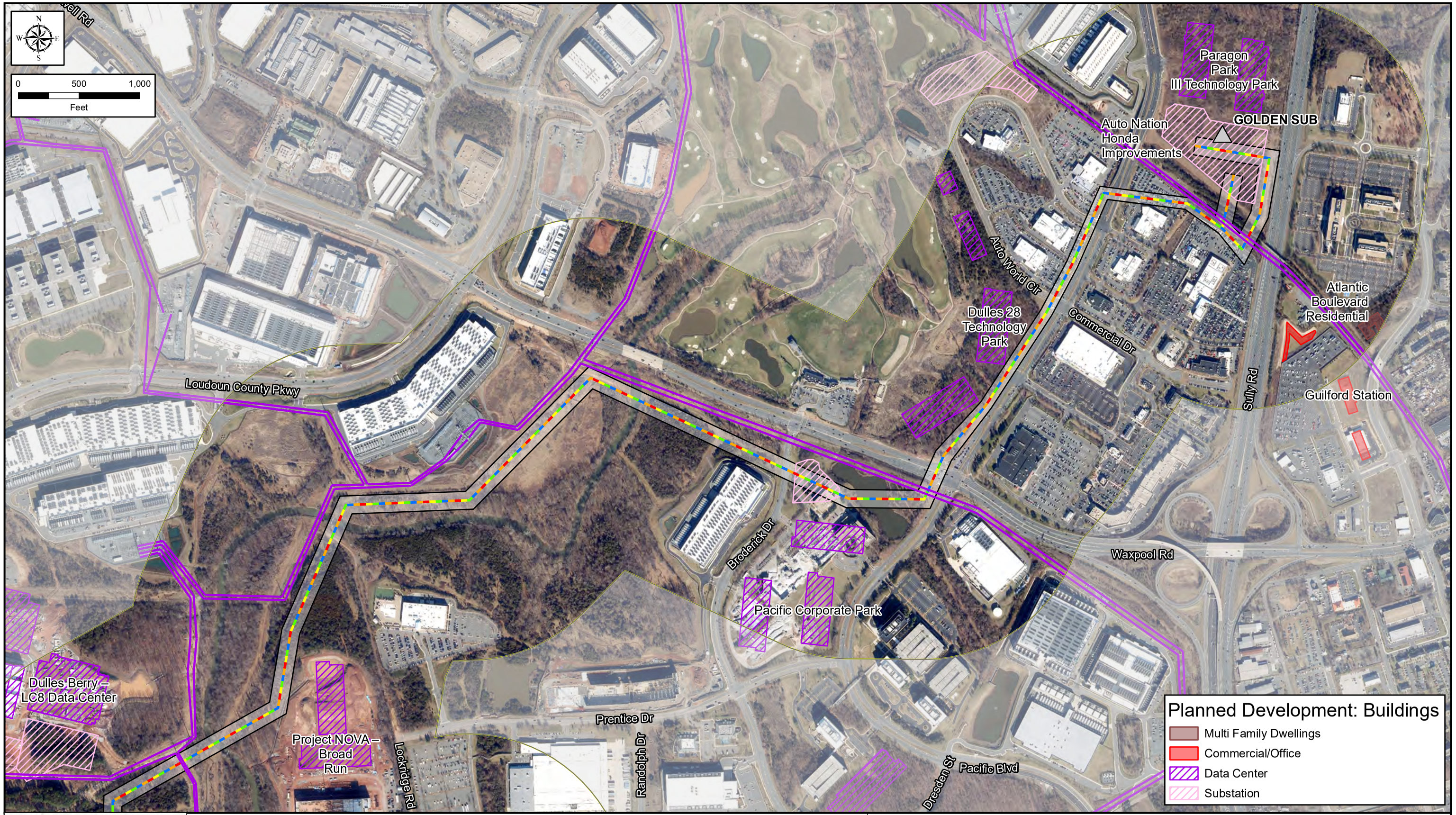


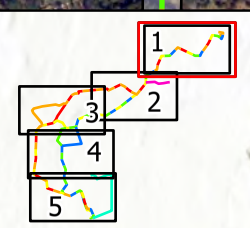
Existing Substation
Future Substation
Existing Dominion Transmission Line
Golden-Mars Route 1
Golden-Mars Route 2
Golden-Mars Route 3
Golden-Mars Route 4
Golden-Mars Route 5
Lockridge 230 kV Loop
Sojourner 230 kV Loop
Page Index

Figure 5.1.6-2
Planned Development: Buildings
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia
Page Index

ERM

Dominion Energy



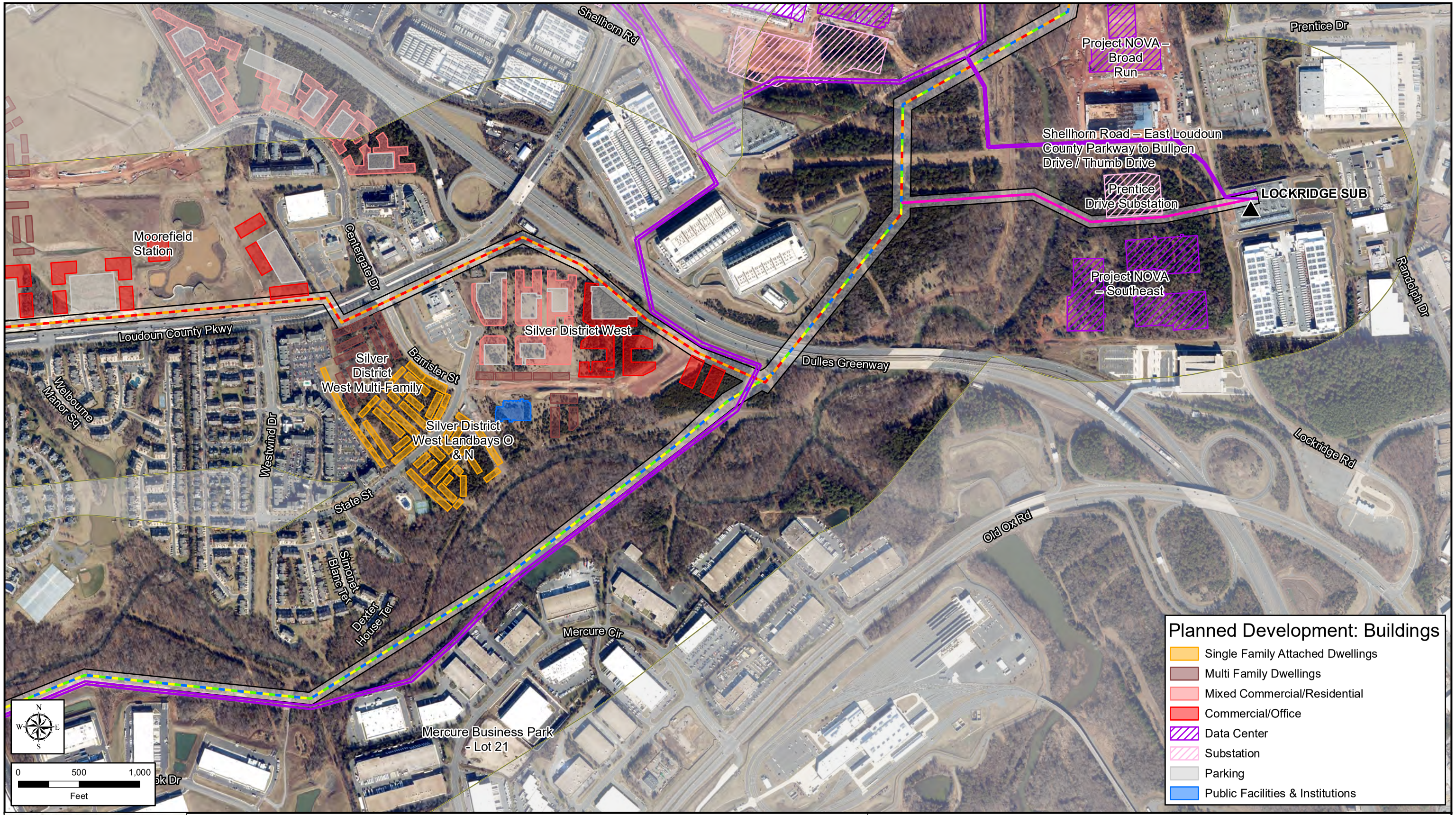


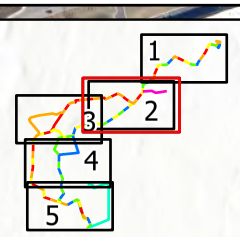
- Future Substation
- Golden-Mars Route 1
- Golden-Mars Route 2
- Golden-Mars Route 3
- Golden-Mars Route 4
- Golden-Mars Route 5
- Existing Dominion Transmission Lines
- 0.25 Mile Centerline Buffer

Figure 5.1.6-2
Planned Development: Buildings
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy





- Existing Substation
- Golden-Mars Route 1
- Golden-Mars Route 2
- Golden-Mars Route 3
- Golden-Mars Route 4
- Golden-Mars Route 5
- Lockridge 230 kV Loop
- Existing Dominion Transmission Lines
- 0.25 Mile Centerline Buffer

Figure 5.1.6-2
Planned Development: Buildings
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

Figure 5.1.6-2
Planned Development: Buildings
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

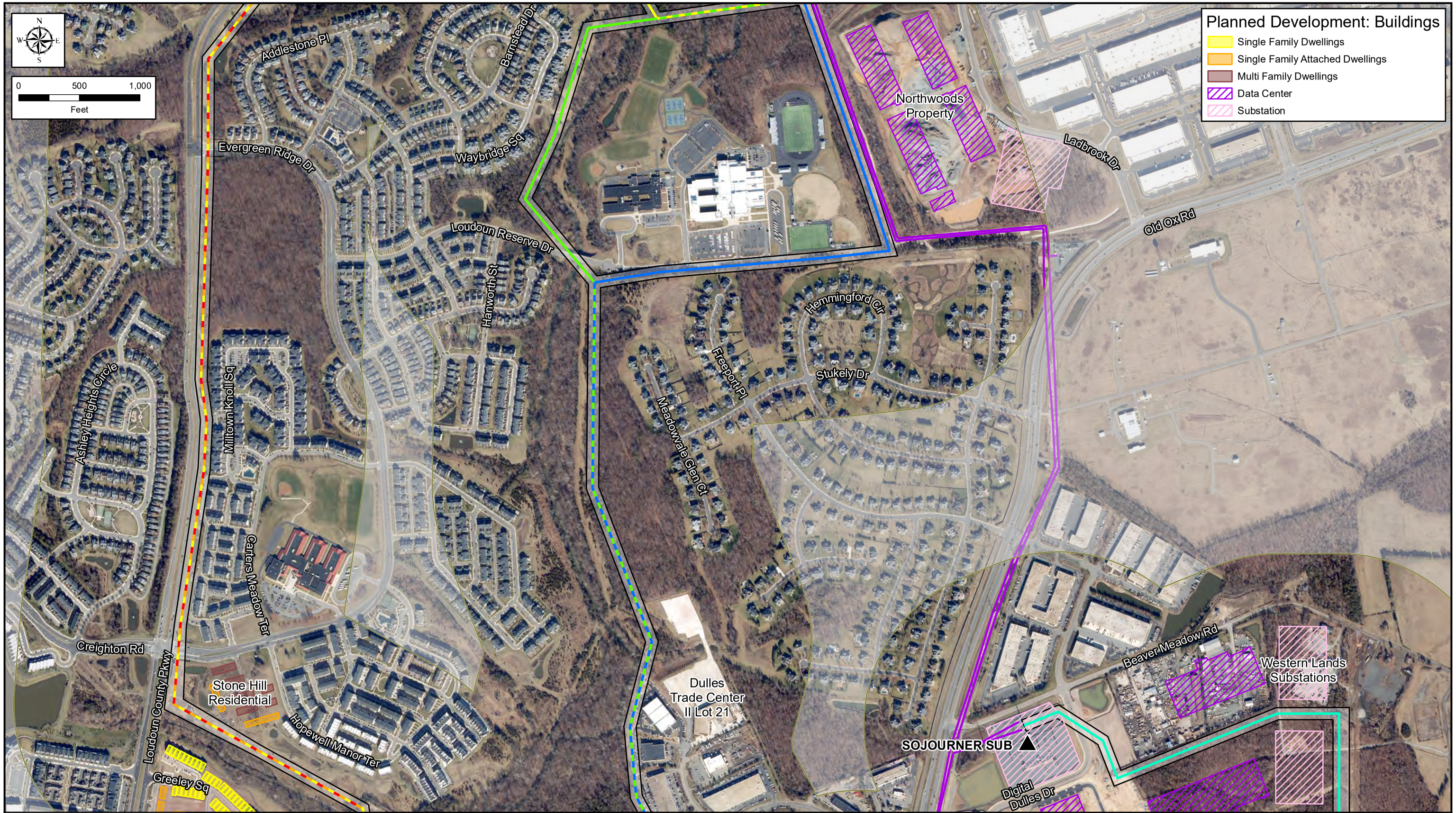


Figure 5.1.6-2
Planned Development: Buildings
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

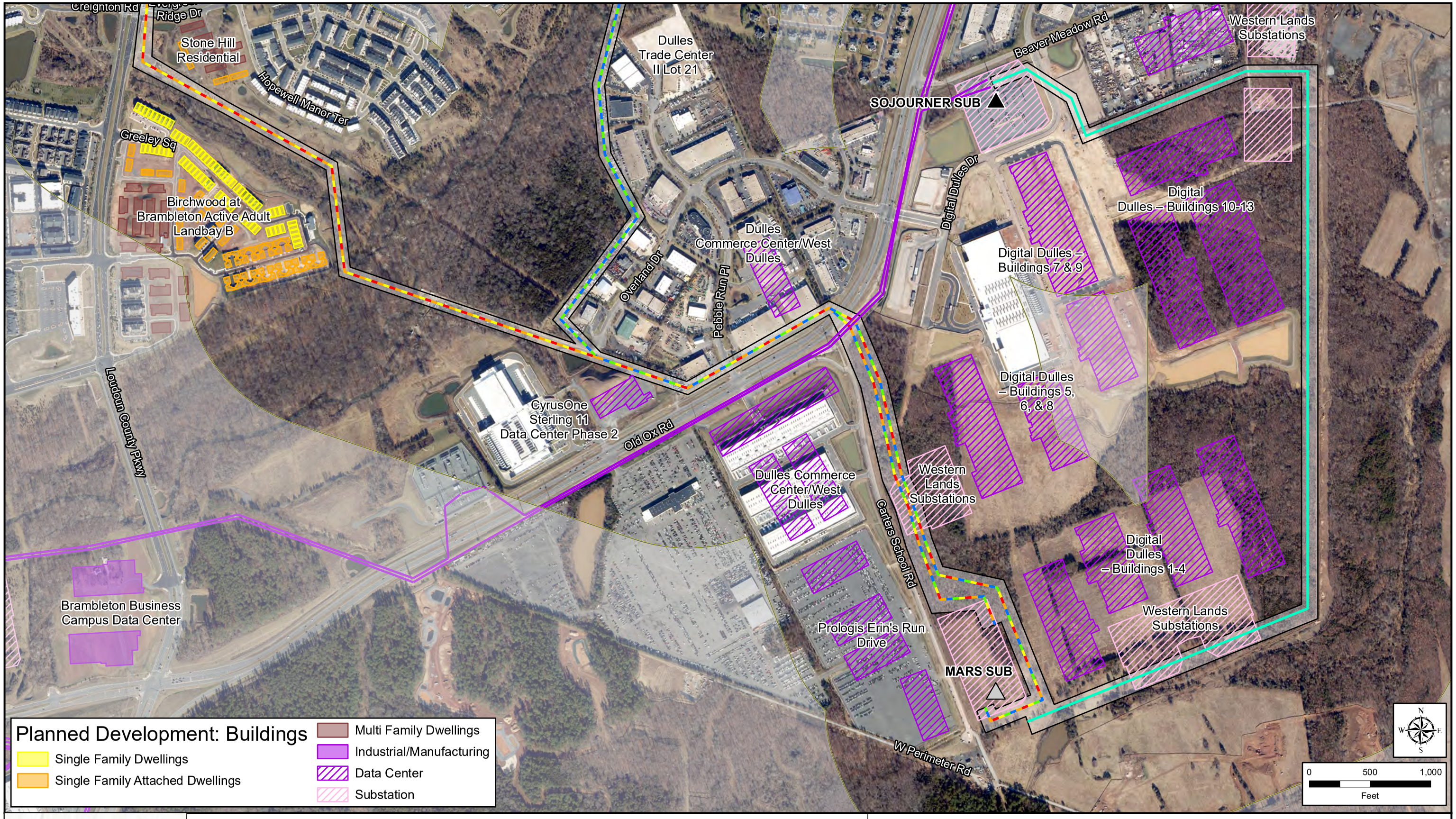


Figure 5.1.6-2
Planned Development: Buildings
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

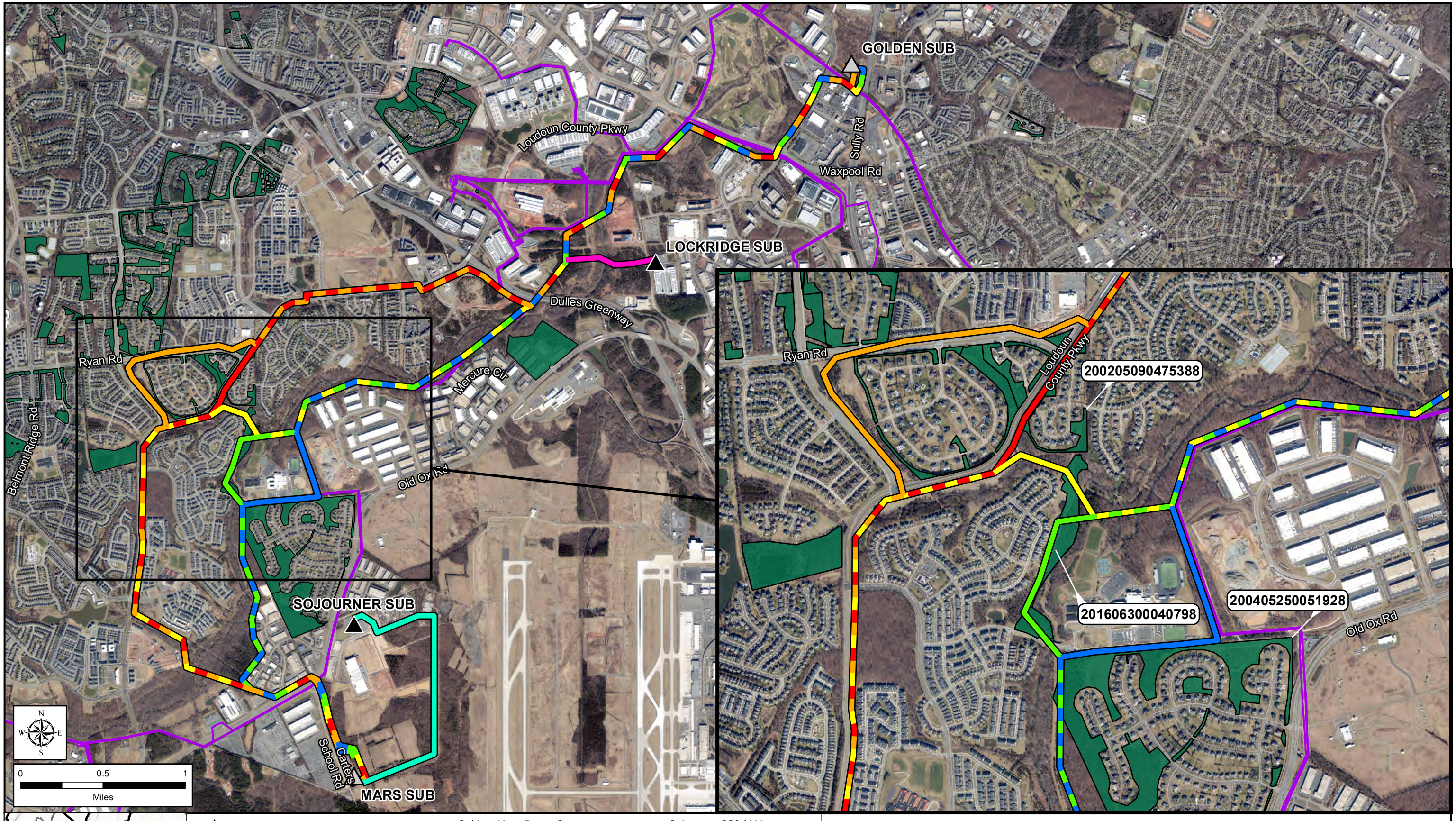


Figure 5.1.7-1
BOS Open Space Easements
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

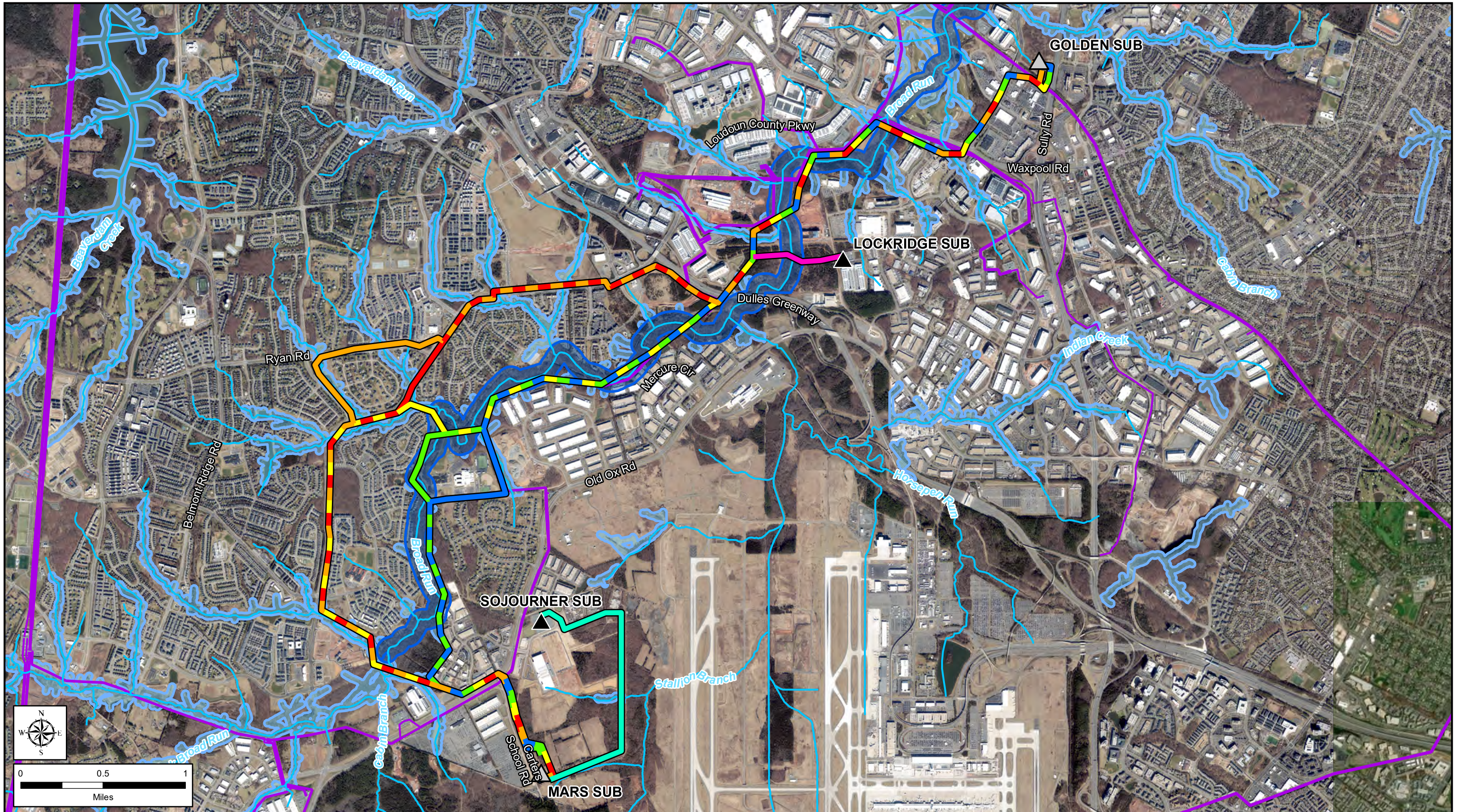


Figure 5.1.7-2
River and Stream Corridor Resources
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

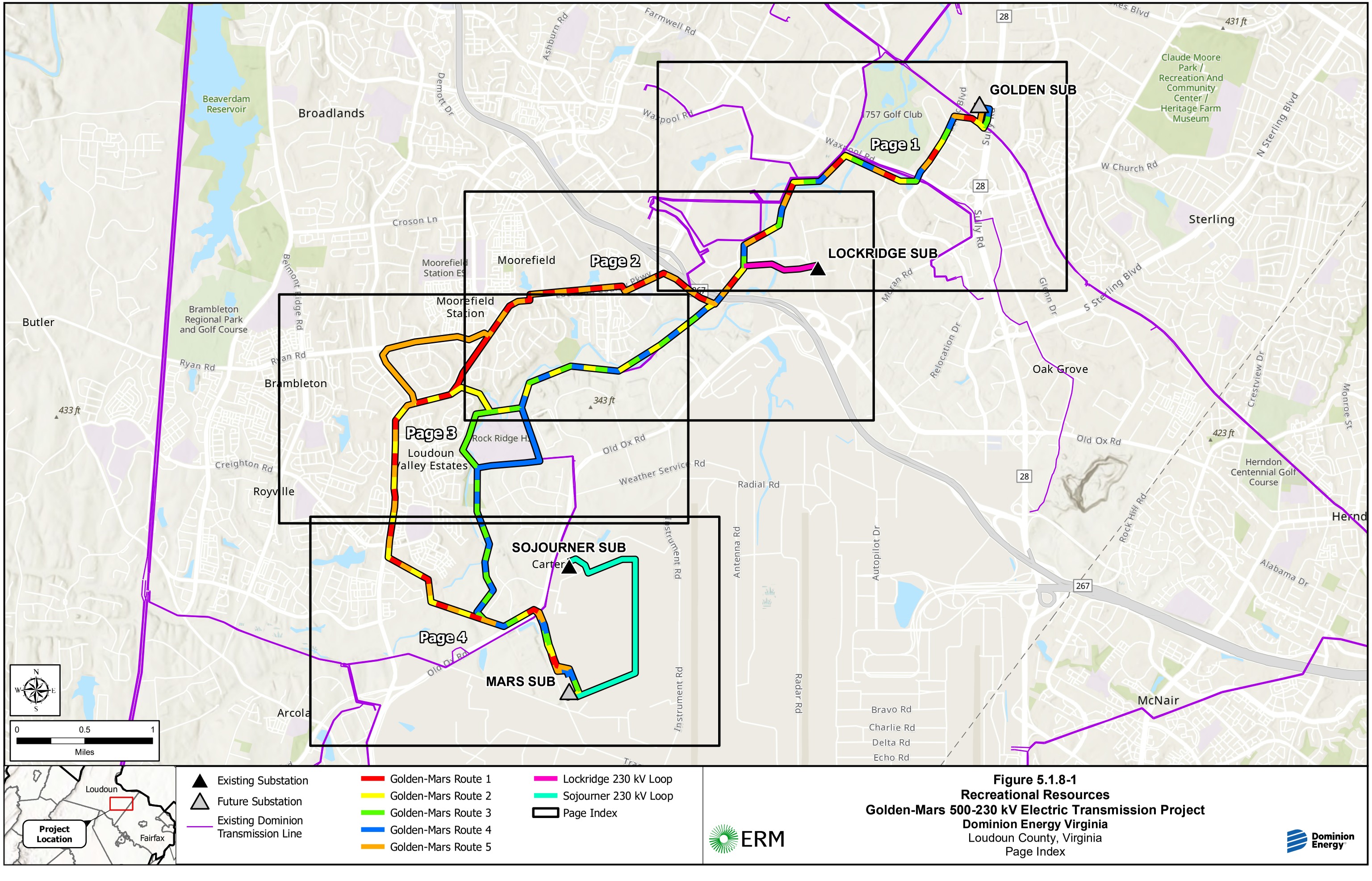


Figure 5.1.8-1
Recreational Resources
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia
Page Index

ERM

Dominion Energy

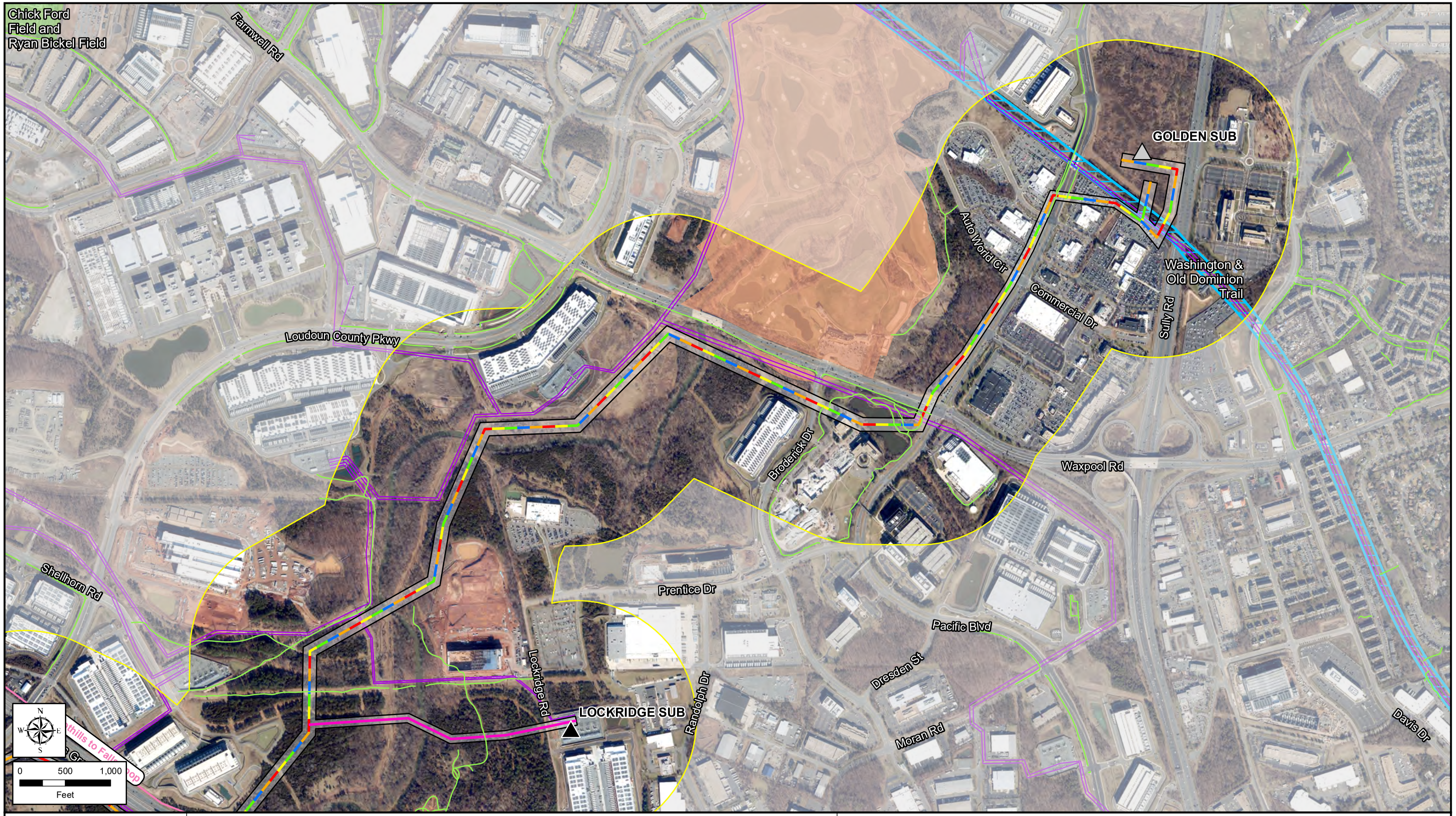
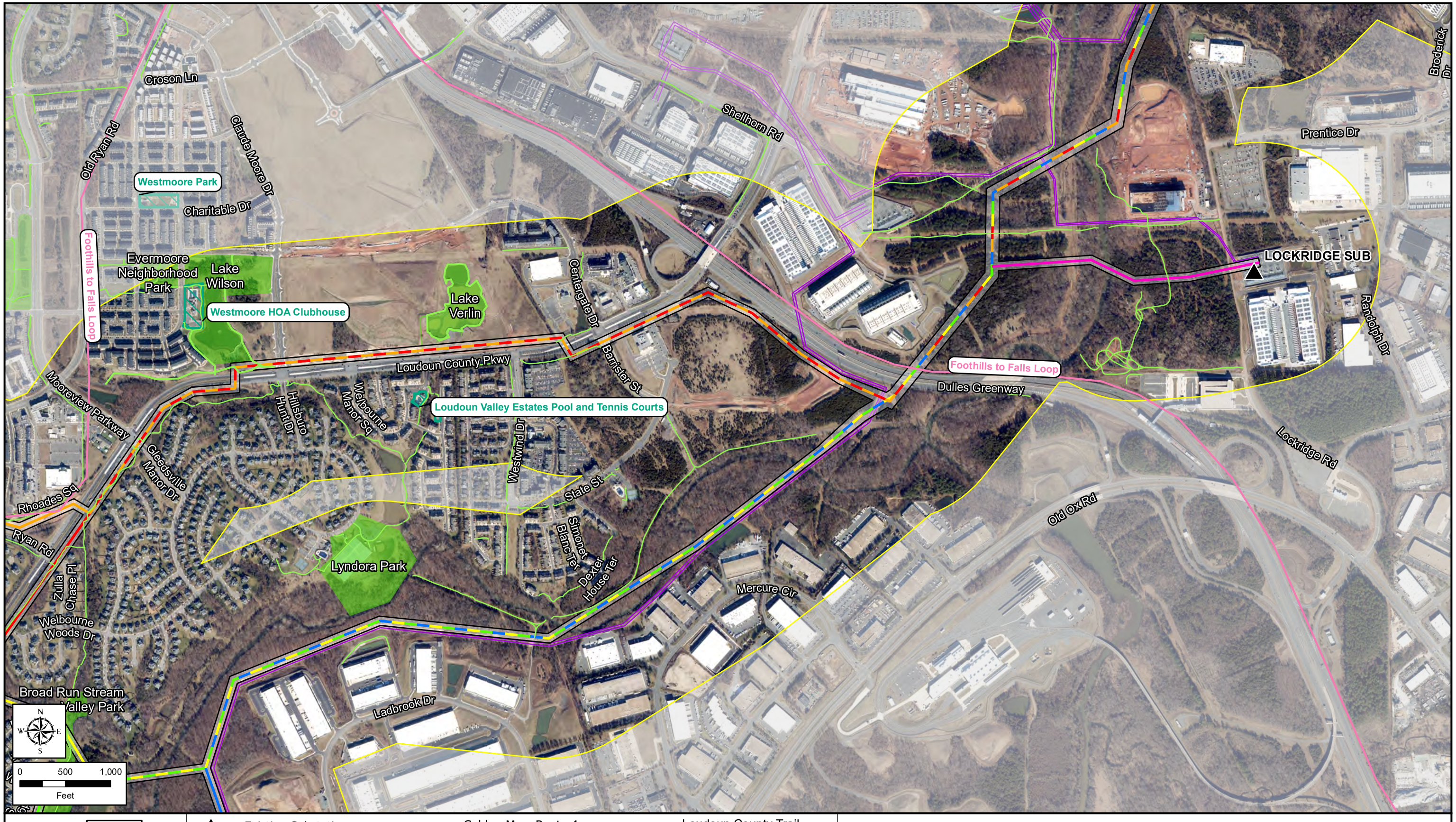
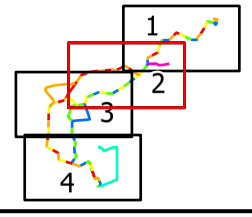


Figure 5.1.8-1
Recreational Resources
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia



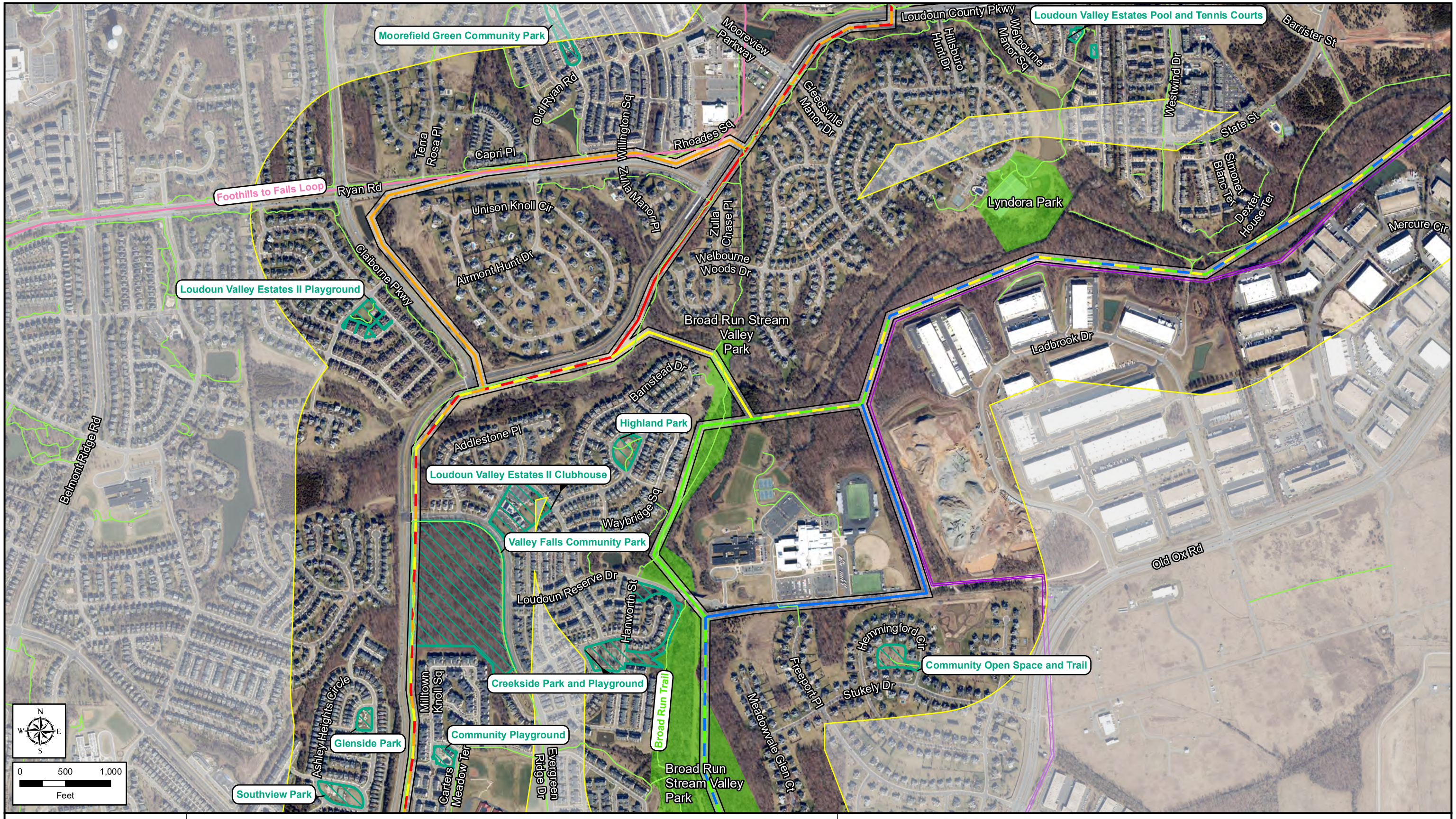


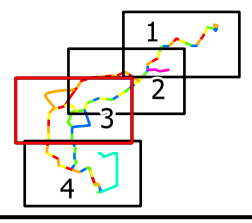
- Existing Substation
- Golden-Mars Route 1
- Golden-Mars Route 2
- Golden-Mars Route 3
- Golden-Mars Route 4
- Golden-Mars Route 5
- Lockridge 230 kV Loop
- Existing Dominion Transmission Lines
- Loudoun County Trail
- DGIF Birding Wildlife Trail
- Loudoun County Park
- HOA Amenity
- 0.25 Mile Centerline Buffer

ERM

Figure 5.1.8-1
Recreational Resources
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

Dominion Energy



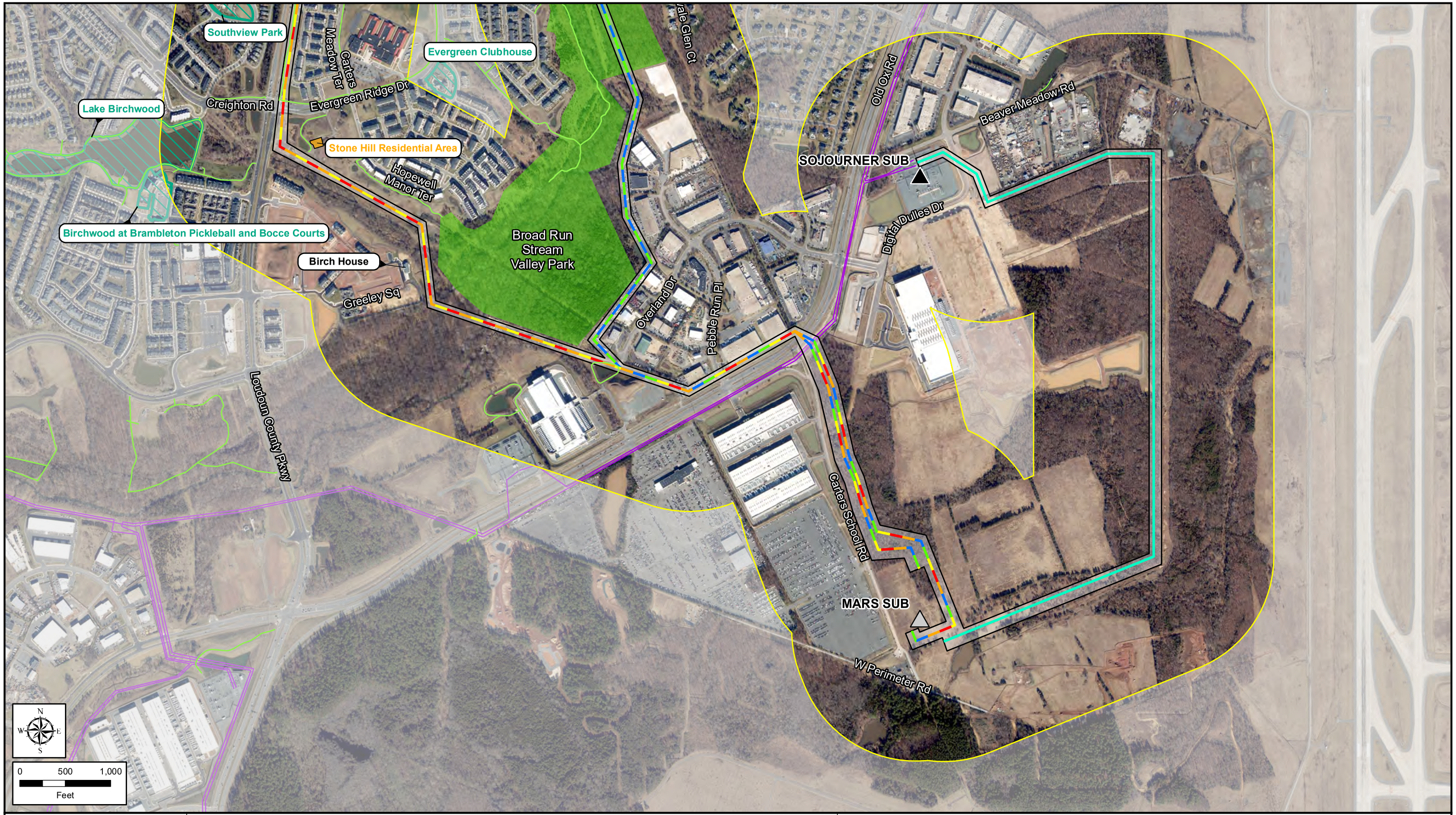


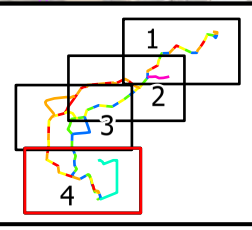
- Golden-Mars Route 1
- Golden-Mars Route 2
- Golden-Mars Route 3
- Golden-Mars Route 4
- Golden-Mars Route 5
- Existing Dominion Transmission Lines
- Loudoun County Trail
- DGIF Birding Wildlife Trail
- Loudoun County Park
- HOA Amenity
- 0.25 Mile Centerline Buffer

Figure 5.1.8-1
Recreational Resources
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy





- Existing Substation
- Future Substation
- Golden-Mars Route 1
- Golden-Mars Route 2
- Golden-Mars Route 3
- Golden-Mars Route 4
- Golden-Mars Route 5
- Sojourner 230 kV Loop
- Existing Dominion Transmission Lines
- Loudoun County Trail
- Loudoun County Park
- HOA Amenity
- Planned Recreational Development
- 0.25 Mile Centerline Buffer

Figure 5.1.8-1
Recreational Resources
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

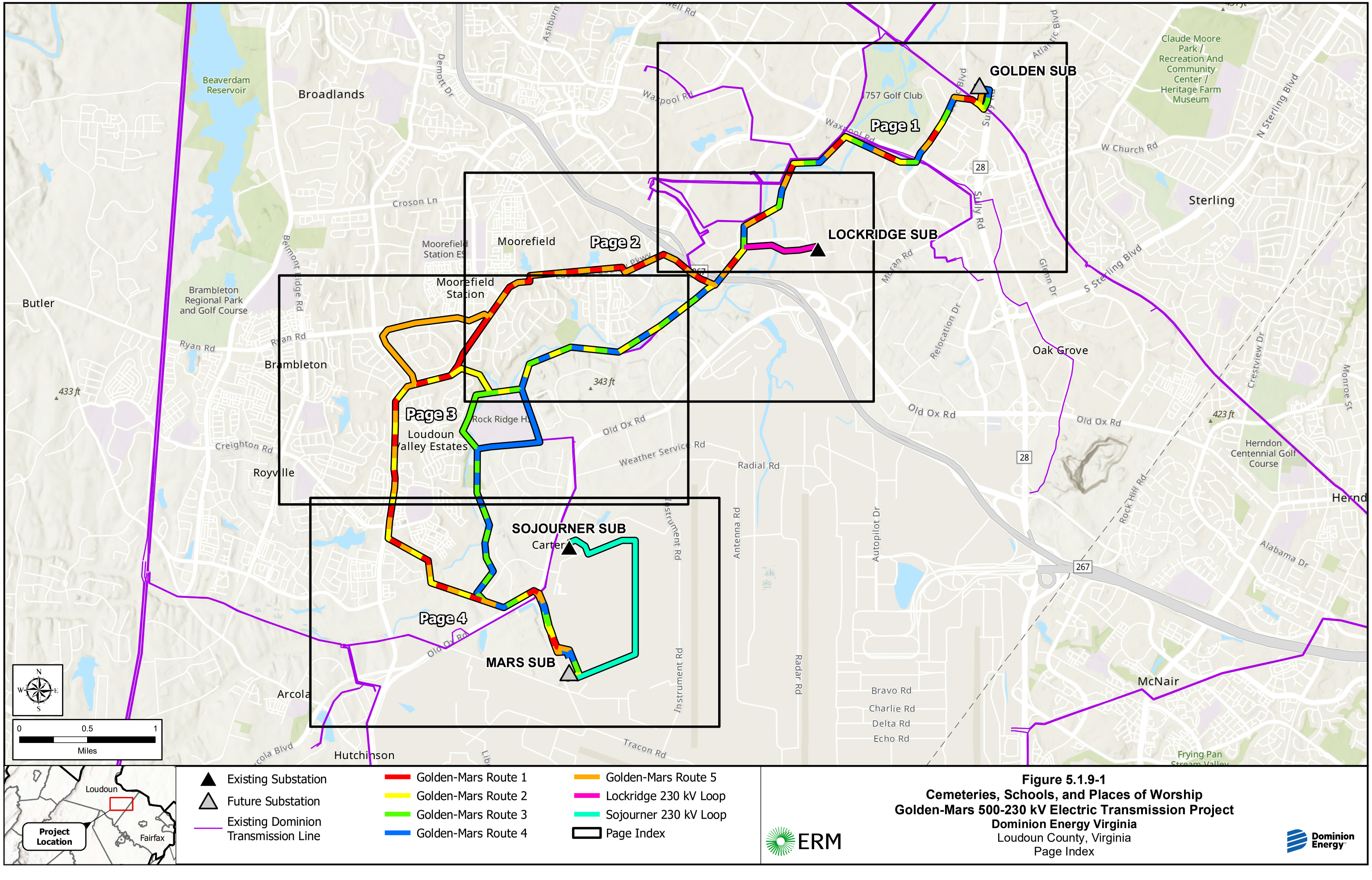
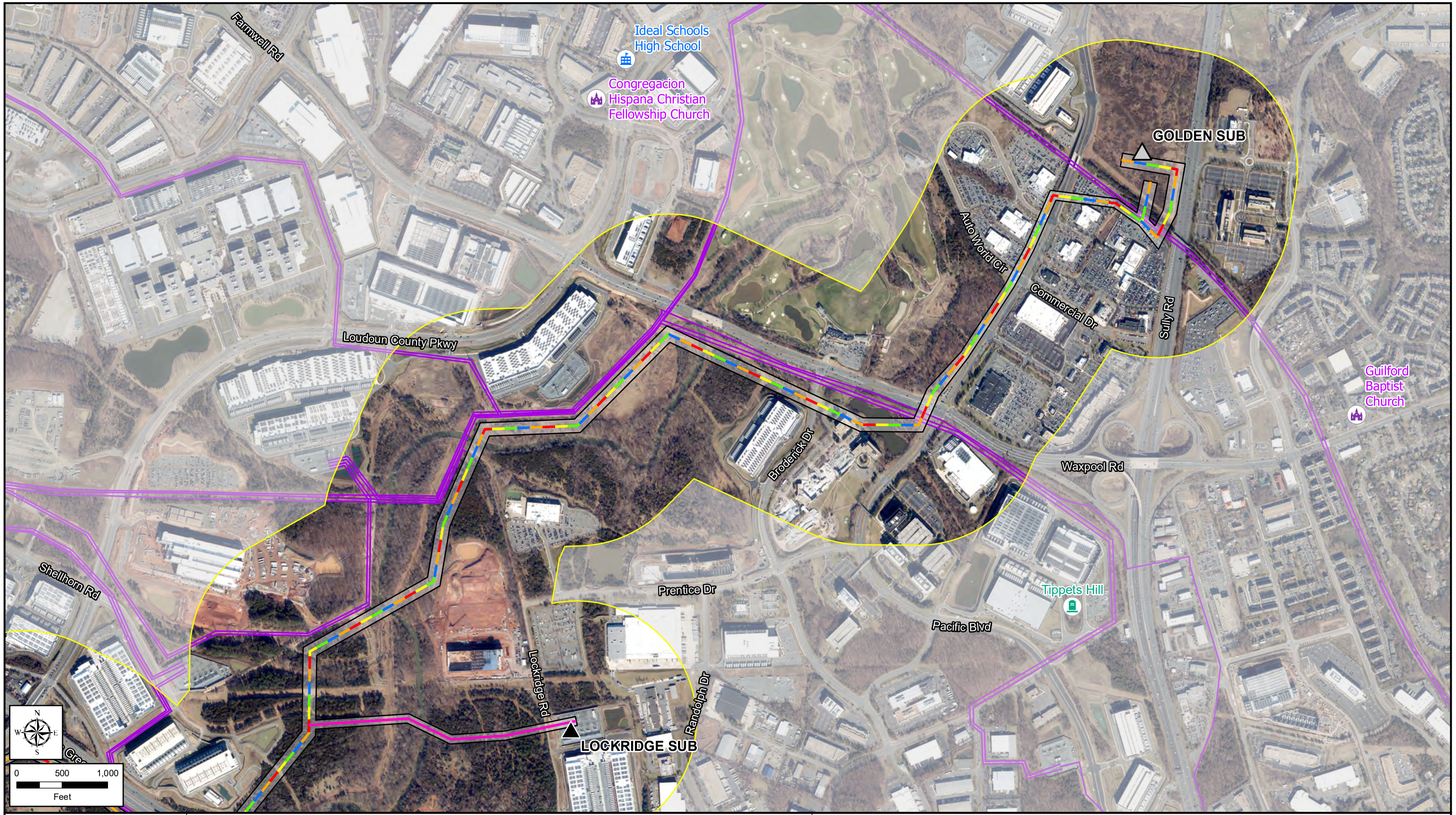
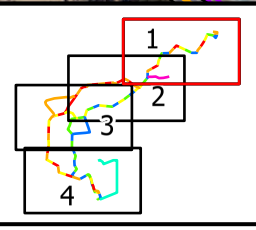


Figure 5.1.9-1
Cemeteries, Schools, and Places of Worship
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia
Page Index

ERM

Dominion Energy





- Existing Substation
- Future Substation
- Golden-Mars Route 1
- Golden-Mars Route 2
- Golden-Mars Route 3
- Golden-Mars Route 4
- Golden-Mars Route 5
- Lockridge 230 kV Loop
- Cemetery
- Place of Worship
- School
- Existing Dominion Transmission Line
- 0.25 Mile Centerline Buffer

Figure 5.1.9-1
Cemeteries, Schools, and Places of Worship
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

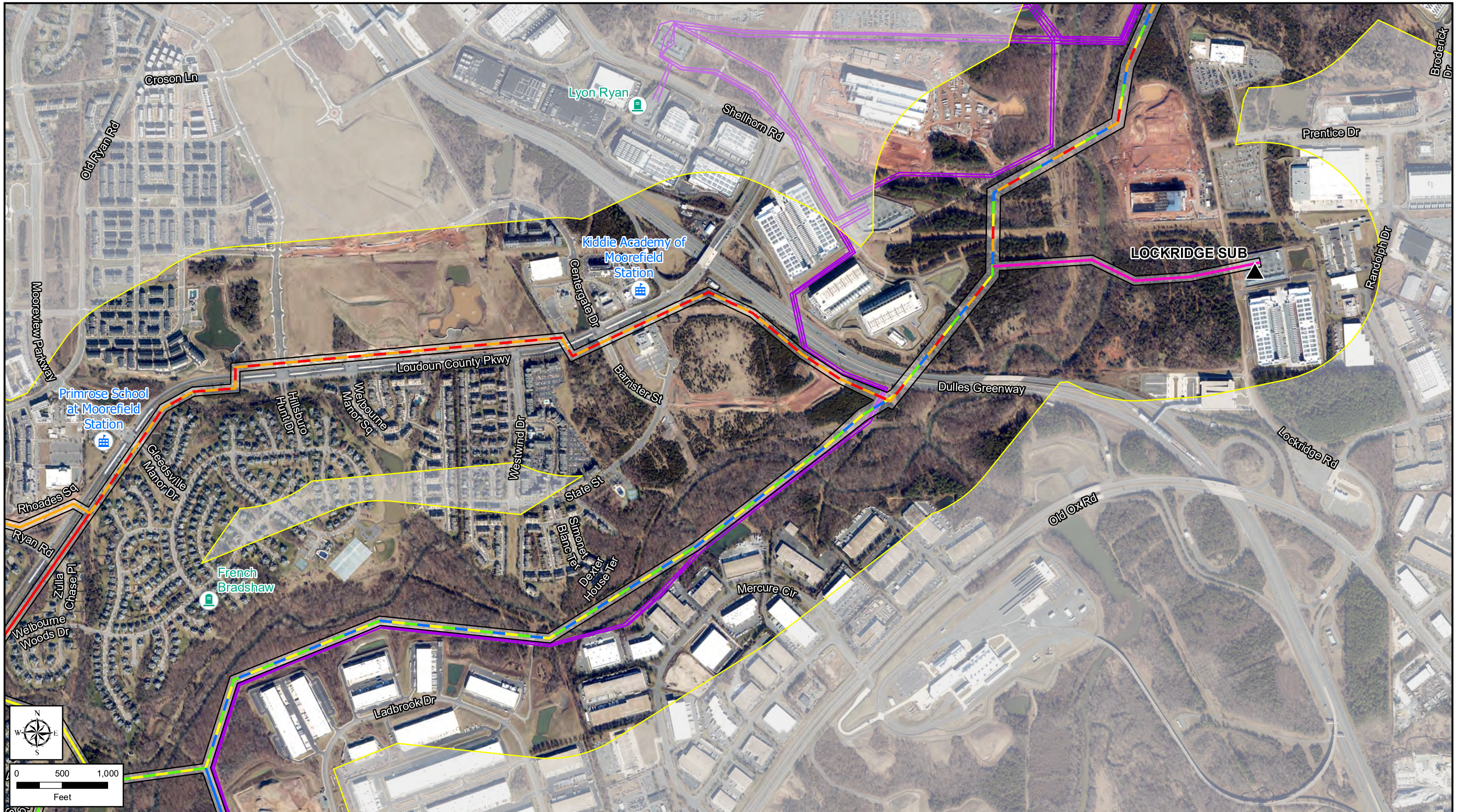


Figure 5.1.9-1
Cemeteries, Schools, and Places of Worship
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

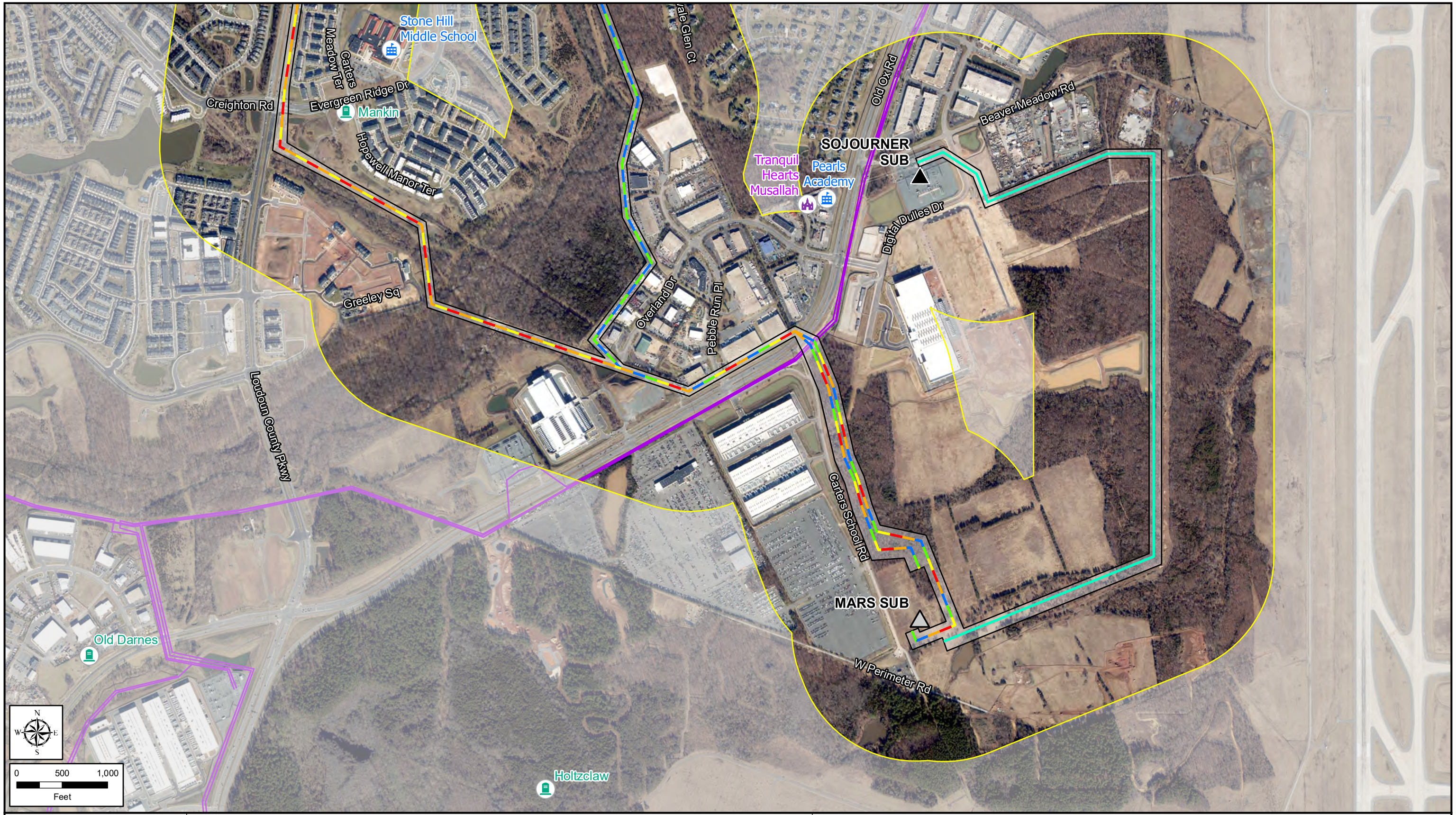
Briar Woods High School
Primrose School at Moorefield Station
French Bradshaw
Legacy Elementary School
Beavers/Spence
Creighton's Corner Elementary School
Rosa Lee Carter Elementary School
Rock Ridge High School
Mooreview Parkway
Loudoun County Pkwy
Old Ryan Rd
Willington Sq
Rhoades Sq
Capri Pl
Terra Rosa Pl
Ryan Rd
Unison Knoll Cir
Zulla Manor Pl
Zulla Chase Pl
Airmont Hunt Dr
Claiborne Pkwy
Weibourne Woods Dr
Gleedsville Manor Dr
Hilsboro Hunt Dr
Weibourne Manor Sq
Westwind Dr
Barrister St
State St
Simonet Blanc Ter
Dexter House Ter
Mercure Cir
Ladbrook Dr
Old Ox Rd
Barnstead Dr
Addlestone Pl
Evergreen Ridge Dr
Waybridge Sq
Loudoun Reserve Dr
Hanworth St
Millitown Knoll Sq
Carters Meadow Ter
Ashley Heights Circle
Belmont Ridge Rd
Hemmingford Cir
Freeport Pl
Stukely Dr
Meadowvale Glen Ct
N
W
E
S
0 500 1,000
Feet

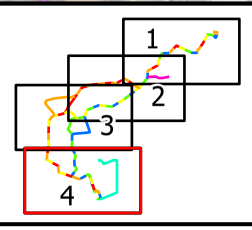
1
2
3
4

Golden-Mars Route 1
Golden-Mars Route 2
Golden-Mars Route 3
Golden-Mars Route 4
Golden-Mars Route 5
Cemetery
School
Existing Dominion Transmission Line
0.25 Mile Centerline Buffer

Figure 5.1.9-1
Cemeteries, Schools, and Places of Worship
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM
Dominion Energy





- Existing Substation
- Future Substation
- Golden-Mars Route 1
- Golden-Mars Route 2
- Golden-Mars Route 3
- Golden-Mars Route 4
- Golden-Mars Route 5
- Sojourner 230 kV Loop
- Cemetery
- Place of Worship
- School
- Existing Dominion Transmission Line
- 0.25 Mile Centerline Buffer

Figure 5.1.9-1
Cemeteries, Schools, and Places of Worship
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

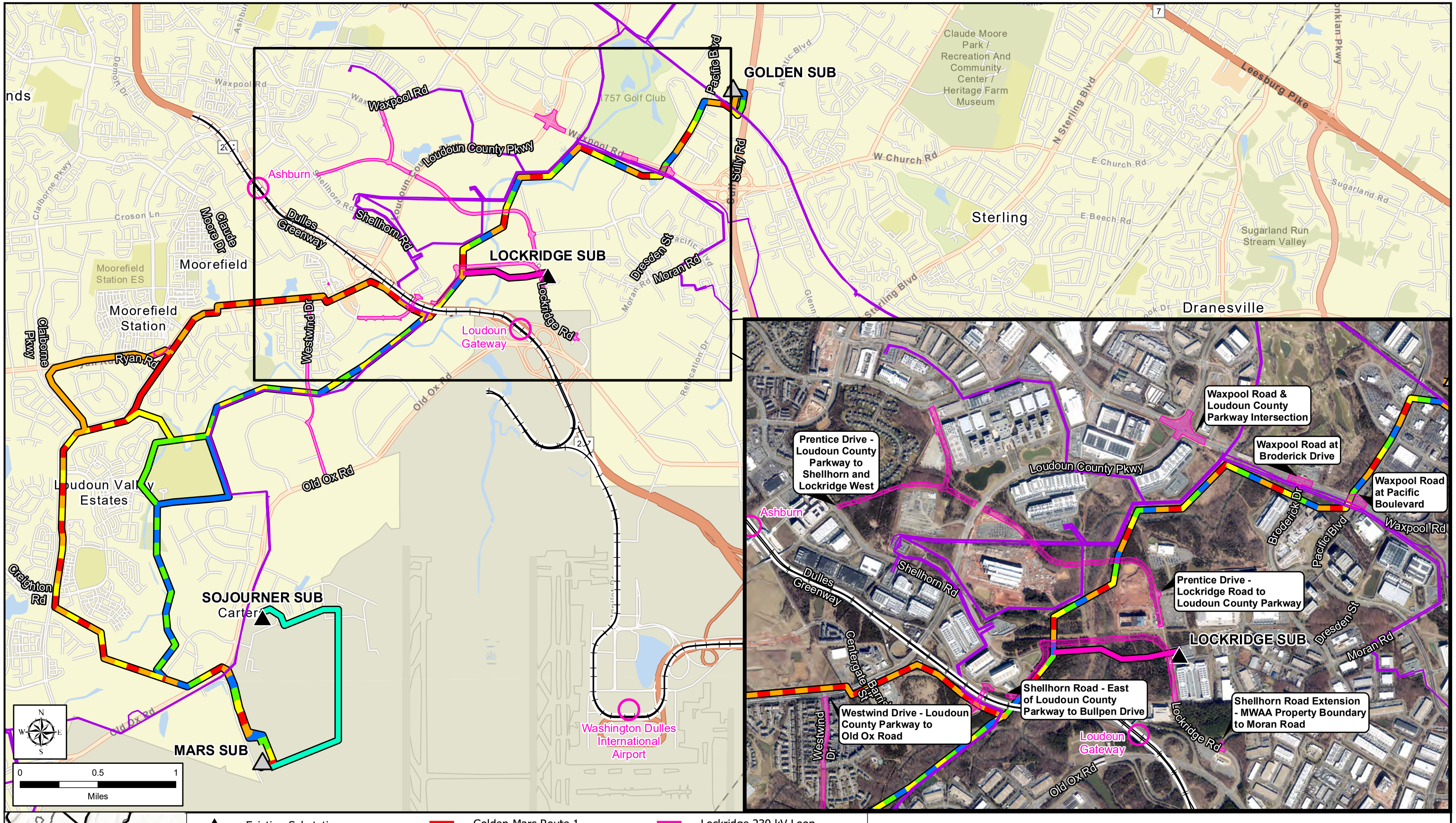


Figure 5.1.10-1
Transportation Infrastructure
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

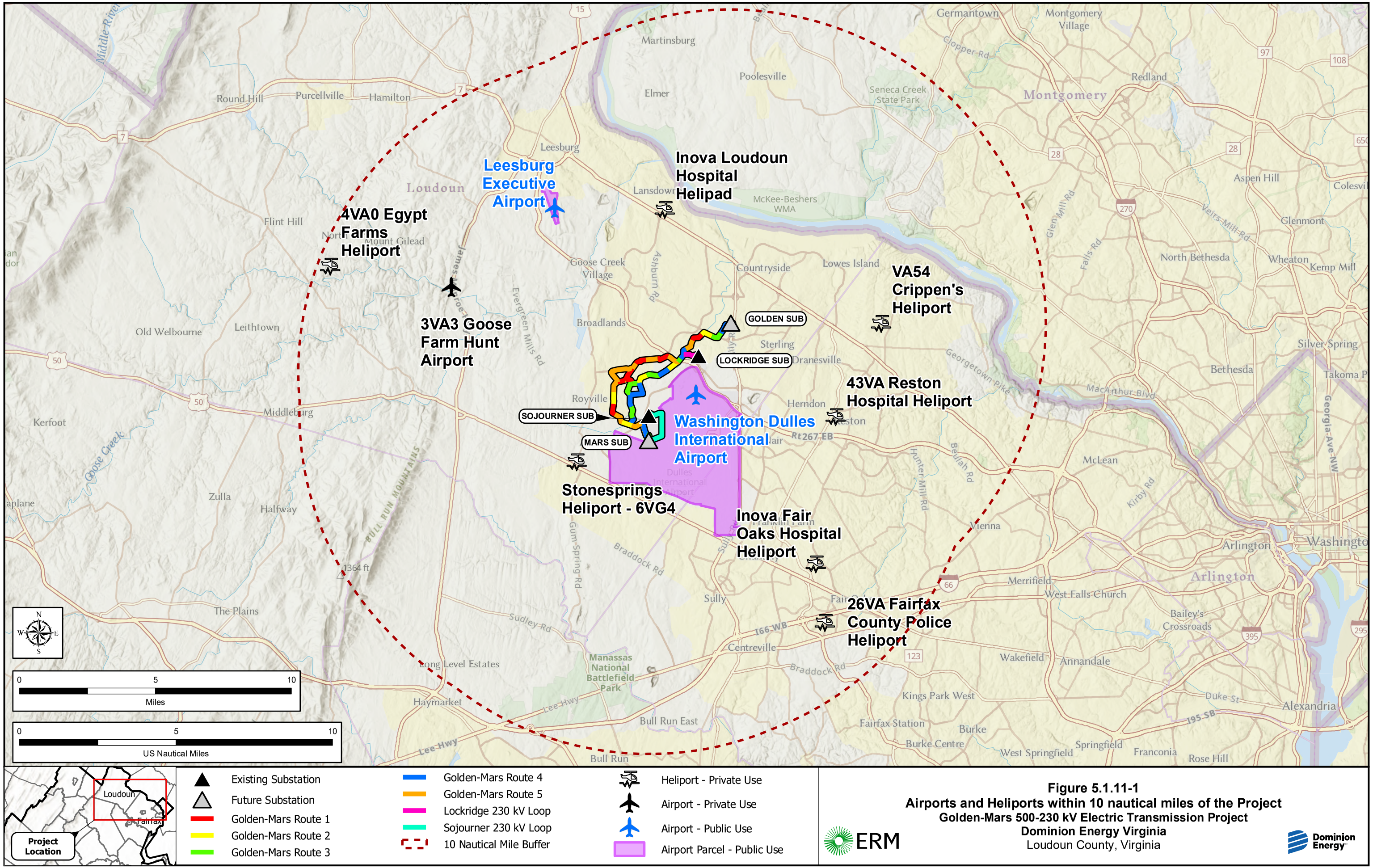
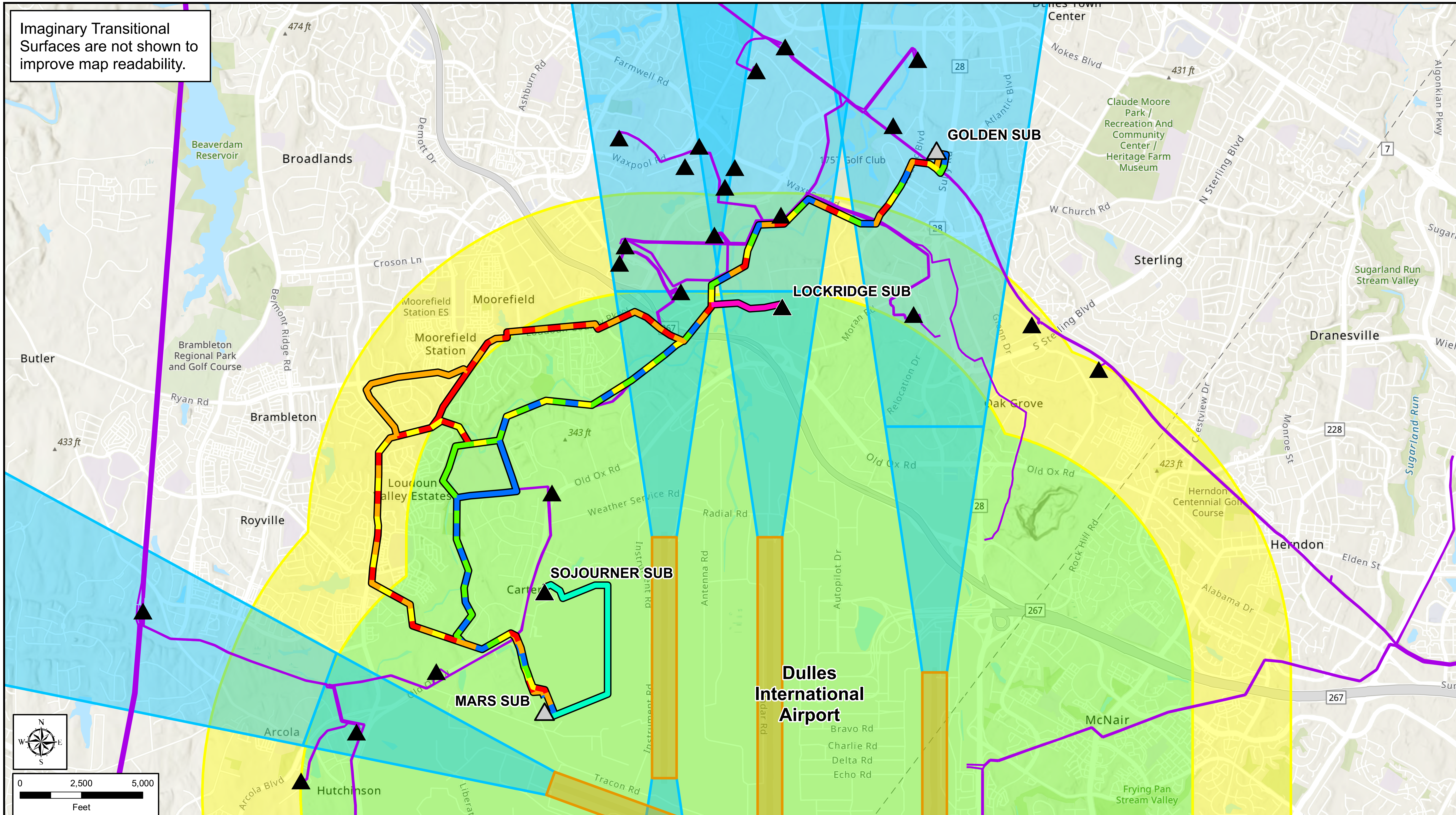


Figure 5.1.11-1
Airports and Heliports within 10 nautical miles of the Project
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy


Imaginary Transitional Surfaces are not shown to improve map readability.
GOLDEN SUB
LOCKRIDGE SUB
SOJOURNER SUB
MARS SUB
Dulles International Airport
Broadlands
Moorefield
Moorefield Station
Brambleton
Butler
Royville
Arcola
Hutchinson
Sterling
Dranesville
Herndon
McNair
Oak Grove
Loudoun Valley Estates
Beaverdam Reservoir
Brambleton Regional Park and Golf Course
Claude Moore Park / Recreation And Community Center / Heritage Farm Museum
Herndon Centennial Golf Course
Sugarland Run Stream Valley
Frying Pan Stream Valley
0 2,500 5,000
Feet
Loudoun
Fairfax
Project Location

▲	Existing Substation
△	Future Substation
Red	Golden-Mars Route 1
Yellow	Golden-Mars Route 2
Green	Golden-Mars Route 3
Blue	Golden-Mars Route 4
Orange	Golden-Mars Route 5
Magenta	Lockridge 230 kV Loop
Cyan	Sojourner 230 kV Loop
Purple line	Existing Dominion Transmission Line
Blue area	Approach Surface
Orange area	Primary Surface
Yellow area	Conical Surface
Green area	Horizontal Surface

Figure 5.1.11-2
Civil Airport Imaginary Surfaces for Dulles International Airport
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM
Dominion Energy

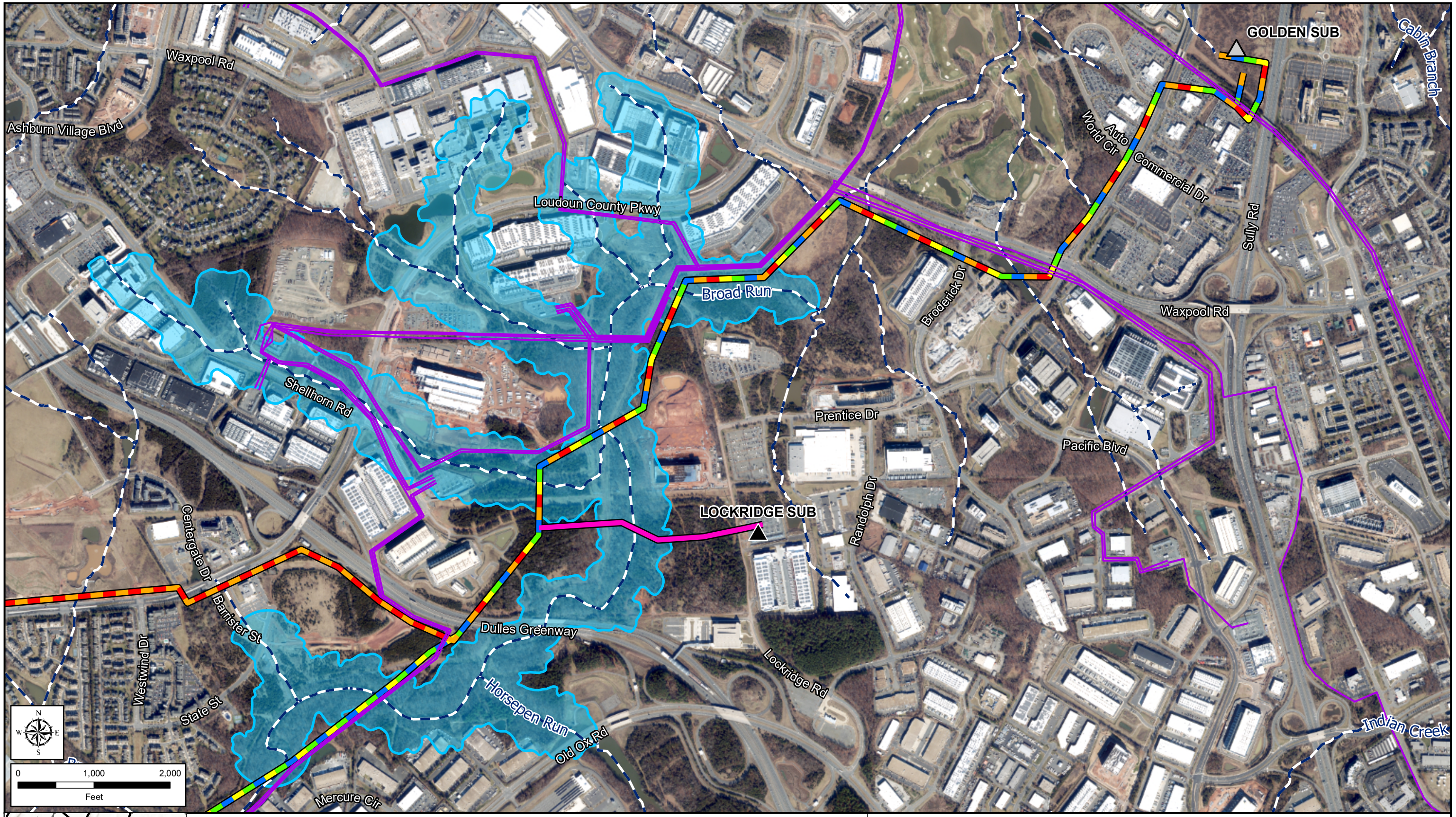


Figure 5.2.2-1
Broad Run – Rt. 607 Stream Conservation Site
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

GOLDEN SUB
LOCKRIDGE SUB
SOJOURNER SUB
MARS SUB
Loudoun County Pkwy
Sully Rd
Waxpool Rd
Pacific Blvd
Dulles Greenway
Claiborne Pkwy
Ryan Rd
Old Ox Rd
Evergreen Ridge Dr
Carters School Rd
N
W
E
S
0
0.5
1
Miles
This information is for environmental review purposes only.

Loudoun
Project Location
Fairfax

Existing Substation
Future Substation
Existing Dominion Transmission Line

Golden-Mars Route 1
Golden-Mars Route 2
Golden-Mars Route 3
Golden-Mars Route 4
Golden-Mars Route 5

Lockridge 230 kV Loop
Sojourner 230 kV Loop

Ecological Cores
C4: Moderate
C5: General

Figure 5.2.2-2
Ecological Cores
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM
Dominion Energy

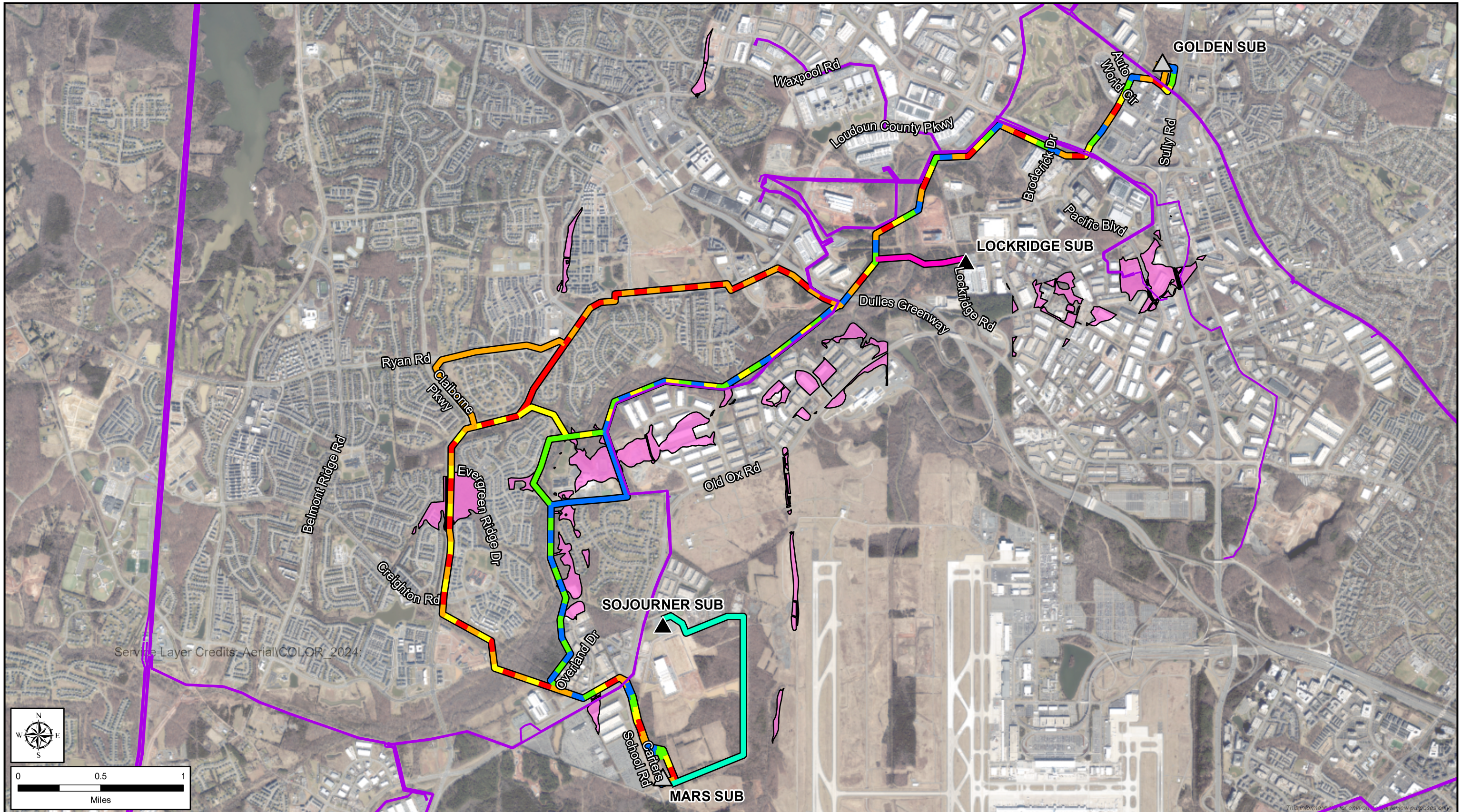


Figure 5.2.2-3
Diabase Soils
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

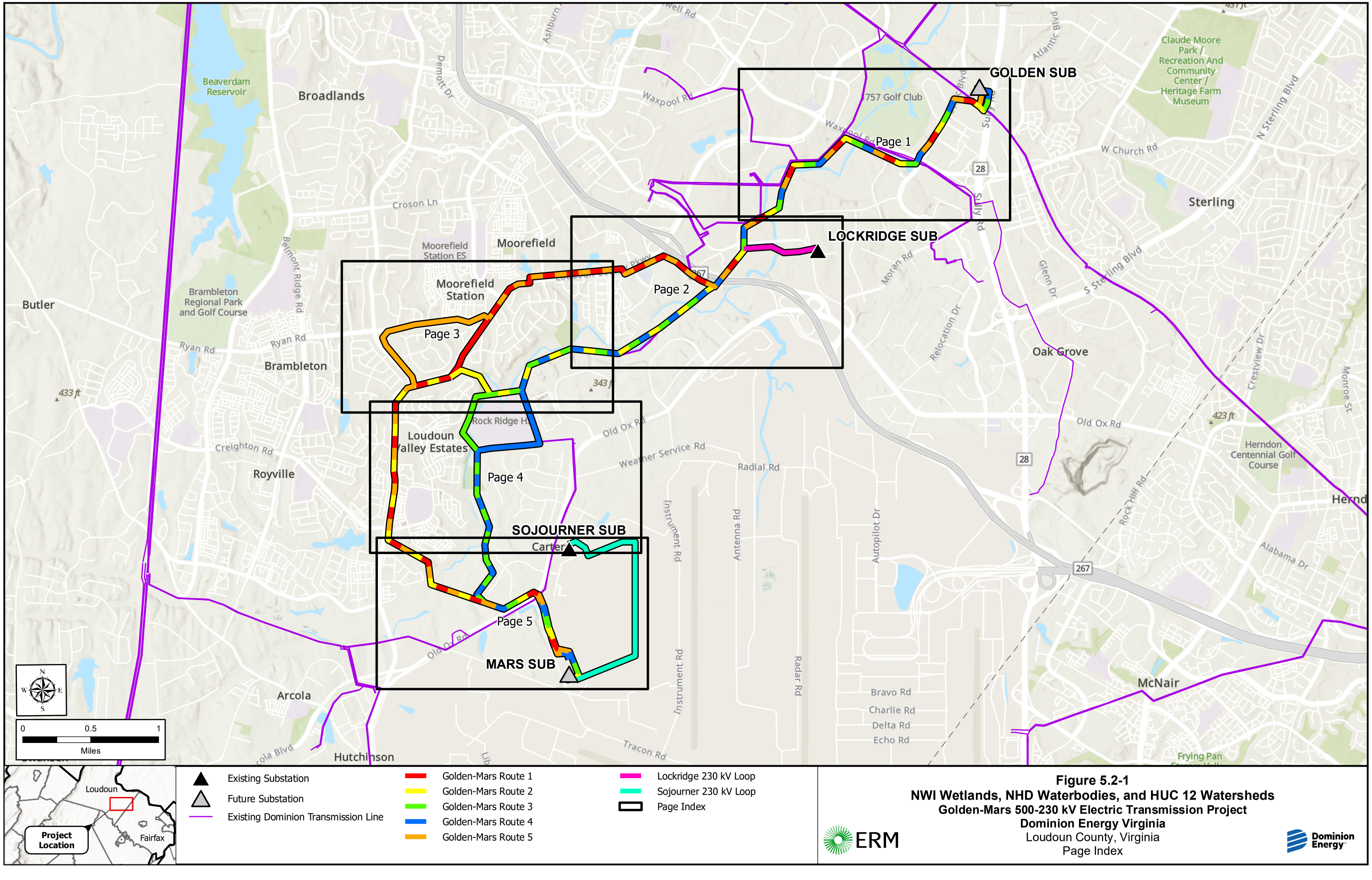


Figure 5.2-1
NWI Wetlands, NHD Waterbodies, and HUC 12 Watersheds
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia
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ERM

Dominion Energy

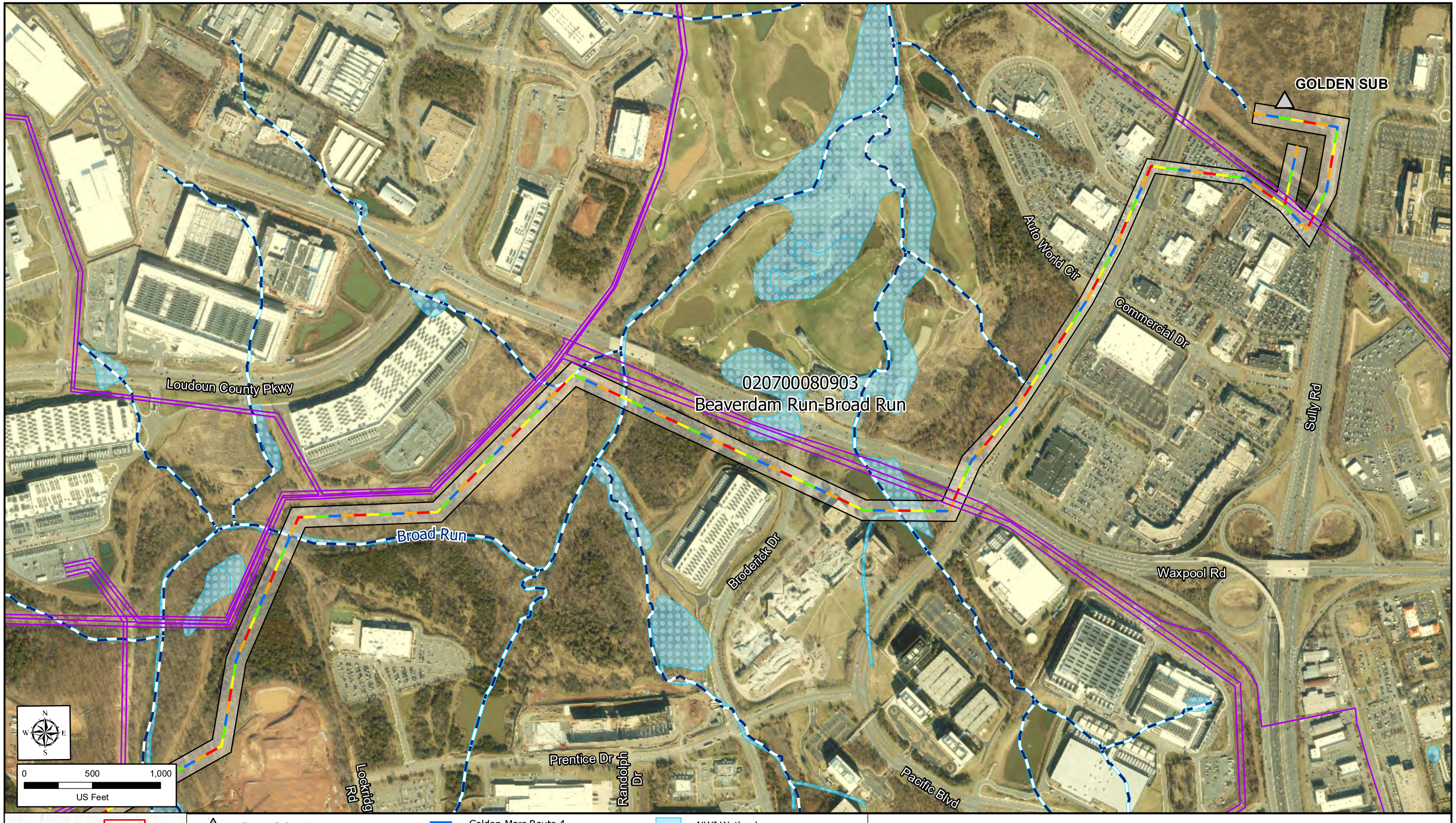


Figure 5.2-1
NWI Wetlands, NHD Waterbodies, and HUC 12 Watersheds
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

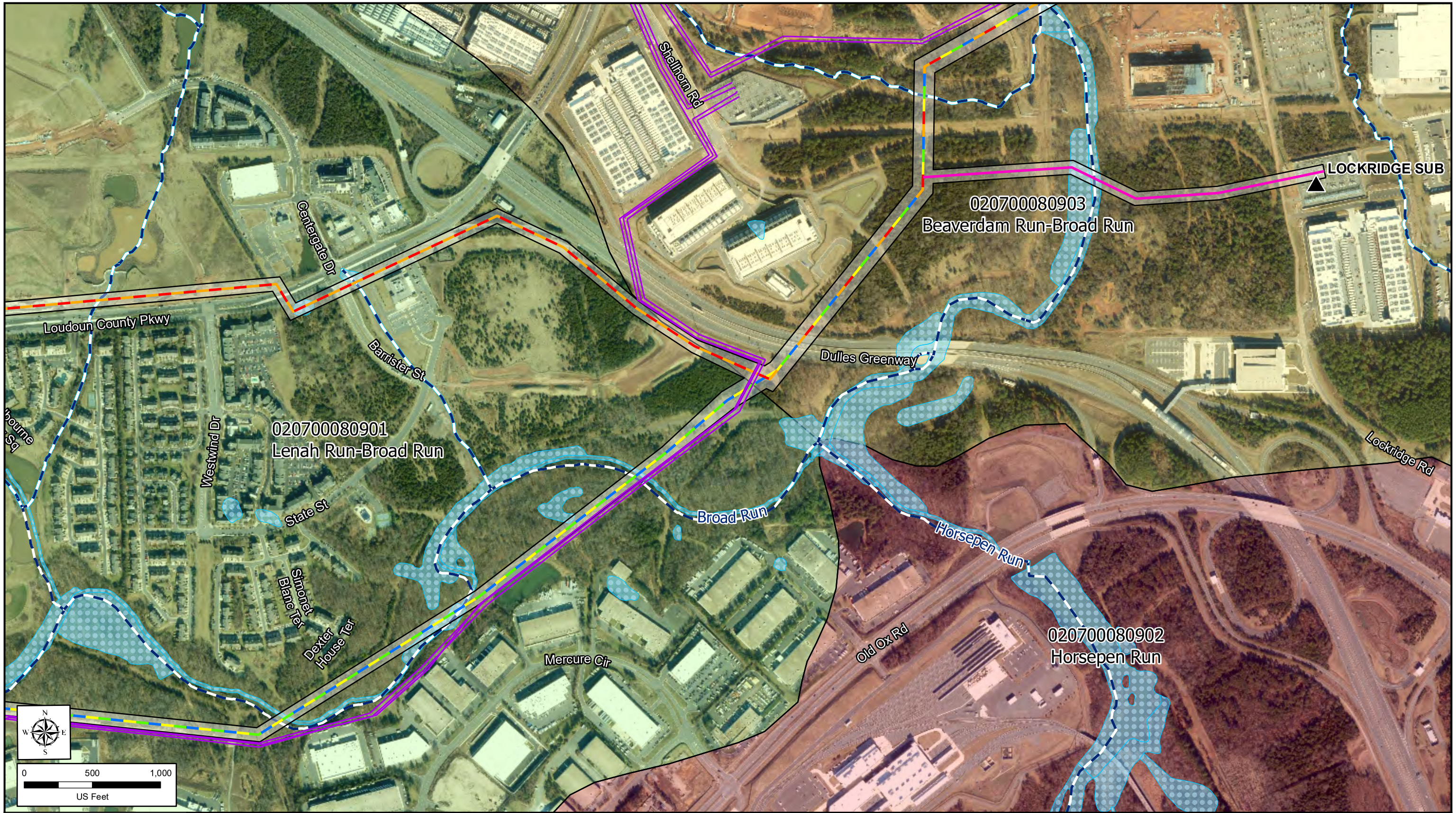
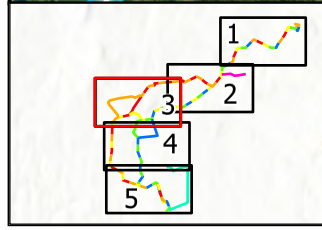


Figure 5.2-1
NWI Wetlands, NHD Waterbodies, and HUC 12 Watersheds
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia
Page 2 of 5

ERM

Dominion Energy



Golden-Mars Route 1
Golden-Mars Route 2
Golden-Mars Route 3
Golden-Mars Route 4
Golden-Mars Route 5
Existing Dominion Transmission Line
NHD Stream
NWI Wetlands

HUC 12 Watershed
Horsepen Run
Lenah Run-Broad Run

Figure 5.2-1
NWI Wetlands, NHD Waterbodies, and HUC 12 Watersheds
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

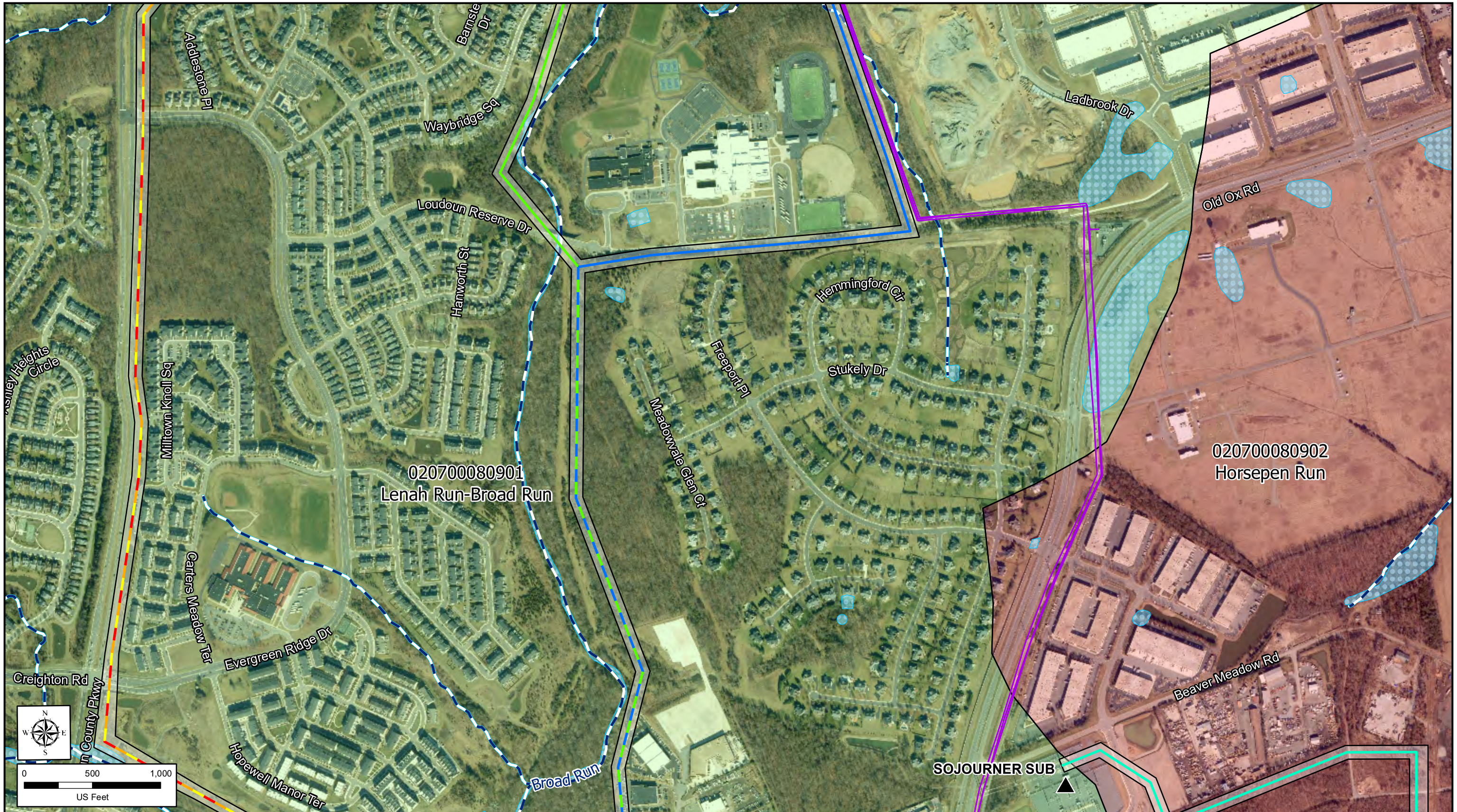


Figure 5.2-1
NWI Wetlands, NHD Waterbodies, and HUC 12 Watersheds
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

Hopewell Manor Ter
Greeley Sq
Beaver Meadow Rd
SOJOURNER SUB
Digital Dulles Dr
Overland Dr
Pebble Run Pl
020700080901
Lenah Run-Broad Run
Loudoun County Pkwy
Broad Run
Old Ox Rd
Cabin Branch
020700080902
Horsepen Run
Stallion Branch
Carters School Rd
MARS SUB
W Perimeter Rd
N
W
E
S
0
500
1,000
US Feet
1
2
3
4
5
Existing Substation
Future Substation
Golden-Mars Route 1
Golden-Mars Route 2
Golden-Mars Route 3
Golden-Mars Route 4
Golden-Mars Route 5
Sojourner 230 kV Loop
Existing Dominion Transmission Line
NHD Stream
NWI Wetlands
HUC 12 Watershed
Horsepen Run
Lenah Run-Broad Run

Figure 5.2-1
NWI Wetlands, NHD Waterbodies, and HUC 12 Watersheds
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM
Dominion Energy

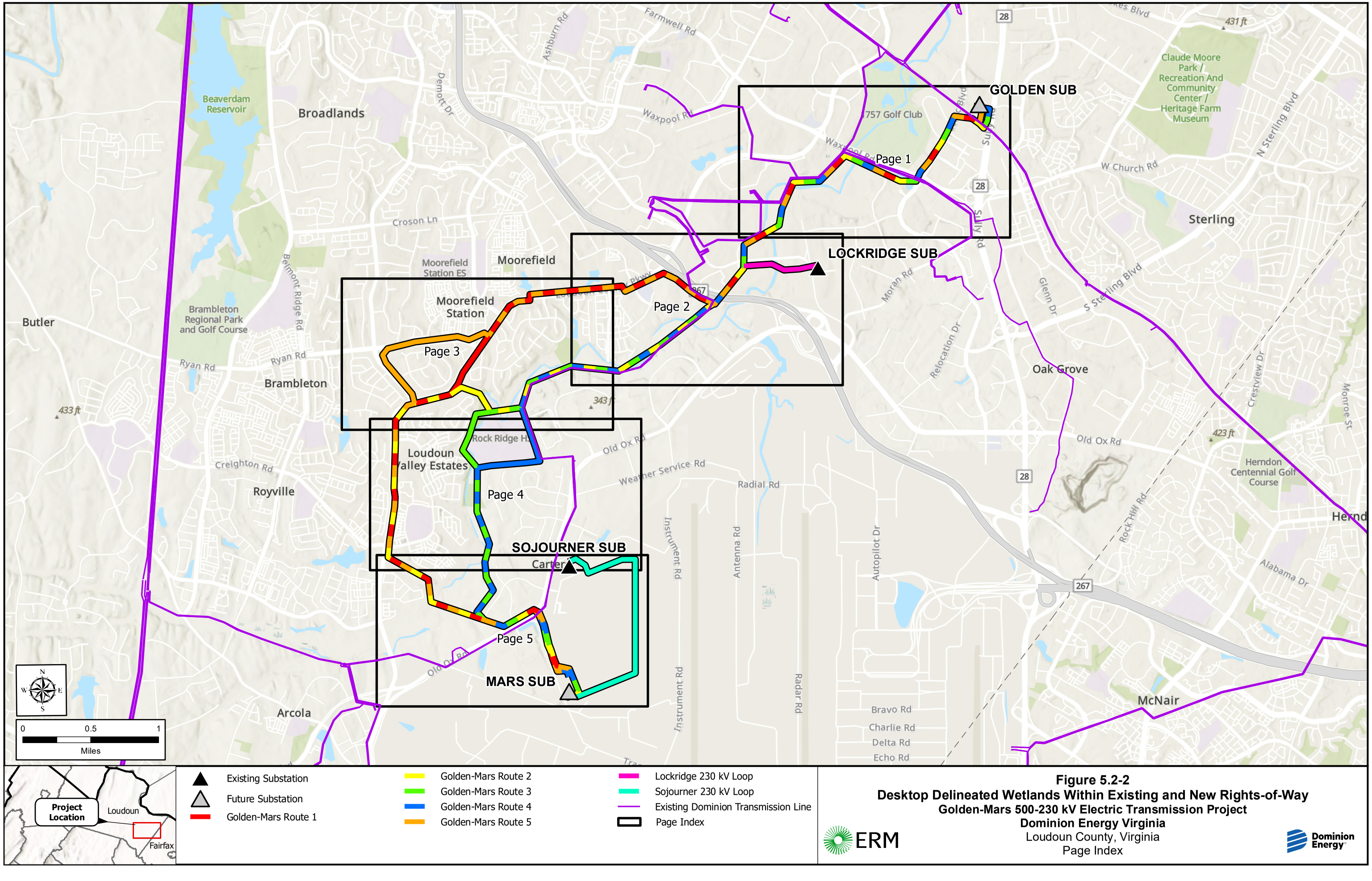


Figure 5.2-2
Desktop Delineated Wetlands Within Existing and New Rights-of-Way
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia
Page Index

ERM

Dominion Energy

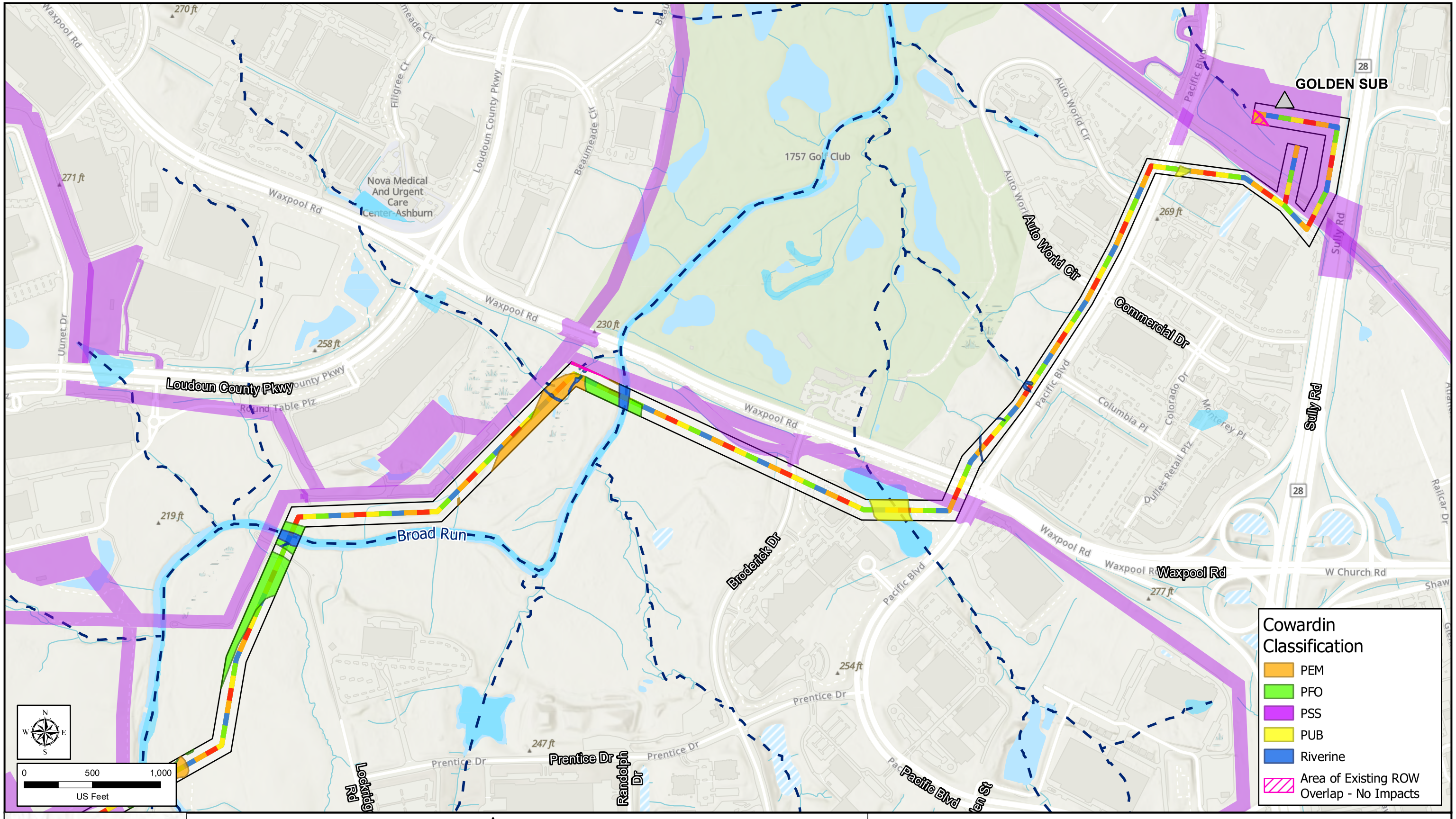


Figure 5.2-2
Desktop Delineated Wetlands within Existing and New Rights-of-Way
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

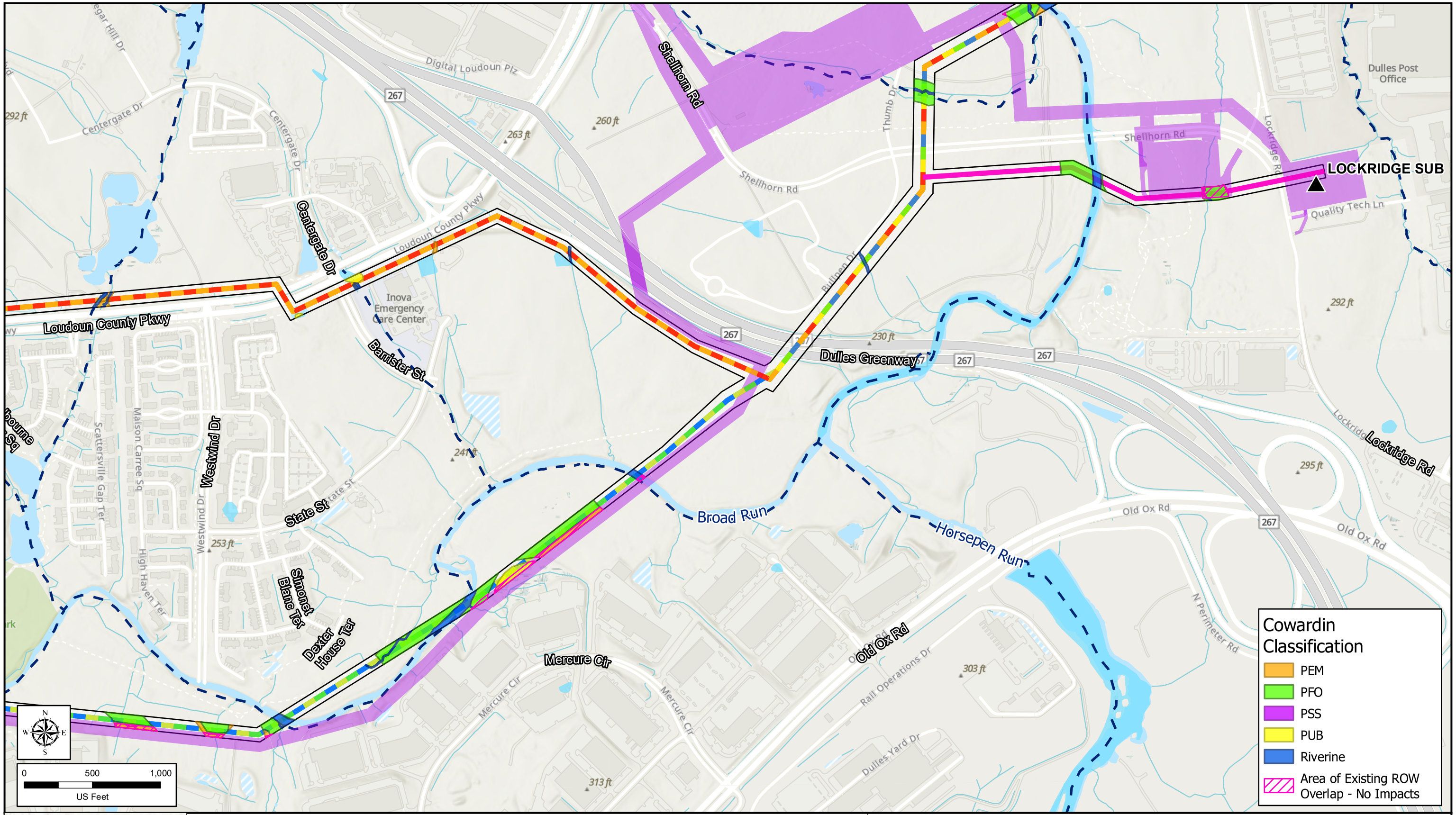
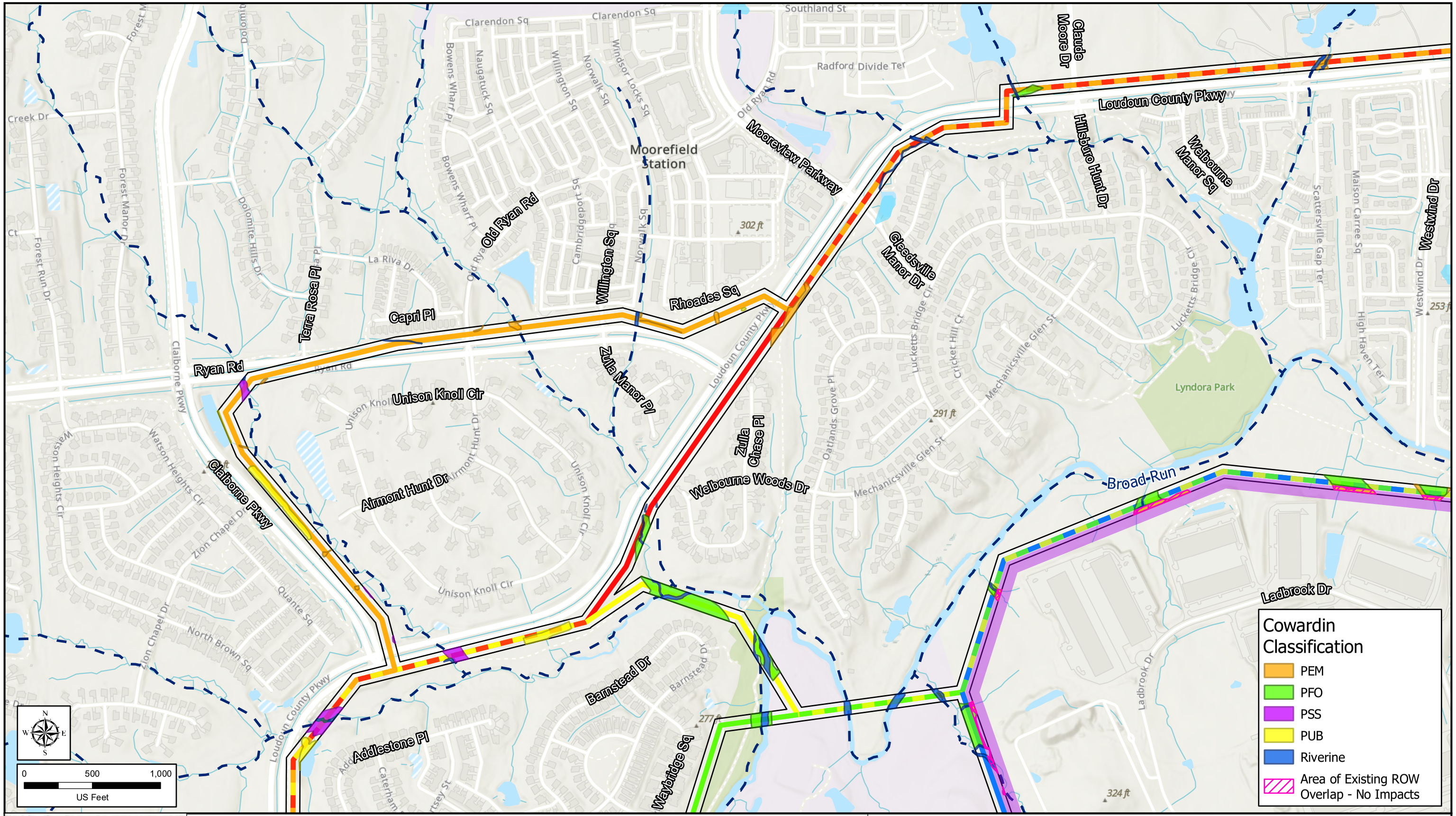
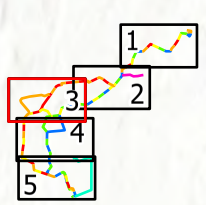


Figure 5.2-2
Desktop Delineated Wetlands within Existing and New Rights-of-Way
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy





Golden-Mars Route 1
Golden-Mars Route 2
Golden-Mars Route 3
Golden-Mars Route 4
Golden-Mars Route 5

Existing Dominion Right-of-Way
NHD Stream
NHD Waterbody

Figure 5.2-2
Desktop Delineated Wetlands within Existing and New Rights-of-Way
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia
Page 3 of 5

ERM

Dominion Energy

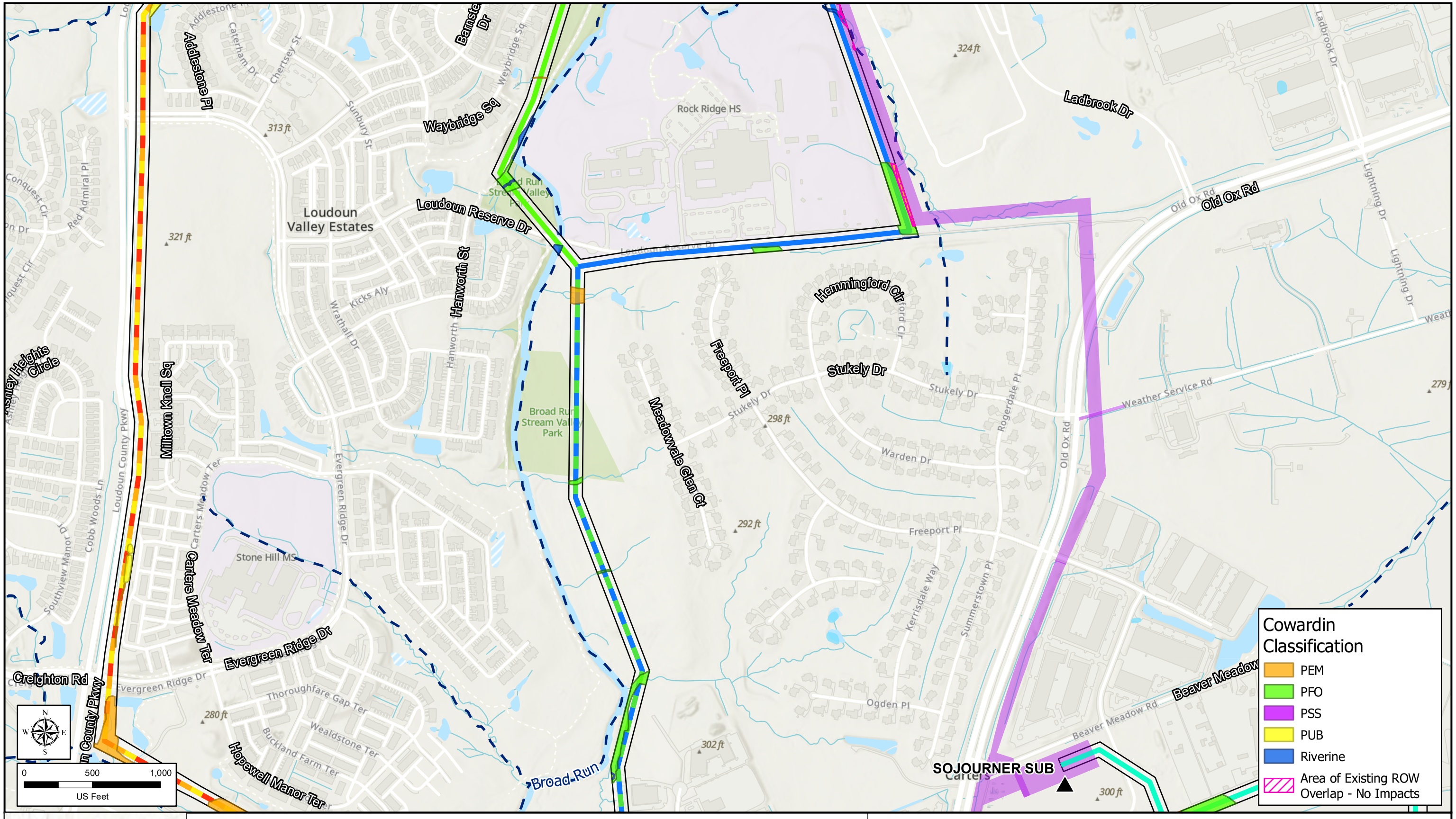


Figure 5.2-2
Desktop Delineated Wetlands within Existing and New Rights-of-Way
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

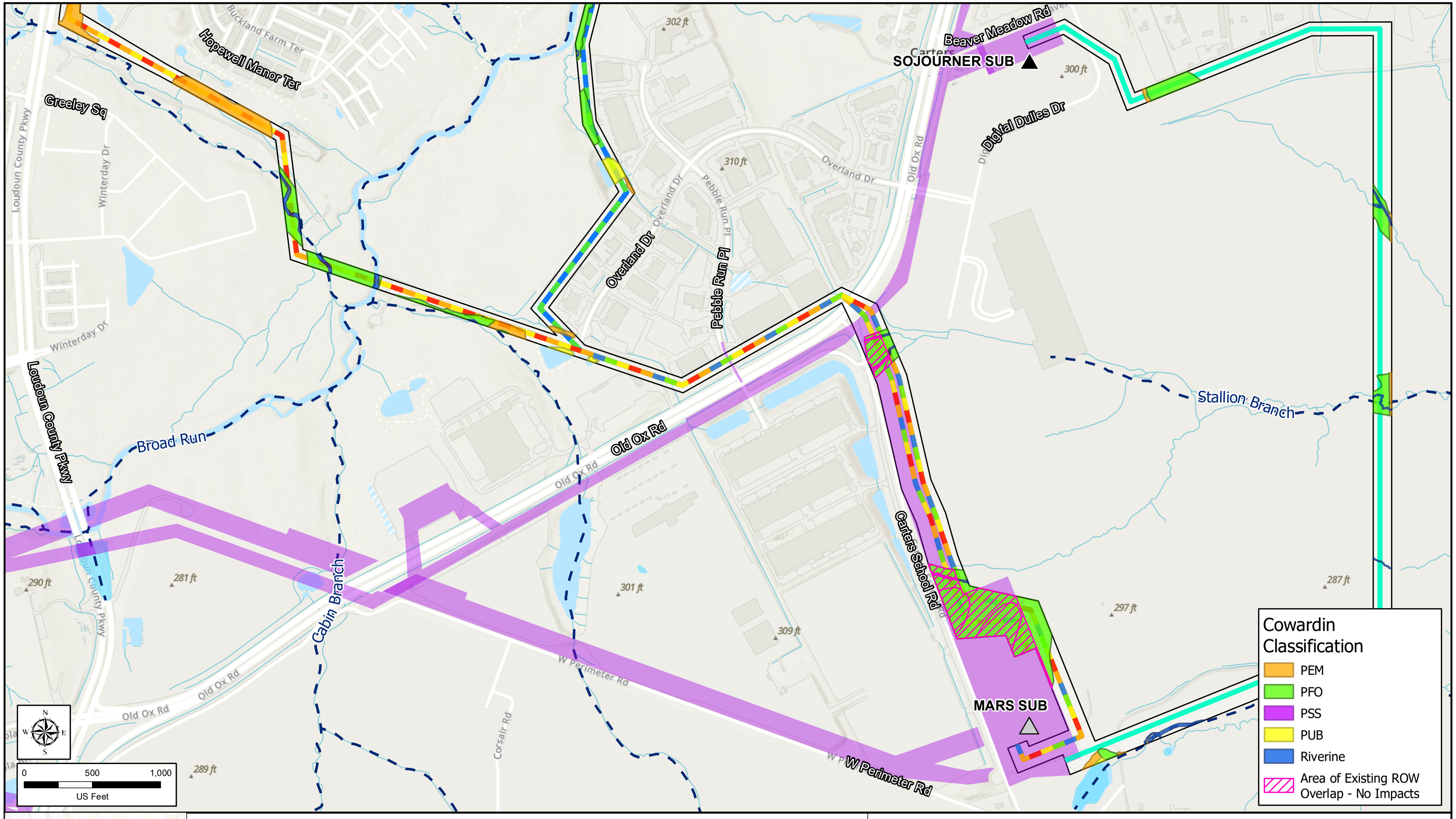
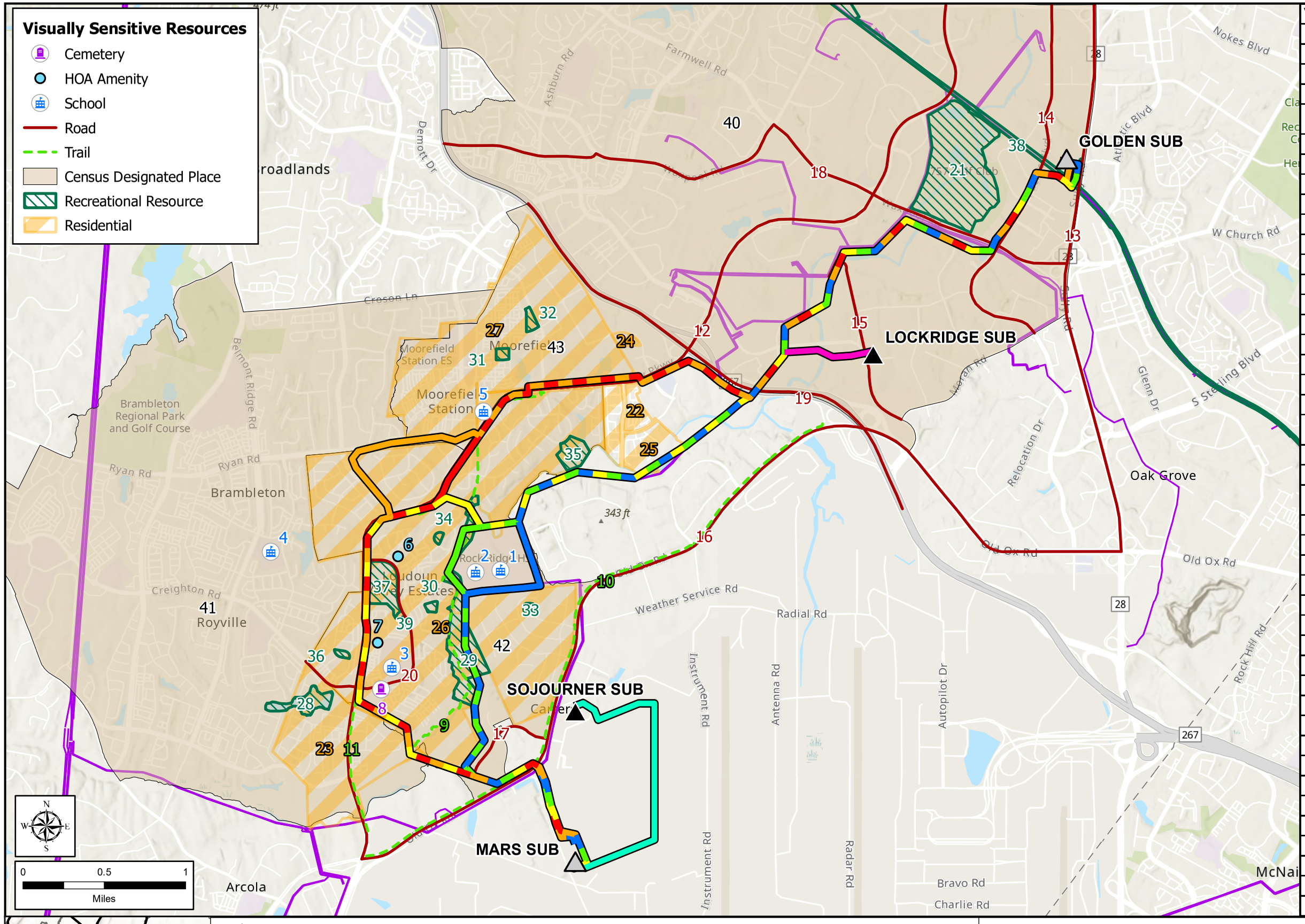


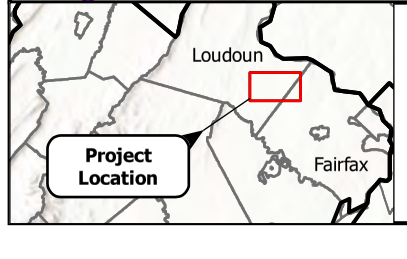
Figure 5.2-2
Desktop Delineated Wetlands within Existing and New Rights-of-Way
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy



VSR Number	VSR Name
1	Rock Ridge High School
2	Rosa Lee Carter Elementary School
3	Stone Hill Middle School
4	Legacy Elementary School
5	Primrose School at Moorefield Station
6	Loudoun Valley Pool
7	Fair Ridge Pool
8	Makin Cemetery
9	Broad Run Trail
10	Old Ox Road Multi-use Path
11	Loudoun County Parkway Trail
12	Loudoun County Parkway
13	Sully Road (Virginia State Route 28)
14	Pacific Boulevard
15	Lockridge Road
16	Old Ox Road (SR 606)
17	Overland Drive
18	Waxpool Road (SR 625)
19	Dulles Greenway (SR 267)
20	Creighton Road/Evergreen Ridge Drive
21	1757 Golf Club
22	Bell Ashburn Farms Apartments
23	Birchwood at Brambleton Subdivision
24	Dulles Parkway Condos
25	Loudoun Parkway Center
26	Loudoun Valley Estates I, II, and III Subdivisions
27	Moorefield Station Subdivision
28	Brambleton Park and Lake Birchwood
29	Broad Run Stream Valley Park
30	Creekside Park
31	Evermoore Neighborhood Park
32	Grandmoore Park
33	Hemmingford Circle Park
34	Highland Park
35	Lyndora Park
36	Southview Park
37	Valley Falls Community Park
38	Washington and Old Dominion Trail
39	Woodside Park
40	Ashburn CDP
41	Brambleton CDP
42	Loudoun Valley Estates CDP
43	Moorefield CDP



Existing Substation
Future Substation
Existing Dominion Transmission Line

Golden-Mars Route 1
Golden-Mars Route 2
Golden-Mars Route 3
Golden-Mars Route 4
Golden-Mars Route 5

Lockridge 230 kV Loop
Sojourner 230 kV Loop

Figure 5.3.2-1
Visually Sensitive Resources
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

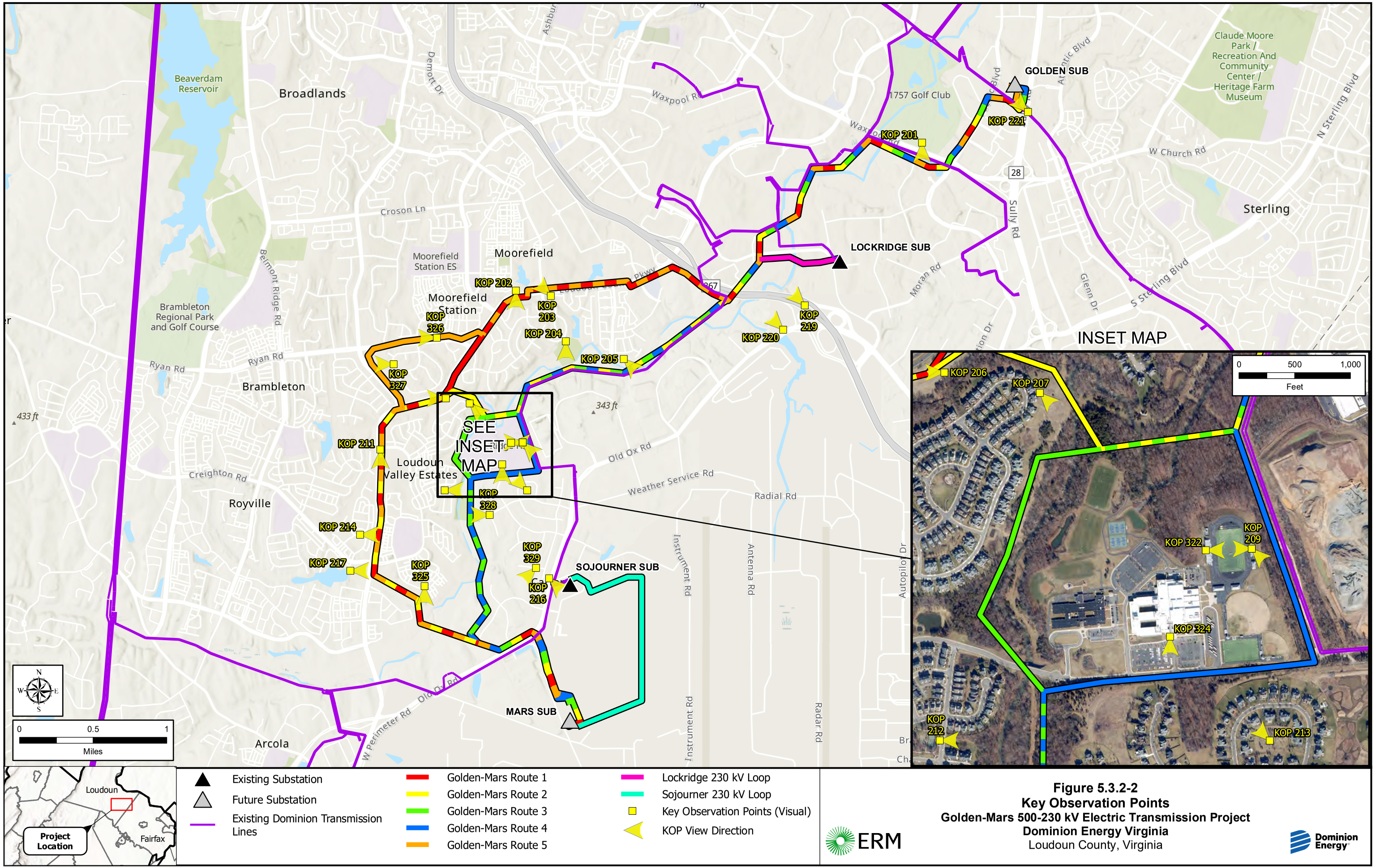
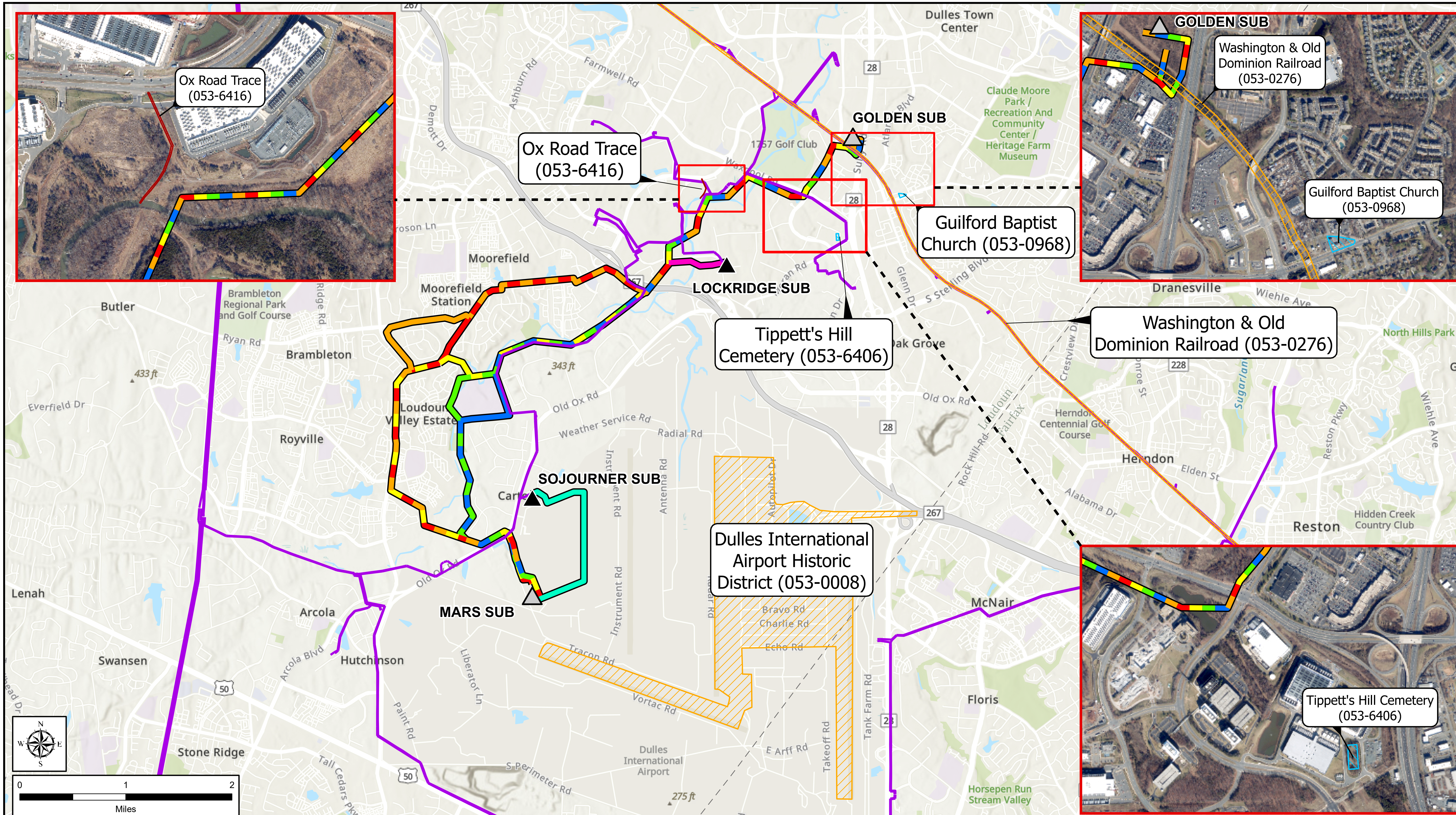


Figure 5.3.2-2
Key Observation Points
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy



Ox Road Trace (053-6416)
Guilford Baptist Church (053-0968)
Tippett's Hill Cemetery (053-6406)
Washington & Old Dominion Railroad (053-0276)
Dulles International Airport Historic District (053-0008)
GOLDEN SUB
LOCKRIDGE SUB
SOJOURNER SUB
MARS SUB
Dulles Town Center
Claude Moore Park / Recreation And Community Center / Heritage Farm Museum
1757 Golf Club
Moorefield
Moorefield Station
Brambleton Regional Park and Golf Course
Brambleton
Butler
Loudoun Valley Estates
Royville
Arcola
Hutchinson
Lenah
Swansen
Stone Ridge
Dranesville
Herndon Centennial Golf Course
Herndon
Reston
Hidden Creek Country Club
North Hills Park
McNair
Floris
Horsepen Run Stream Valley
Dulles International Airport
Oak Grove
Farmwell Rd
Ashburn Rd
Demott Dr
Ryan Rd
Everfield Dr
Old Ox Rd
Weather Service Rd
Radial Rd
Instrument Rd
Antenna Rd
Autopilot Dr
Bravo Rd
Charlie Rd
Echo Rd
Tracon Rd
Vortac Rd
E Arff Rd
Takeoff Rd
Tank Farm Rd
S Perimeter Rd
Liberator Ln
Paint Rd
Arcola Blvd
Tall Cedars Pkwy
Rock Hill Rd
Loudoun-Fairfax
Alabama Dr
Elden St
Wiehle Ave
Reston Pkwy
Sugarland
Crestview Dr
S Sterling Blvd
Glenn Dr
343 ft
433 ft
275 ft
28
228
267
50
0 1 2
Miles
Loudoun
Fairfax
Project Location

- Existing Substation
- Future Substation
- Golden-Mars Route 1
- Golden-Mars Route 2
- Golden-Mars Route 3
- Golden-Mars Route 4
- Golden-Mars Route 5
- Lockridge 230 kV Loop
- Sojourner 230 kV Loop
- Existing Dominion Transmission Lines

Architectural Resources

- Eligible
- Unevaluated, Locally Significant
- Potentially Eligible, Locally Significant

Figure 5.4.2-1
Aboveground Historic Resources
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

Dominion Energy

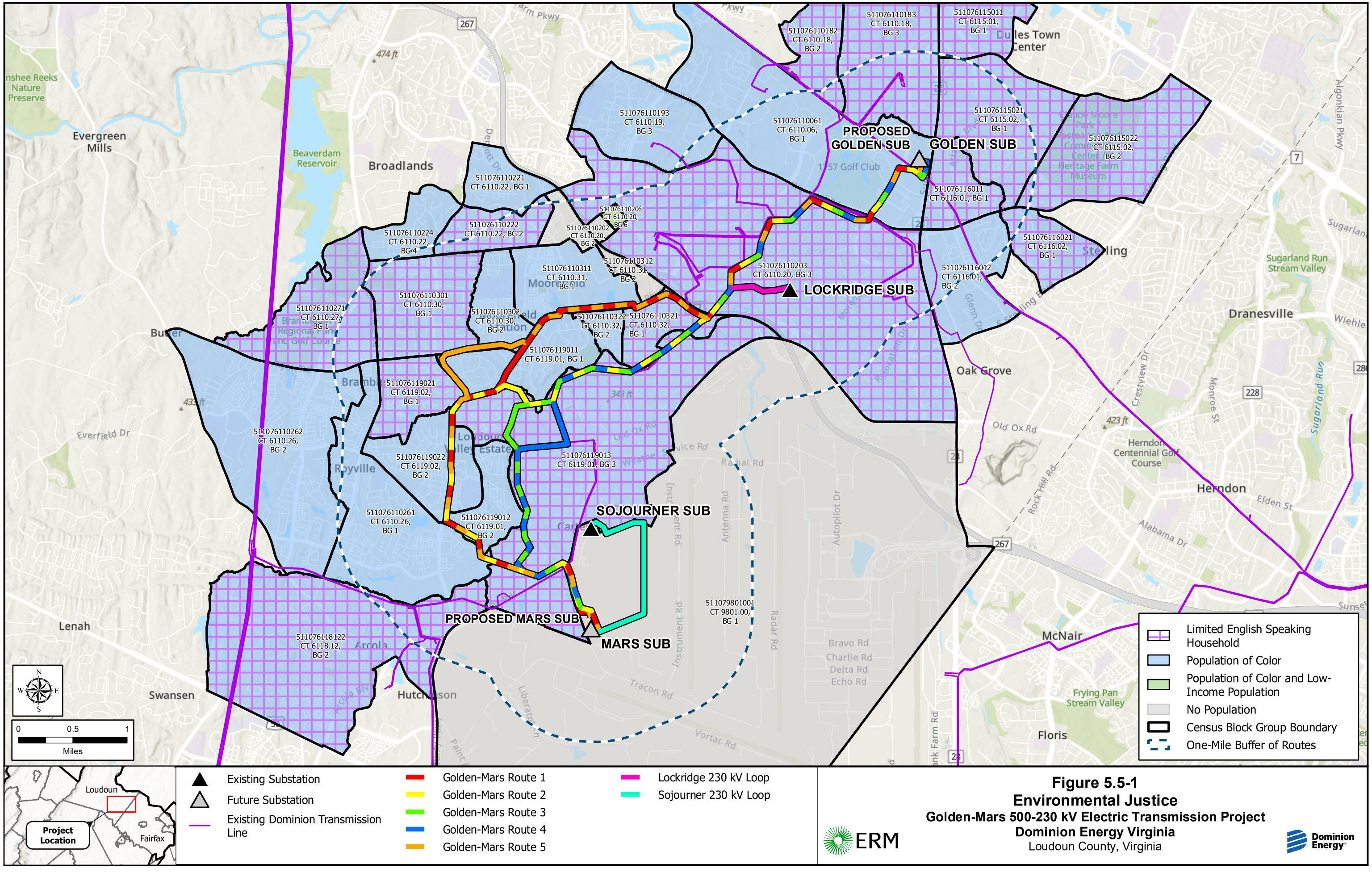
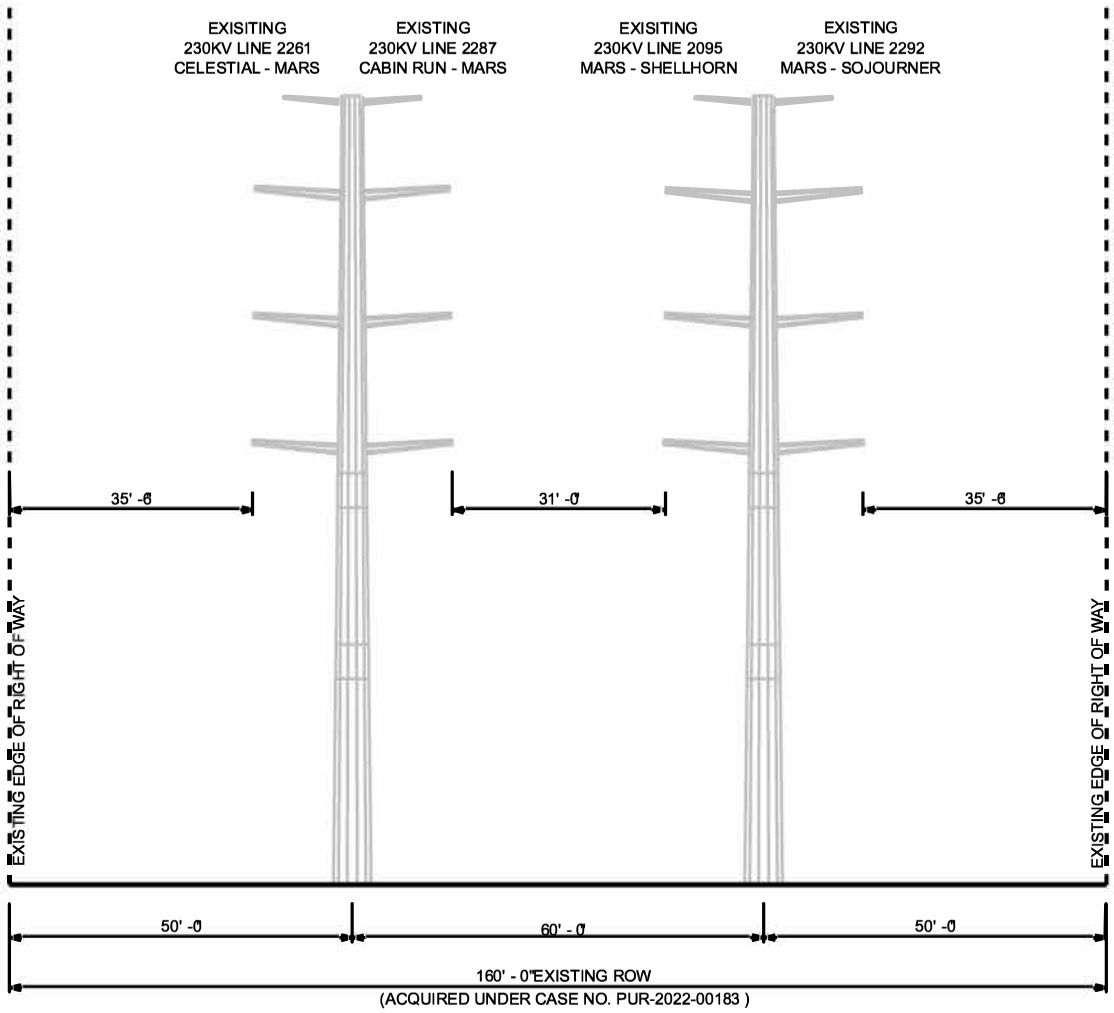


Figure 5.5-1
Environmental Justice
Golden-Mars 500-230 kV Electric Transmission Project
Dominion Energy Virginia
Loudoun County, Virginia

ERM

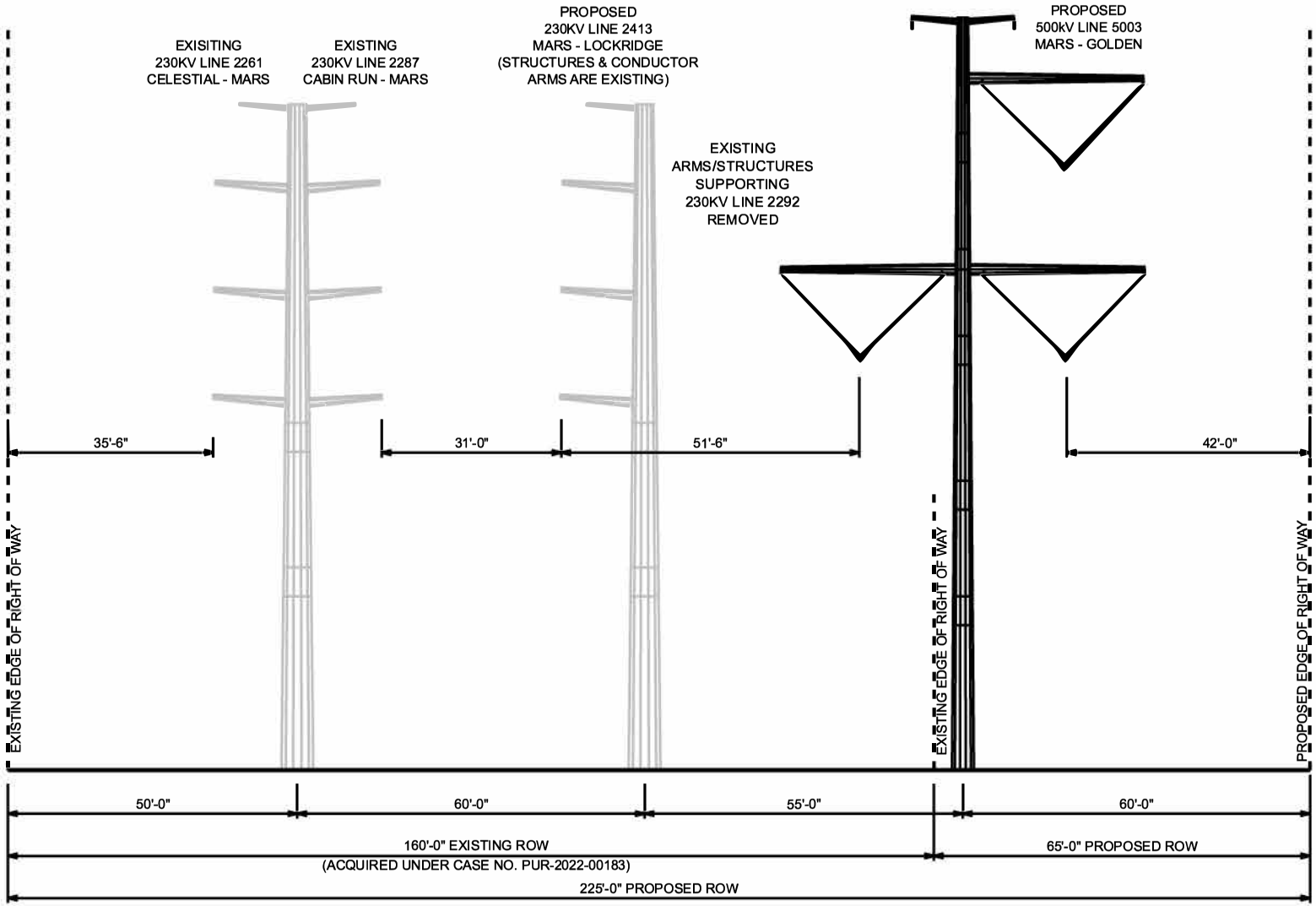
Dominion Energy

APPENDIX B STRUCTURE DRAWINGS



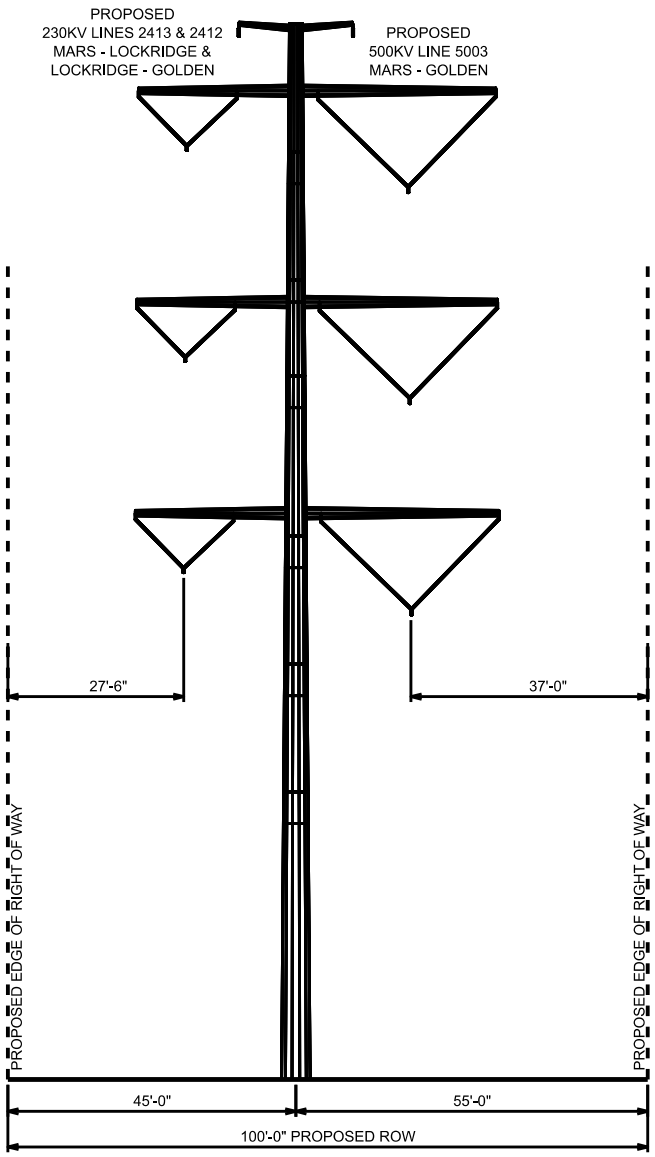
EXISTING ROW CONFIGURATION - CARTERS SCHOOL ROAD SEGMENT

DISCLAIMER		DESCRIPTION & VIEW	ATTACHMENT NO.
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	STR. 5003/5 - 5003/10 TYPICAL RIGHT OF WAY LOOKING TOWARDS GOLDEN SUB	II.A.5.a DRAWN BY | TMR



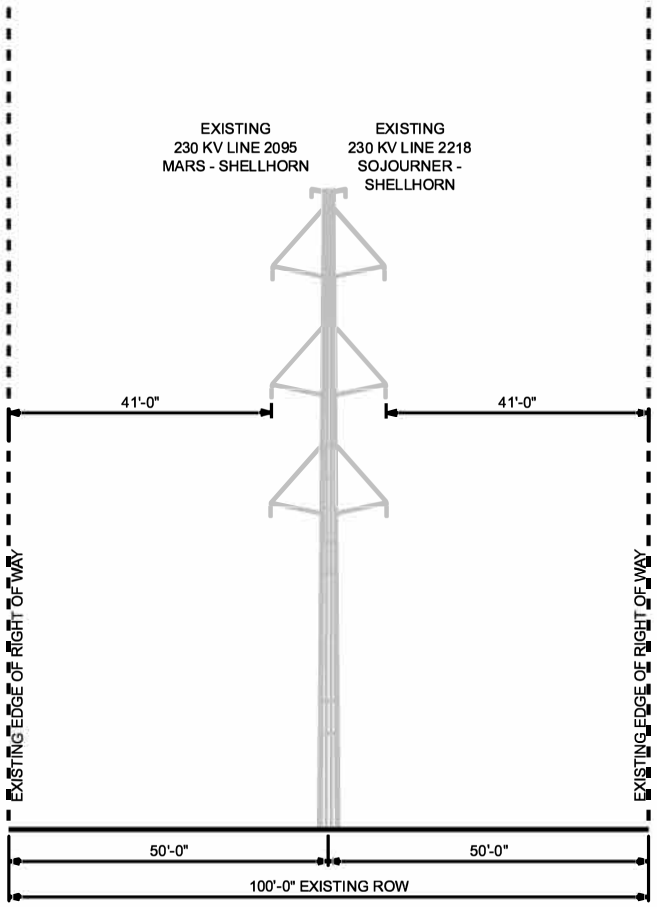
PROPOSED ROW CONFIGURATION - CARTERS SCHOOL ROAD SEGMENT

DISCLAIMER		DESCRIPTION & VIEW	ATTACHMENT NO.
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	STR. 5003/5 - 5003/10 TYPICAL RIGHT OF WAY LOOKING TOWARDS GOLDEN SUB	II.A.5.b DRAWN BY: TMR



PROPOSED ROW CONFIGURATION - GOLDEN TO MARS LINES

DISCLAIMER		DESCRIPTION & VIEW	ATTACHMENT NO.
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	STR. 5003/11 - 5003/42 AND 5003/64 - 5003/69 TYPICAL RIGHT OF WAY LOOKING TOWARDS GOLDEN SUB	II.A.5.c DRAWN BY: TMR



EXISTING ROW CONFIGURATION - GOLDEN TO MARS LINES

DISCLAIMER		DESCRIPTION & VIEW	ATTACHMENT NO.
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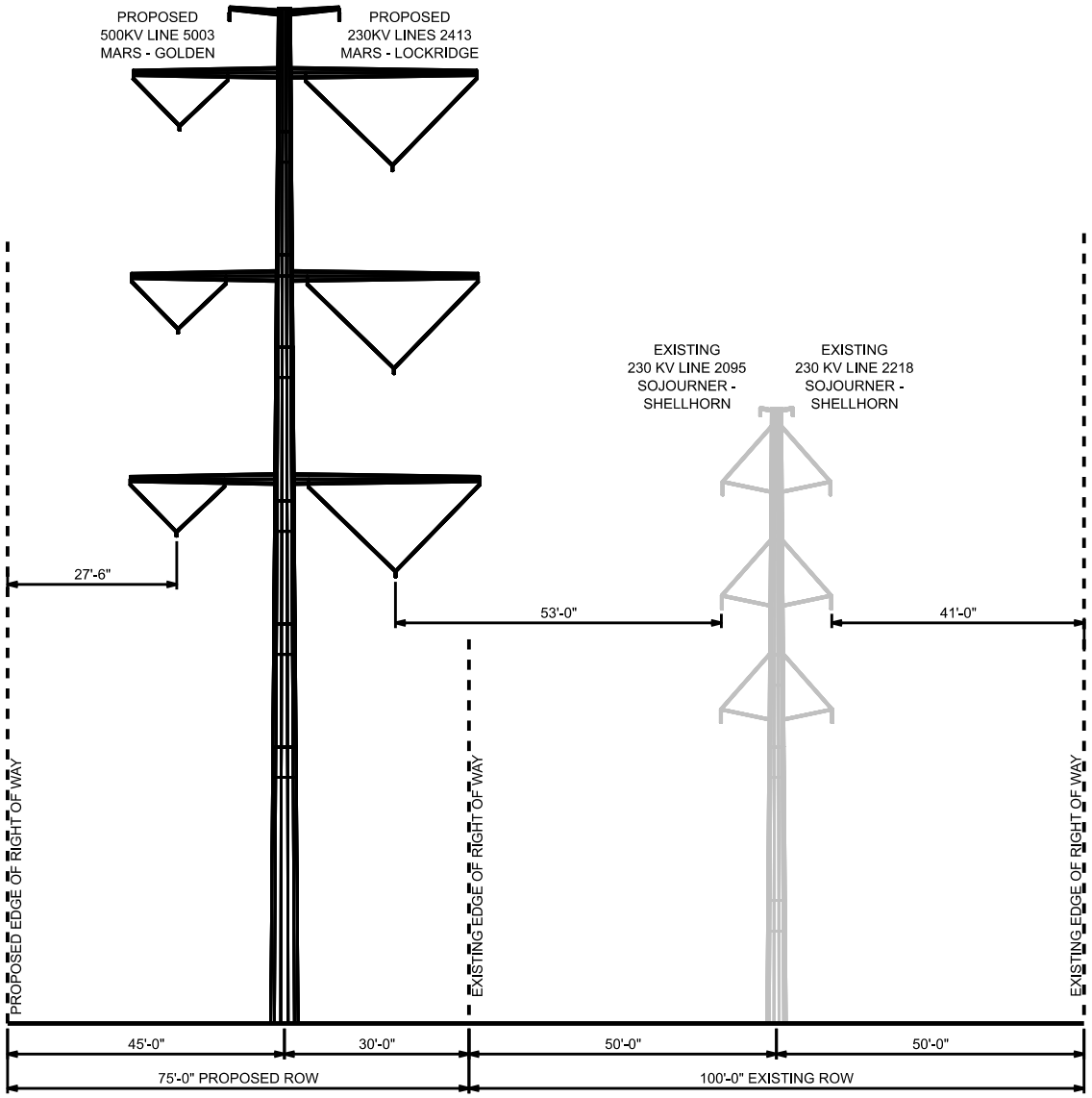
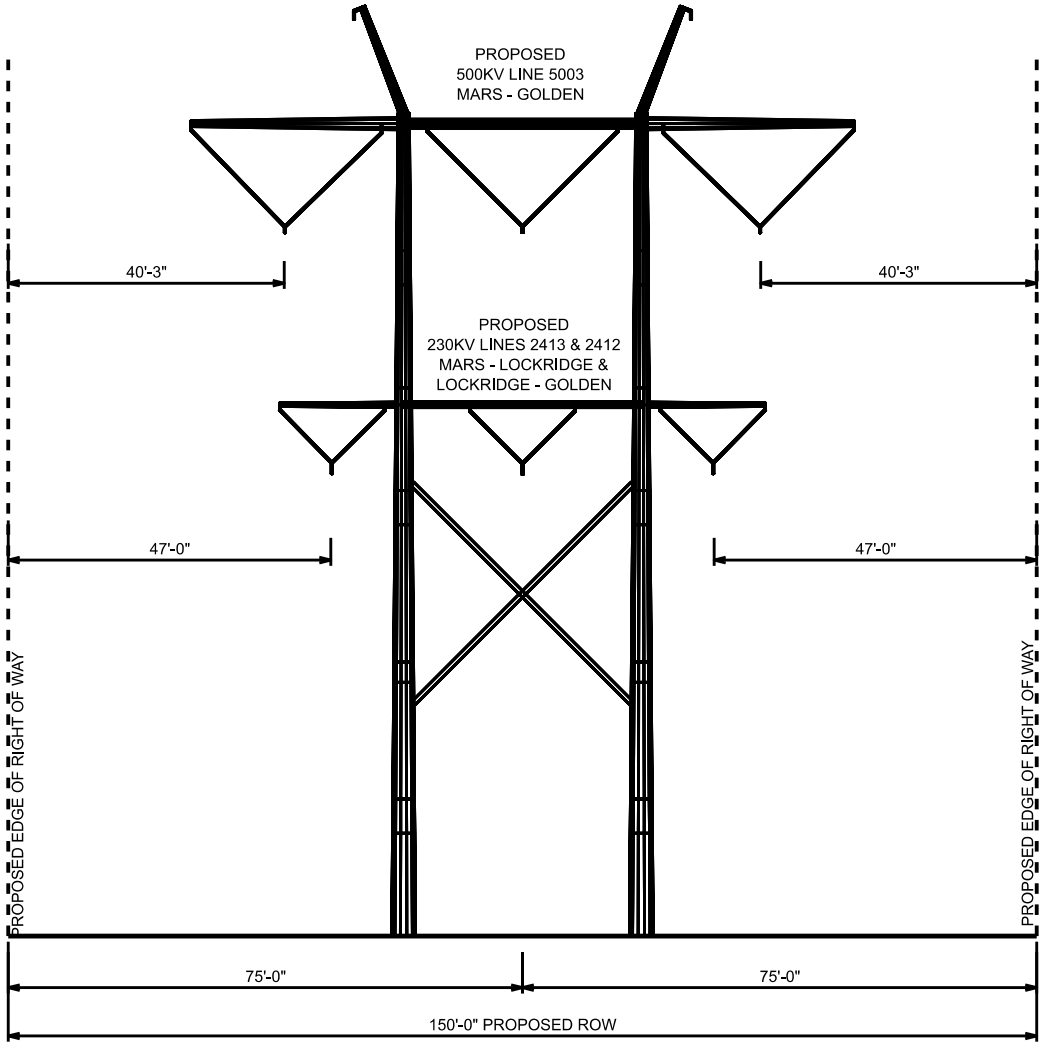


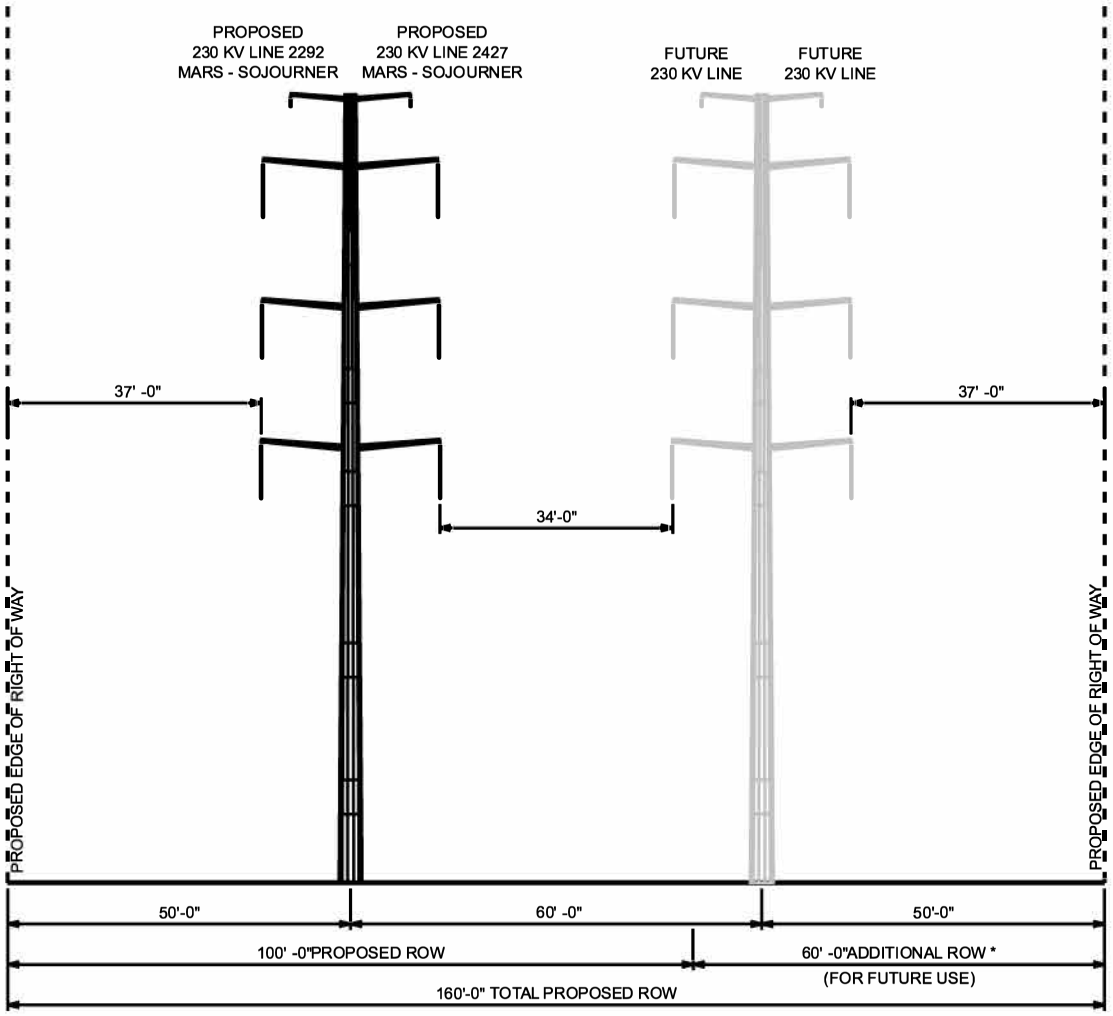
PROPOSED ROW CONFIGURATION - GOLDEN TO MARS LINES

DISCLAIMER		DESCRIPTION & VIEW	ATTACHMENT NO.
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	STR. 5003/43 - 5003/46 TYPICAL RIGHT OF WAY LOOKING TOWARDS GOLDEN SUB	II.A.5.e DRAWN BY: TMR



PROPOSED ROW CONFIGURATION - GOLDEN TO MARS LINES

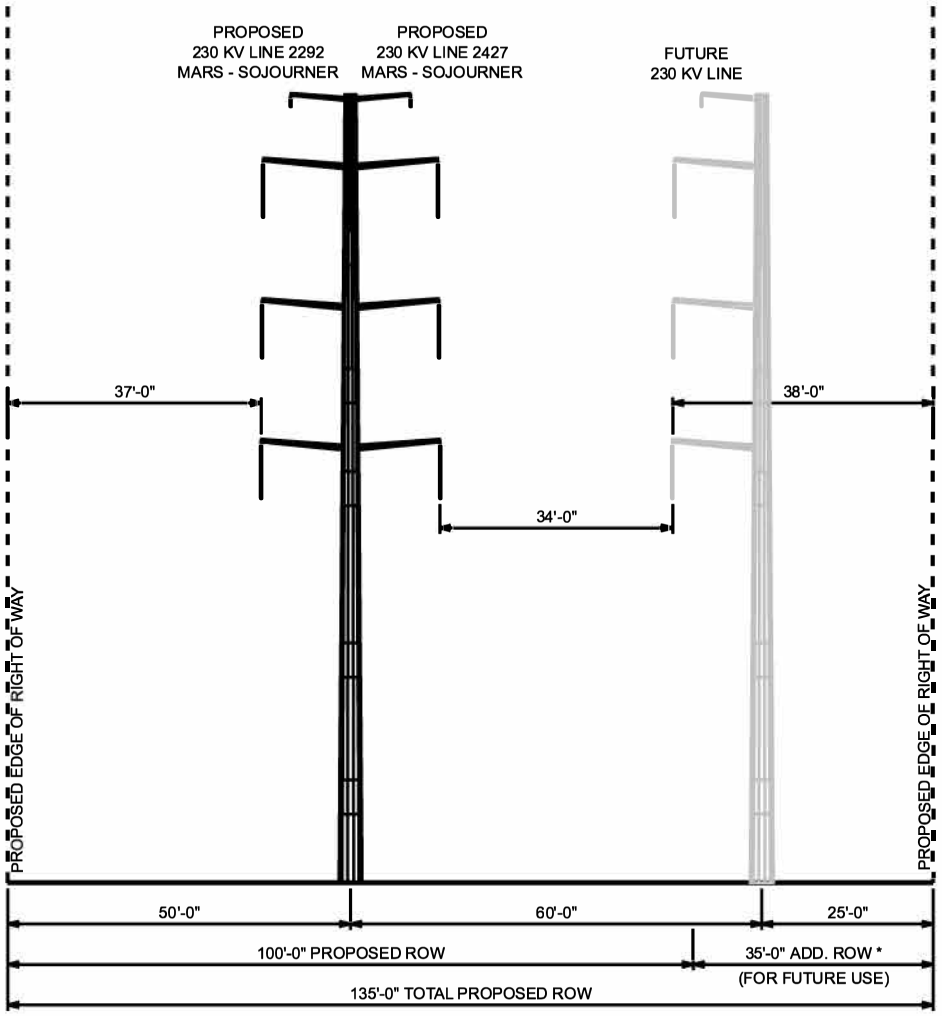
DISCLAIMER		DESCRIPTION & VIEW	ATTACHMENT NO.
THE INFORMATION CONTAINED ON THIS DRAWING IS CONSIDERED PRELIMINARY IN NATURE AND IS SUBJECT TO CHANGE BASED ON FINAL DESIGN	Dominion Energy 5000 Dominion Blvd. Glen Allen, VA 23060	STR. 5003/2 - 5003/4 AND 5003/47 - 5003/63 TYPICAL RIGHT OF WAY LOOKING TOWARDS GOLDEN SUB	II.A.5.f DRAWN BY: TMR



* THE COMPANY IS SEEKING TO VOLUNTARILY OBTAIN THIS ADDITIONAL WIDTH

PROPOSED ROW CONFIGURATION - SOJOURNER 230KV LOOP

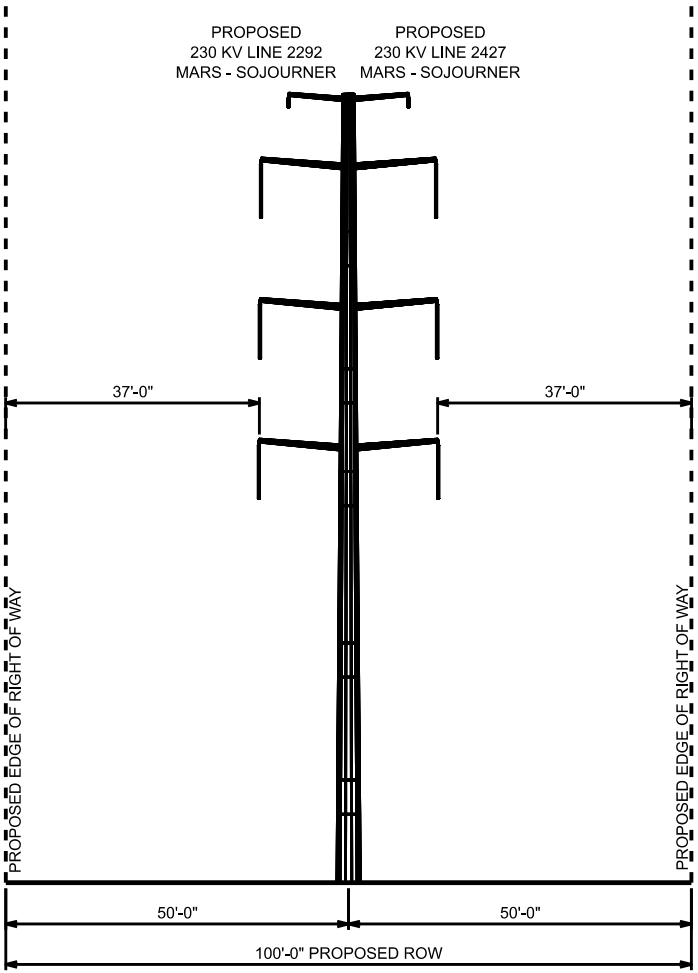
DISCLAIMER		DESCRIPTION & VIEW	ATTACHMENT NO.
THE INFORMATION CONTAINED ON THIS DRAWING IS CONSIDERED PRELIMINARY IN NATURE AND IS SUBJECT TO CHANGE BASED ON FINAL DESIGN	Dominion Energy 5000 Dominion Blvd. Glen Allen, VA 23060	STR. 2292/5 (2427/2) - 2292/10 (2427/7) TYPICAL RIGHT OF WAY LOOKING TOWARDS SOJOURNER SUB	II.A.5.g DRAWN BY: TMR



* THE COMPANY IS SEEKING TO VOLUNTARILY OBTAIN THIS ADDITIONAL WIDTH

PROPOSED ROW CONFIGURATION - SOJOURNER 230KV LOOP

DISCLAIMER		DESCRIPTION & VIEW	ATTACHMENT NO.
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	STR. 2292/10 (2427/7) - 2292/17 (2427/14) TYPICAL RIGHT OF WAY LOOKING TOWARDS SOJOURNER SUB	II.A.5.h DRAWN BY: TMR



PROPOSED ROW CONFIGURATION - SOJOURNER 230KV LOOP

DISCLAIMER		DESCRIPTION & VIEW	ATTACHMENT NO.
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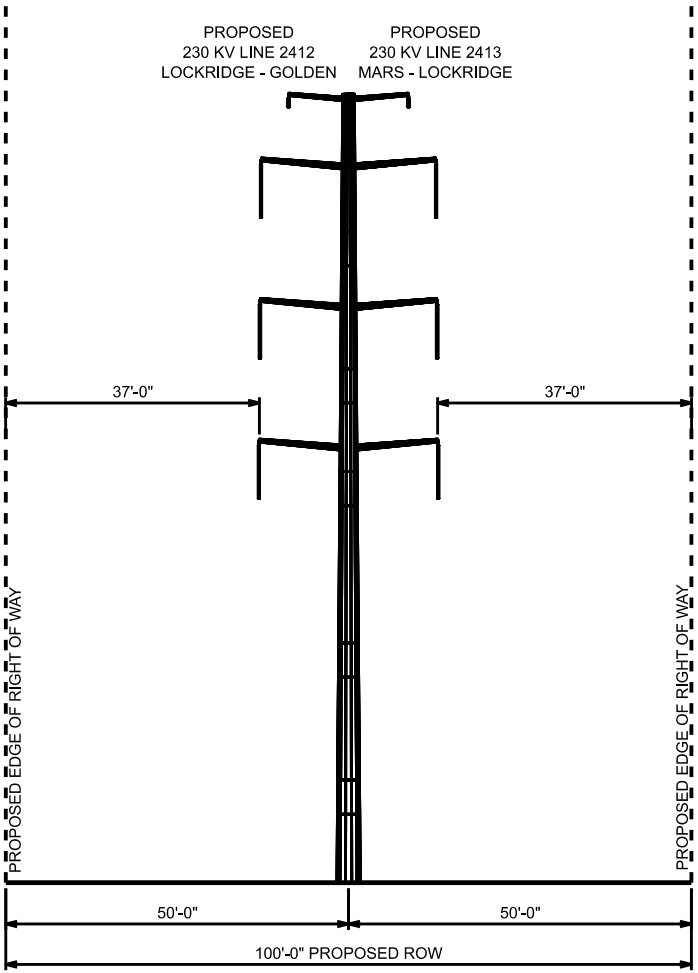

PROPOSED ROW CONFIGURATION - LOCKRIDGE 230KV LOOP

DISCLAIMER		DESCRIPTION & VIEW	ATTACHMENT NO.
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	STR. 2413/49 (2412/7) - 2413/54 (2412/2) TYPICAL RIGHT OF WAY LOOKING TOWARDS LOCKRIDGE SUB	II.A.5.j DRAWN BY: TMR