

October 29, 2020

BY ELECTRONIC FILING

Mr. Bernard Logan, Interim Clerk
c/o Document Control Center
State Corporation Commission
1300 East Main Street
Tyler Building – 1st Floor
Richmond, Virginia 23219

*Application of Virginia Electric and Power Company
For approval and certification of electric transmission facilities:
Lanexa-Northern Neck 230 kV Line #224 Rebuild and New 230 kV Line #2208
Case No. PUR-2020-00247*

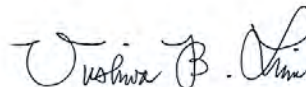
Dear Mr. Logan:

Please find enclosed for electronic filing in the above-captioned proceeding the application for approval of electric facilities on behalf of Virginia Electric and Power Company (the “Company”). This filing contains the Application, Appendix, Direct Testimony, and DEQ Supplement, including attachments.

As indicated in Section II.A.12.b of the Appendix, three (3) color copies of the map of the Virginia Department of Transportation “General Highway Map” for New Kent, King William, King and Queen, Essex, and Richmond Counties were mailed to the Commission’s Division of Energy Regulation on October 26, 2020. The Company also provided the Division of Energy Regulation electronic access, via e-room on October 27, 2020, to the digital geographic information system (“GIS”) map required by § 56-46.1 of the Code of Virginia, which is Attachment II.A.2 to the Appendix.

Please do not hesitate to call if you have any questions in regard to the enclosed.

Very truly yours,



Vishwa B. Link

Enclosures

cc: William H. Chambliss, Esq.
David J. DePippo, Esq.

COMMONWEALTH OF VIRGINIA
BEFORE THE
STATE CORPORATION COMMISSION

APPLICATION OF

VIRGINIA ELECTRIC AND POWER COMPANY

FOR APPROVAL AND CERTIFICATION
OF ELECTRIC FACILITIES

Lanexa-Northern Neck 230 kV Line #224 Rebuild and
New 230 kV Line #2208

Application No. 301

Case No. PUR-2020-00247

Filed: October 29, 2020

COMMONWEALTH OF VIRGINIA

STATE CORPORATION COMMISSION

APPLICATION OF)
VIRGINIA ELECTRIC AND POWER COMPANY) Case No. PUR-2020-00247
)
For approval and certification of electric)
transmission facilities: Lanexa-Northern Neck 230 kV)
Line #224 Rebuild and New 230 kV Line #2208)

**APPLICATION OF VIRGINIA ELECTRIC AND POWER COMPANY
FOR APPROVAL AND CERTIFICATION OF
ELECTRIC TRANSMISSION FACILITIES:
LANEXA-NORTHERN NECK 230 kV LINE #224 REBUILD AND
NEW 230 kV LINE #2208**

Pursuant to § 56-46.1 of the Code of Virginia (“Va. Code”) and the Utility Facilities Act, Va. Code § 56-265.1 *et seq.*, Virginia Electric and Power Company (“Dominion Energy Virginia” or the “Company”), by counsel, files with the State Corporation Commission of Virginia (the “Commission”) this application for approval and certification of electric facilities (the “Application”). In support of its Application, Dominion Energy Virginia respectfully shows as follows:

1. Dominion Energy Virginia is a public service corporation organized under the laws of the Commonwealth of Virginia furnishing electric service to the public within its Virginia service territory. The Company also furnishes electric service to the public in portions of North Carolina. Dominion Energy Virginia’s electric system—consisting of facilities for the generation, transmission, and distribution of electric energy—is interconnected with the electric systems of neighboring utilities and is a part of the interconnected network of electric systems serving the continental United States. By reason of its operation in two states and its interconnections with other utilities, the Company is engaged in interstate commerce.

2. In order to perform its legal duty to furnish adequate and reliable electric service,

Dominion Energy Virginia must, from time to time, replace existing transmission facilities or construct new transmission facilities in its system.

3. In this Application, in order to maintain the structural integrity and reliability of its transmission system in compliance with mandatory North American Electric Reliability Corporation (“NERC”) Reliability Standards, as well as resolve a potential violation of planning criteria, the Company proposes, within New Kent, King William, King and Queen, Essex, and Richmond Counties, Virginia, the following (collectively, the “Project”):

- (i) Rebuild within an existing right-of-way or on Company-owned property, approximately 38.3 miles of the existing 41.3-mile long 230 kV Lanexa-Northern Neck Line #224, which is nearing its end of life, on new double circuit structures;¹
- (ii) Install approximately 40.5 miles² of new 230 kV Lanexa-Northern Neck Line #2208 collocated on double circuit structures with Line #224;
- (iii) Perform expansion and installation work at the Company’s existing Lanexa and Northern Neck Substations, and minor work at the Dunnsville Substation; and
- (iv) Perform minor transmission-related work on Lines #2016, #2076, #2113, and #2129.³

¹ The remaining approximately 3.0 miles of Line #224 currently is being rebuilt as a partial rebuild of Line #224 (“Partial Rebuild Project”), which was approved and certificated by the State Corporation Commission (the “Commission”) in Case No. PUR-2018-00090. This includes refurbishment of foundations and replacement of the structures and conductor along the Pamunkey River crossing (approximately 1.7 miles) and the Mattaponi River crossing (approximately 1.3 miles) of Line #224. The Pamunkey River crossing work was completed in December 2019, and the Mattaponi River crossing work is scheduled to be completed by December 2020.

² As part of the certificated Partial Rebuild Project, the Company will install approximately 0.8 mile of double circuit line along the Mattaponi River crossing as a 34.5 kV distribution feed designed to allow conversion to operation at 230 kV. Therefore, approximately 0.8 mile of the entire 41.3-mile length of the route will not require installation of a new second circuit as part of this Project, leaving approximately 40.5 miles.

³ The Company considers the work associated with these lines to qualify as “ordinary extensions or improvements in the usual course of business” pursuant to § 56-265.2 A 1 of the Code of Virginia (“Va. Code”) and, therefore, does not require approval pursuant to Va. Code § 56-46.1 B or a certificate of public convenience and necessity (“CPCN”) from the Commission. Specifically, the proposed work includes:

- Line #2016: (i) moving Line #2016 from existing Structure #224/297, 2016/6, which it currently shares with Line #224, to one new Structure #2016/6 supporting Line #2016; and (ii) moving the span of Line #2016 to Structure #2016/6 to be reused.
- Line #2076: installation of (i) one 3-pole structure outside of the Northern Neck Substation fence to accommodate the expanded bus at the substation; (ii) one new span of 3-phase twin-bundled 636 ACSR

4. The proposed Project will replace aging infrastructure at the end of its service life in accordance with the Company's mandatory electric transmission planning criteria (the "Planning Criteria"), as well as resolve potential violations of NERC Reliability Standards, thereby enabling the Company to maintain the overall long-term reliability of its transmission system.

5. As of April 2020, the Company's system has approximately 3,115 miles of overhead transmission lines built prior to 1980 (approximately 47% of the overall overhead transmission system mileage). The Company has developed a proactive plan to rebuild transmission lines that are comprised of wood pole structures that are experiencing maintenance and reliability issues, including cracked and decaying wood, ground line rot and woodpecker damage, as well as weathering steel towers (COR-TEN®⁴ towers). The 230 kV system accounts for approximately 2,861 miles of the Company's total overhead transmission line system, of which approximately 1,502 miles were built primarily before 1980.

6. Line #224, which was constructed in 1969 predominately on wood H-frame structures and weathering steel towers, has been identified for rebuild based on the Company's assessment in accordance with Dominion Energy Virginia's mandatory electric transmission planning criteria ("Planning Criteria"). Additionally, a second 230 kV Lanexa-Northern Neck

conductor along Line #2076 from the new backbone in the substation to the proposed 3-pole structure; and (iii) one span of dual 7#7 alumoweld shield wire along Line #2076 outside of Northern Neck Substation.

- Line #2113: installation of (i) one 3-pole structure; and (ii) one 80-foot span of 3-phase 1033 ACSR conductor along Line #2113 between an existing 3-pole dead end pole and the proposed 3-pole structure outside of Lanexa Substation.
- Line #2129: installation of (i) one 3-pole structure; (ii) one new span of 3-phase twin-bundled 636 ACSR conductor along Line #2129 from the new backbone in Lanexa Substation and the relocated single circuit 3-pole structure along Line #2129; and (iii) two spans of dual 7#7 alumoweld over the proposed backbone in Northern Neck Substation and the relocated pole along Line #2129.

Should the Commission determine that CPCNs are required for the work as described above and in Section I.F of the Appendix, the Company requests that the Commission grant such CPCNs as part of its final order in this proceeding.

⁴ Registered trademark of United States Steel Corporation.

transmission line, Line #2208, is needed to resolve a potential violation of PJM Interconnection, L.L.C. (“PJM”) and Dominion Energy Virginia Planning Criteria that involves dropping over 300 MW in the 2022/2023 timeframe based on the 2020 PJM Load Forecast. The need for the Project is described in detail in Section I of the Appendix attached to this Application.

7. The desired in-service date for the Project is December 31, 2023. The Company estimates it will take approximately 27 months for detailed engineering, scheduled outages, materials procurement, permitting, and construction of the Project after a final order from the Commission on the Project. Accordingly, to support this estimated construction timeline and construction plan, the Company respectfully requests a final order on the Project by September 1, 2021. Should the Commission issue a final order by September 1, 2021, the Company estimates that construction of the Project should begin on November 15, 2021, and be completed by December 31, 2023. This construction timeline will enable the Company to meet the targeted in-service date for the Project.

8. The total estimated conceptual cost of the Project is approximately \$96.7 million, which includes approximately \$87.1 million for transmission-related work, and approximately \$9.6 million for substation-related work (2020 dollars). The description of the proposed Project is provided in detail in Sections I and II of the Appendix attached to this Application.

9. Given the availability of existing right-of-way and the statutory preference given to the use of existing rights-of-way, and because additional costs and environmental impacts would be associated with the acquisition and construction of new right-of-way, the Company did not consider any alternate routes requiring new right-of-way for the Project. The impact of the proposed Project on scenic, environmental, and historical features is described in detail in Section III of the Appendix.

10. Based on consultations with the Virginia Department of Environmental Quality (“DEQ”), the Company has developed a supplement (“DEQ Supplement”) containing information designed to facilitate review and analysis of the proposed facilities by the DEQ and other relevant agencies. The DEQ Supplement is attached to this Application.

11. Based on the Company’s experience, the advice of consultants, and a review of published studies by experts in the field, the Company believes that there is no causal link to harmful health or safety effects from electric and magnetic fields generated by the Company’s existing or proposed facilities. Section IV of the Appendix provides further details on Dominion Energy Virginia’s consideration of the health aspects of electric and magnetic fields.

12. Section V of the Appendix provides a proposed route description for public notice purposes and a list of federal, state, and local agencies and officials that the Company has or will notify about the Application.

13. In addition to the information provided in the Appendix and the DEQ Supplement, this Application is supported by the prefiled direct testimony of Company Witnesses Mark R. Gill, Rebecca A. Suther, Mohammad M. Othman, and Lane E. Carr filed with this Application.

WHEREFORE, Dominion Energy Virginia respectfully requests that the Commission:

- (a) direct that notice of this Application be given as required by § 56-46.1 of the Code of Virginia;
- (b) approve pursuant to § 56-46.1 of the Code of Virginia the construction of the Project; and,
- (c) grant a certificate of public convenience and necessity for the Project under the Utility Facilities Act, § 56-265.1 *et seq.* of the Code of Virginia.

VIRGINIA ELECTRIC AND POWER COMPANY

By: /s/ Vishwa B. Link
Counsel for Applicant

David J. DePippo
Dominion Energy Services, Inc.
120 Tredegar Street, Riverside 2
Richmond, Virginia 23219
(804) 819-2411
david.j.depippo@dominionenergy.com

Vishwa B. Link
Timothy D. Patterson
Jennifer D. Valaika
April M. Jones
McGuireWoods LLP
Gateway Plaza
800 E. Canal Street
Richmond, Virginia 23219
(804) 775-4330 (VBL)
(804) 775-1069 (TDP)
(804) 775-1051 (JDV)
(804) 775-1042 (AMJ)
vlink@mcguirewooods.com
tpatterson@mcguirewoods.com
jvalaika@mcguirewoods.com
amjones@mcguirewoods.com

Counsel for Applicant Virginia Electric and Power Company

October 29, 2020

COMMONWEALTH OF VIRGINIA
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New 230 kV Line #2208

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Appendix

Containing Information in Response to
“Guidelines for Transmission Line Applications Filed Under Title 56 of the Code of Virginia”

Case No. PUR-2020-00247

Filed: October 29, 2020

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EXECUTIVE SUMMARY

In order to maintain the structural integrity and reliability of its transmission system in compliance with mandatory North American Electric Reliability Corporation (“NERC”) Reliability Standards, as well as resolve a potential violation of planning criteria, Virginia Electric and Power Company (“Dominion Energy Virginia” or the “Company”) proposes, within New Kent, King William, King and Queen, Essex, and Richmond Counties, Virginia, the following (collectively, the “Project”):

- (i) Rebuild within an existing right-of-way or on Company-owned property, approximately 38.3 miles of the existing 41.3-mile long 230 kV Lanexa-Northern Neck Line #224, which is nearing its end of life, on new double circuit structures;¹
- (ii) Install approximately 40.5 miles² of new 230 kV Lanexa-Northern Neck Line #2208 collocated on double circuit structures with Line #224;
- (iii) Perform expansion and installation work at the Company’s existing Lanexa and Northern Neck Substations, and minor work at the Dunnsville Substation; and
- (iv) Perform minor transmission-related work on Lines #2016, #2076, #2113, and #2129.³

¹ The remaining approximately 3.0 miles of Line #224 currently is being rebuilt as a partial rebuild of Line #224 (“Partial Rebuild Project”), which was approved and certificated by the State Corporation Commission (the “Commission”) in Case No. PUR-2018-00090. This includes refurbishment of foundations and replacement of the structures and conductor along the Pamunkey River crossing (approximately 1.7 miles) and the Mattaponi River crossing (approximately 1.3 miles) of Line #224. The Pamunkey River crossing work was completed in December 2019, and the Mattaponi River crossing work is scheduled to be completed by December 2020.

² As part of the certificated Partial Rebuild Project, the Company will install approximately 0.8 mile of double circuit line along the Mattaponi River crossing as a 34.5 kV distribution feed designed to allow conversion to operation at 230 kV. Therefore, approximately 0.8 mile of the entire 41.3-mile length of the route will not require installation of a new second circuit as part of this Project, leaving approximately 40.5 miles. See Section I.B[2].

³ The Company considers the work associated with these lines to qualify as “ordinary extensions or improvements in the usual course of business” pursuant to § 56-265.2 A 1 of the Code of Virginia (“Va. Code”) and, therefore, does not require approval pursuant to Va. Code § 56-46.1 B or a certificate of public convenience and necessity (“CPCN”) from the Commission. Specifically, the proposed work includes:

- Line #2016: (i) moving Line #2016 from existing Structure #224/297, 2016/6, which it currently shares with Line #224, to one new Structure #2016/6 supporting Line #2016; and (ii) moving the span of Line #2016 to Structure #2016/6 to be reused.
- Line #2076: installation of (i) one 3-pole structure outside of the Northern Neck Substation fence to accommodate the expanded bus at the substation; (ii) one new span of 3-phase twin-bundled 636 ACSR conductor along Line #2076 from the new backbone in the substation to the proposed 3-pole structure; and (iii) one span of dual 7#7 alumoweld shield wire along Line #2076 outside of Northern Neck Substation.
- Line #2113: installation of (i) one 3-pole structure; and (ii) one 80-foot span of 3-phase 1033 ACSR conductor along Line #2113 between an existing 3-pole dead end pole and the proposed 3-pole structure outside of Lanexa Substation.
- Line #2129: installation of (i) one 3-pole structure; (ii) one new span of 3-phase twin-bundled 636 ACSR conductor along Line #2129 from the new backbone in Lanexa Substation and the relocated single circuit 3-pole structure along Line #2129; and (iii) two spans of dual 7#7 alumoweld over the proposed backbone

As of April 2020, the Company's system has approximately 3,115 miles of overhead transmission lines built prior to 1980 (approximately 47% of the overall overhead transmission system mileage). The Company has developed a proactive plan to rebuild transmission lines that are comprised of wood pole structures that are experiencing maintenance and reliability issues, including cracked and decaying wood, ground line rot, and woodpecker damage, as well as weathering steel towers (COR-TEN®⁴ towers). The 230 kV system accounts for approximately 2,861 miles of the Company's total overhead transmission line system, of which approximately 1,502 miles were built primarily before 1980.

Line #224, which was constructed in 1969 predominately on wood H-frame structures and weathering steel towers, has been identified for rebuild based on the Company's assessment in accordance with Dominion Energy Virginia's mandatory electric transmission planning criteria ("Planning Criteria"). Additionally, a second 230 kV Lanexa-Northern Neck transmission line, Line #2208, is needed to resolve a potential violation of PJM Interconnection, L.L.C. ("PJM") and Dominion Energy Virginia Planning Criteria that involves dropping over 300 MW in the 2022/2023 timeframe based on the 2020 PJM Load Forecast. In summary, the proposed Project will replace aging infrastructure at the end of its service life in accordance with Planning Criteria, as well as resolve potential violations of NERC Reliability Standards, thereby enabling the Company to maintain the overall long-term reliability of its transmission system.

The length of the existing right-of-way and Company-owned property to be used for the Project is approximately 41.3 miles, of which 38.3 miles will be rebuilt on double circuit structures and a second new circuit will be installed for 40.5 miles as part of the Project. Because the existing right-of-way and Company-owned property is adequate to construct the proposed Project, no new right-of-way is required. Given the availability of existing right-of-way and the statutory preference given to use existing rights-of-way, and because additional costs and environmental impacts would be associated with the acquisition and construction of new right-of-way, the Company did not consider any alternate routes requiring new right-of-way for this Project.

The total estimated conceptual cost of the Project is approximately \$96.7 million, which includes approximately \$87.1 million for transmission-related work, and approximately \$9.6 million for substation-related work (2020 dollars).

The desired in-service date for the Project is December 31, 2023. The Company estimates it will take approximately 27 months for detailed engineering, scheduled outages, materials procurement, permitting, and construction of the Project after a final order from the Commission on the Project. Accordingly, to support this estimated construction timeline and construction plan, the Company respectfully requests a final order on the Project by September 1, 2021. Should the Commission issue a final order by September 1, 2021, the Company estimates that construction of the Project should begin on November 15, 2021, and be completed by December 31, 2023. This construction timeline will enable the Company to meet the targeted in-service date for the Project.

in Northern Neck Substation and the relocated pole along Line #2129.

Should the Commission determine that CPCNs are required for the work as described above and in Section I.F, the Company requests that the Commission grant such CPCNs as part of its final order in this proceeding.

⁴ Registered trademark of United States Steel Corporation.

I. NECESSITY FOR THE PROPOSED PROJECT

- A. State the primary justification for the proposed project (for example, the most critical contingency violation including the first year and season in which the violation occurs). In addition, identify each transmission planning standard(s) (of the Applicant, regional transmission organization ("RTO"), or North American Electric Reliability Corporation) projected to be violated absent construction of the facility.**

Response: The Project is necessary to rebuild Lanexa-Northern Neck Line #224, which is nearing its end of life, as well as resolve a potential violation of PJM and Dominion Energy Virginia Planning Criteria that involves dropping over 300 MW in the 2022/2023 timeframe based on the 2020 PJM Load Forecast. See Attachment I.A.1 for an overview map of the Project.

Dominion Energy Virginia's transmission system is responsible for providing transmission service (i) for redelivery to the Company's retail customers, (ii) to Appalachian Power Company, Old Dominion Electric Cooperative, Northern Virginia Electric Cooperative, Central Virginia Electric Cooperative, and Virginia Municipal Electric Association for redelivery to their retail customers in Virginia, and (iii) to North Carolina Electric Membership Corporation and North Carolina Eastern Municipal Power Agency for redelivery to their customers in North Carolina (collectively, the "Dominion Energy Zone" or "DOM Zone").

Dominion Energy Virginia is part of the PJM Interconnection, L.L.C. ("PJM") regional transmission organization, which provides service to a large portion of the eastern United States. PJM currently is responsible for ensuring the reliability of and coordinating the movement of electricity through all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and the District of Columbia. This service area has a population of approximately 65 million and on August 2, 2006, set a record high of 166,929 megawatts ("MW") for summer peak demand, of which Dominion Energy Virginia's load portion was approximately 19,256 MW serving 2.4 million customers. On July 20, 2020, the Company set a record high of 20,087 MW for summer peak demand. On February 20, 2015, the Company set a winter peak and all-time record demand of 21,651 MW. Based on the 2020 PJM Load Forecast, the DOM Zone is expected to be one of the fastest growing zones in PJM, with average growth rates of 1.2% summer and 1.4% winter over the next 10 years compared to the PJM average of 0.6% and 0.6% over the same period for both summer and winter, respectively.

Dominion Energy Virginia also is part of the Eastern Interconnection transmission grid, meaning its transmission system is interconnected, directly or indirectly, with all of the other transmission systems in the United States and Canada between the Rocky Mountains and the Atlantic Coast, except for Quebec and most of Texas. All of the transmission systems in the Eastern

Interconnection are dependent on each other for moving bulk power through the transmission system and for reliability support. Dominion Energy Virginia's service to its customers is extremely reliant on a robust and reliable regional transmission system.

NERC has been designated by the Federal Energy Regulatory Commission ("FERC") as the electric reliability organization for the United States. Accordingly, NERC requires that the planning authority and transmission planner develop planning criteria to ensure compliance with NERC Reliability Standards. Mandatory NERC Reliability Standards require that a transmission owner ("TO") develop facility interconnection requirements that identify load and generation interconnection minimum requirements for a TO's transmission system, as well as the TO's reliability criteria.⁵

Federally-mandated NERC Reliability Standards constitute minimum criteria with which all public utilities must comply as components of the interstate electric transmission system. Moreover, the Energy Policy Act of 2005 mandates that electric utilities follow these NERC Reliability Standards, and imposes fines on utilities found to be in noncompliance up to \$1.3 million per day per violation.

PJM's Regional Transmission Expansion Plan ("RTEP") is the culmination of a FERC-approved annual transmission planning process that includes extensive analysis of the electric transmission system to determine any needed improvements.⁶ PJM's annual RTEP is based on the effective criteria in place at the time of the analyses, including applicable standards and criteria of NERC, PJM, and local reliability planning criteria, among others.⁷ Projects identified through the RTEP process are developed by the TO in coordination with PJM, and are presented at the Transmission Expansion Advisory Committee ("TEAC") meetings prior to inclusion in the RTEP that is then presented for approval by the PJM Board of Managers (the "PJM Board").

Outcomes of the RTEP process include three types of transmission system upgrades or projects: (i) baseline upgrades are those that resolve a system reliability criteria violation, which can include planning criteria from NERC, ReliabilityFirst, SERC Reliability Corporation, PJM, and TOs; (ii) network upgrades are new or upgraded facilities required primarily to eliminate reliability criteria violations caused by proposed generation, merchant transmission, or long-term firm transmission service requests; and (iii) supplemental projects are projects initiated by the TO in order to interconnect new customer load, address degraded equipment performance, improve operational flexibility and efficiency, and increase infrastructure resilience. While supplemental projects are included

⁵ See FAC-001-2, effective January 1, 2016 at <http://www.nerc.com/pa/Stand/Reliability%20Standards/FAC-001-2.pdf>.

⁶ PJM Manual 14B focuses on the RTEP process and can be found at <http://www.pjm.com/documents/manuals.aspx>.

⁷ See PJM Manual 14B, Attachment D: PJM Reliability Planning Criteria.

in the RTEP, and the PJM Board administers stakeholder review of supplemental projects as part of the RTEP process, the PJM Board does not actually approve such projects.

Line #224 Rebuild Component

As of April 2020, the Company's system has approximately 3,115 miles of overhead transmission lines built prior to 1980 (approximately 47% of the overall overhead transmission system mileage). The Company has developed a proactive plan to rebuild transmission lines that are comprised of wood pole structures that are experiencing maintenance and reliability issues, including cracked and decaying wood, ground line rot, and woodpecker damage, as well as weathering steel towers (COR-TEN® towers). The 230 kV system accounts for approximately 2,861 miles of the Company's total overhead transmission line system, of which approximately 1,502 miles were built primarily before 1980.

Line #224, which was constructed in 1969 predominately on wood H-frame structures and weathering steel towers, has been identified for full rebuild based on the Company's assessment in accordance with the Company's Planning Criteria.

Effective March 24, 2020, the Company's Planning Criteria was updated so that infrastructure to be evaluated under end-of-life (or, "EOL") criteria changed from "all transmission lines at 69 kV and above" to "all regional transmission lines operated at 500 kV and above." The remaining transmission lines below 500 kV were provisioned to be evaluated per the Company's Attachment M-3 End-of-Life Planning Criteria. This M-3 End-of-life Planning Criteria was presented at the June 16, 2020 PJM Sub-Regional RTEP meeting. See Attachment I.A.2 for updated slides presented by the Company at that meeting. As discussed in Attachment I.A.2, EOL projects under 500 kV that were approved by PJM after March 24, 2020, were formerly designated as baseline projects and are now classified as supplemental projects. However, the process for determining that an asset has reached its EOL remains the same; therefore, the Company continues to use the criteria evaluation process outlined in Section C.2.9 of the Planning Criteria.

Section C.2.9 of the Planning Criteria addresses electric transmission infrastructure approaching its end of life:⁸

Electric transmission infrastructure reaches its end of life as a result of many factors. Some factors such as extreme weather and environmental conditions can *shorten* infrastructure life, while

⁸ The Company's Transmission Planning Criteria can be found in revised Exhibit A of the Company's Facility Interconnection Requirements document, which is available online at the following address under the Facility Interconnection Requirements:
<https://www.dominionenergy.com/our-company/moving-energy/electric-transmission-access>.

others such as maintenance activities can *lengthen* its life. Once end of life is recognized, in order to ensure continued reliability of the transmission grid, a decision must be made regarding the best way to address this end-of-life asset.

For this criterion, “end of life” is defined as the point at which infrastructure is at risk of failure, and continued maintenance and/or refurbishment of the infrastructure is no longer a valid option to extend the life of the facilities consistent with Good Utility Practice and Dominion Energy Transmission Planning Criteria. The infrastructure to be evaluated under this end-of-life criteria are all regional transmission lines operated at 500 kV and above.

The decision point of this criterion is based on satisfying two metrics:

- 1) *Facility is nearing, or has already passed, its end of life, and*
- 2) *Continued operation risks negatively impacting reliability of the transmission system.*

For facilities that satisfy both of these metrics, this criterion mandates either replacing these facilities with in-kind infrastructure that meets current Dominion standards or employing an alternative solution to ensure the Dominion transmission system satisfies all applicable reliability criteria.

Dominion Energy will determine whether the two metrics are satisfied based on the following assessment:

1. End of Life

Factors that support a determination that a facility has reached its end of life include, but are not limited to,

- Condition of the facility, taking into consideration:
 - Industry recommendations on service life for the particular type of facility
 - The facility’s performance history
 - Documented evidence indicating that the facility has reached the end of its useful service life
 - The facility’s maintenance and expense history
- Third-party assessment - While not required, Dominion Energy has the option of seeking a third-party assessment of a facility to determine if industry specialists agree the facility has reached the end of its useful service life

2. Reliability and System Impact

The reliability impact of continued operation of a facility will be determined based on a planning assessment and operational performance considerations. The end-of-life determination for a facility to be tested for reliability impact will be assessed by evaluating the impact on short and long term reliability with and without the facility in service. The existing system with the facility removed will become the base case system for which all reliability tests will be performed.

The primary four (4) reliability tests to be considered are:

1. NERC Reliability Standards
2. PJM Planning Criteria As documented in PJM Manual 14B PJM Region Transmission Planning Process
3. Dominion Energy Transmission Planning Criteria contained in this document
4. Operational Performance – This test will be based on input from PJM and/or Dominion Energy System Operations as to the impact on reliably operating the system without the facility

Additional factors to be evaluated under system impact may include but not be limited to:

1. Market efficiency
2. Stage 1A ARR sufficiency
3. Public policy
4. SERC reliability criteria

Failure of any of these reliability tests, along with the end-of-life assessment discussed herein, will indicate a violation of the End-of-Life Criteria and necessitate replacement as mandated earlier in this document.

After the end of service life and reliability impact of a facility are evaluated and it has been determined that the facility violates the End-of-Life Criteria, a determination will be made as to whether replacement of the facility is the most effective solution for an identified reliability need, or whether an alternative solution should be employed. One or more of the following factors may be considered in determining whether to proceed with facility replacement or with an alternative solution:

- Planning analysis which may include power flow studies
- Operational performance

- System Reliability
- Effectiveness of the alternative as compared to the replacement facility
- Future load growth in the study area
- Future transmission projects or interconnects that impact the study area
- Constructability comparison
- Cost comparison

As part of the rebuild component of the Project, the Company proposes to wreck and rebuild approximately 38.3 miles of the existing 41.3-mile long Line #224 in existing right-of-way or on Company-owned property between the Company's existing Lanexa Substation and Northern Neck Substation utilizing double circuit structures. The two segments of the 41.3-mile long Line #224 that are being rebuilt as part of the Project include approximately 31.6 miles from Lanexa to Dunnsville Substation, and approximately 9.7 miles from Dunnsville Substation to Northern Neck Substation.

The remaining approximately 3.0 miles of Line #224 are already being rebuilt as a partial rebuild of Line #224 (*i.e.*, the Partial Rebuild Project), which was approved and certificated by the Commission in Case No. PUR-2018-00090. These two segments of Line #224 include the Pamunkey River crossing (1.7 miles) and the Mattaponi River crossing (1.3 miles). This Project does not include work approved as part of the Partial Rebuild Project. See Attachment I.A.1. The Pamunkey River crossing work was completed in December 2019, and the Mattaponi River crossing work is scheduled to be completed by December 2020.⁹

1) Facility is nearing, or has already passed, its end of life

In regard to the first metric of the Company's Planning Criteria addressing end of life, the structures on Line #224 are primarily wood H-frame structures that were erected in 1969, as noted above. Industry experience indicates that life for wood pole structures is approximately 35 to 55 years, for conductor and connectors is approximately 40 to 60 years, and for porcelain insulators is approximately 50 years. As supported by Attachment I.L.1, there are wood structures that have been identified for replacement and other line components are showing signs of their age. The majority of these structures are 51 years old, and the Company believes it is most cost-effective to rebuild the line versus continuing to replace individual components.

The structures being rebuilt on Line #224 also include COR-TEN® steel structures. COR-TEN® steel is now known to be problematic when used for lattice-type structures. These COR-TEN® towers have been identified for rebuild based on the Company's assessment in accordance with the Planning

⁹ See, *supra*, n. 1 and 2.

Criteria. The Company retained a third-party company, Quanta Technology (“Quanta”), to evaluate the condition of its COR-TEN® towers. After completing its evaluation, Quanta provided the Company with the 2016 Quanta Report, which confirmed the need to rebuild the COR-TEN® structures supporting Line #224, among other 230 kV COR-TEN® transmission lines on the Company’s system.

2) Continued operation risks negatively impacting reliability of the transmission system

Regarding the second metric of the Company’s Planning Criteria addressing end of life, Line #224 provides service to Dominion Energy Virginia’s Dunnsville Substation, which in turn serves approximately 7,568 customers, including approximately 4,701 customers of Rappahannock Electric Cooperative (“REC”). The Company would be unable to continue to provide reliable transmission service to these customers unless it addresses the aging infrastructure at the end of its service life.

The Company also relied on one of the reliability tests identified in the Company’s Planning Criteria, specifically, the fourth reliability test above regarding Operational Performance, which states in part that the “test will be based on input from PJM and/or Dominion Energy System Operations as to the impact on reliably operating the system without the facility.”

Assuming that the Company would choose not to rebuild the full length of Line #224, a portion of the line would still have to be rebuilt to continue feeding the direct-connected load at Dunnsville Substation. The section that would make the most sense to rebuild would be the shorter, approximately 9.7-mile section from Northern Neck Substation, since serving the Dunnsville load from the longer, approximately 31.6-mile section from Lanexa would result in a violation of the Company’s Radial Transmission Line criteria by exceeding the 700 MW/mile criteria limit.¹⁰ However, eliminating the transmission source from Lanexa creates the potential for an additional criteria violation by setting up a load drop greater than 300 MW for an N-1-1 contingency that involves the loss of Line #2083 from Fredericksburg and Line #65 from Harmony Village.

Further, discussions with REC indicate that, for the loss of Dunnsville Substation under peak load conditions, REC’s Howerton delivery point (“DP”), which is sourced by a 34.5 kV circuit from Dunnsville, would be unable to pick up all of its customers through field switching to adjacent distribution facilities, leaving approximately 3,855 of its members without power.

¹⁰ This criteria limit can be found under Section C.2.6 of revised Exhibit A of the Company’s Facility Interconnection Requirements document, which is available online at the following address under the Facility Interconnection Requirements:

<https://www.dominionenergy.com/our-company/moving-energy/electric-transmission-access>.

New Line #2208 Component

The new Line #2208 component of the Project provides for the proposed installation of approximately 40.5 miles¹¹ of new 230 kV Lanexa-Northern Neck Line #2208 collocated on double circuit structures with Line #224, which is needed to resolve a potential violation of PJM and Dominion Energy Virginia Planning Criteria that involves dropping over 300 MW in the 2022/2023 timeframe based on the 2020 PJM Load Forecast.

As discussed in Section I.C, the Northern Neck load area is fed by three transmission sources that include lines from Fredericksburg (#2083, #2145, #2076), Lanexa (#224), and Harmony Village (#65). Historically, the Company has employed an operating procedure to open 115 kV Line #65 at the Northern Neck end for the loss of either of the 230 kV sources from Fredericksburg or Lanexa. The intent of the operating procedure is to mitigate the thermal overloads on Line #65 that would occur for the loss of the remaining 230 kV source. By opening Line #65 after the loss of either one of the 230 kV sources, it prevents Line #65 from trying to feed all of the 230 kV load for loss of the remaining 230 kV source, which would create thermal and voltage issues. Also, the Company's System Operations Center ("SOC") has indicated that voltage in the area is difficult to manage with either of the 230 kV sources going to Northern Neck out of service. As a result, SOC placed a mobile statcom at Northern Neck to assist with maintaining voltage levels during the ongoing Line #224 outage to rebuild the river crossings that were approved by the Commission in Case No. PUR-2018-00090.

The results of PJM's winter 2025 RTEP N-1-1 analysis show that, without utilizing the operating procedure described above, both thermal and voltage violations will occur for the loss of both 230 kV sources into the Northern Neck load area in 2025; however, continued use of the operating procedure by the Company's SOC to mitigate thermal and voltage issues on Line #65 will result in a potential PJM Planning Criteria violation of dropping over 300 MW in the 2022/2023 timeframe based on the 2020 PJM Load Forecast. With the addition of new 230 kV Line #2208 between Lanexa and Northern Neck, the operating procedure described above—where Line #65 is opened between N-1-1 events involving the 230 kV sources into Northern Neck—will no longer be required and the potential 300 MW load loss for an N-1-1 contingency will be eliminated.

The Project

This Project has been designated "immediate need" by PJM to address the near-term violation of dropping more than 300 MW in the 2022/2023 timeframe as well as those violations seen in 2025. The new Line #2208 component was included in PJM's Competitive Planning Process and listed in the 2020 Open Window 1, which opened on July 1, 2020, and closed on August 31, 2020. The

¹¹ See, *supra*, n. 2.

Competitive Planning Process affords non-incumbent transmission developers an opportunity to participate in the regional planning and expansion of the PJM bulk electric system. Due to the “immediate need” designation, PJM has indicated that the Company will be the designated entity to mitigate these violations. See Attachment I.D.2.

The Company initially submitted the rebuild of Line #224 as a proposal to the PJM RTEP process to address EOL criteria.¹² The Line #224 rebuild component of the Project was initially reviewed at the December 2018 Transmission Expansion Advisory Committee (“TEAC”) meeting and was recommended for approval at the February 2019 TEAC Meeting. See Attachment I.A.3 for the relevant slides from the December 2018 TEAC Meeting. In addition to the need to serve customers from Dunnsville Substation, removal of Line #224 results in over 300 MW load loss for an N-1-1 condition. This exceeds the Company’s 300 MW load loss limit. See Section I.C of this Appendix for details. No additional reliability studies were required by PJM in support of the need for the proposed rebuild of Line #224. The PJM Board approved the rebuild of Line #224 as a baseline project in February 2019 (b3089). See Attachment I.A.4 for the relevant slides from the February 2019 PJM Board Meeting. While the PJM Board approved the rebuild of Line #224 as a baseline project, as noted above, the rebuild would have been considered a supplemental project under the M-3 EOL Planning Criteria effective March 24, 2020.

Based on discussions with PJM, the initial Project (i.e., the Line #224 rebuild component to address aging infrastructure) will remain as a baseline project (b3089) with an expanded scope to include the need for a new 230 kV line. PJM also issued an additional, separate baseline project number (b3223) for the new 230 kV line component of the Project. The new line component was presented at the September 2020 TEAC Meeting. See Attachment I.A.5. Because PJM has designated the Project as “immediate need,” the Company is expecting to receive PJM Board approval following the second review in a two-phase review process, which occurred at the October 2020 TEAC Meeting. See Attachment I.A.6.

In summary, the proposed Project will replace aging infrastructure at the end of its service life in order to comply with the Company’s mandatory Planning Criteria, as well as resolve potential violations of NERC Reliability Standards, thereby enabling the Company to maintain the overall long-term reliability of its transmission system.

¹² To be clear, at the time of this initial submittal, the Company’s proposal did not include installation of the new Line #2208 component to address potential violations of NERC Reliability Standards.

Figure No.
I.A.1

Title
Overview Map

Client/Project
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208

203401404

Project Location
New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia

Prepared by LJB on 2020-10-01
TR by TPS on 2020-10-01
IR by CFG on 2020-10-02

Substation

Proposed Transmission Line #224 230 kV Line
Rebuild and New 230 kV Circuit

Line #224 Authorized Under PUR-2018-00090

Proposed Transmission Line #2208 230 kV Line
Second Circuit Installed Under PUR-2018-00090
to be Line #2208

Railroad

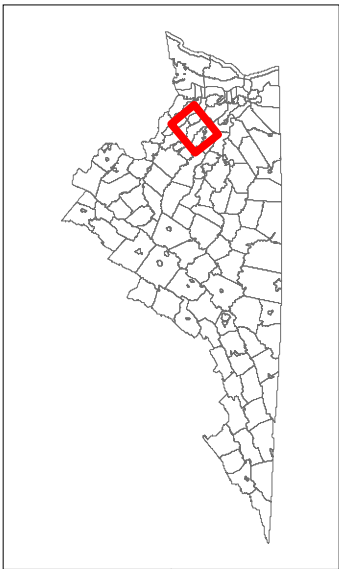
Freeway or Other Major Road

Other Major Road

Secondary Road

Local Connecting Road

Important Local Road



Notes
1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
2. Data Sources: Dominion Energy Virginia, Stantec, ESRI, NHD, DCR, U.S. National Transportation Atlas Railroads



Dominion Energy

PJM Southern Sub-Regional RTEP Meeting

- Update to the Dominion Energy Local Planning Assumptions previously discussed at the December 2019 Sub-Regional RTEP Meeting

Attachment I.A.2

Planning Criteria and Assumptions

- PJM Assumptions Apply
- All analysis and solutions must satisfy
 - NERC TPL standards
 - PJM Planning Criteria in Attachment D & G of PJM Manual 14B
 - [Dominion Energy's Facility Interconnection Requirements](#)
 - Requirements to connect to Dominion's Transmission system
 - Exhibit A – Dominion's FERC 715 Planning Criteria
 - Exhibit C – Generation Interconnection Protection Requirements
 - **Supplemental Project Drivers as Described Below**
- PJM and Dominion validate each other's study results to ensure solutions resolve specific need and create no other harm to system
- Proposed solutions are presented
 - TEAC for facilities 230 kV and above
 - Southern Sub-regional for facilities below 230 kV

Dominion Energy's Form No. 715 End of Life Planning Criteria

- Dominion has an End of Life (EOL) FERC 715 criteria for addressing transmission lines
 - The Infrastructure to be evaluated under this end-of-life criteria are all **regional transmission lines operated at 500 kV and above.**
 - The decision point of this criterion is based on satisfying two metrics:
 - 1) Facility is nearing, or has already passed, its end of life, and
 - 2) Continued operation risks negatively impacting reliability of the transmission system.
 - Projects approved by PJM under this criteria are classified as baseline
 - Detailed discussion on the End of Life criteria can be found in Exhibit A, section C.2.9 of [Dominion Energy's Facility Interconnection Requirements](#) document
 - All other asset management **of** transmission infrastructure is covered by the M-3 Supplemental process
 - The Appendix lists transmission lines expected to be evaluated using the **Form No. 715 and Attachment M-3** End of Life criteria in the 2020 RTEP cycle

Equipment Material Condition, Performance and Risk

Types of equipment assessed include but not limited to:

- **Transmission Lines below 500 kV**
- Line Components (not part of EOL Criteria)
- Transformers
- Breakers
- Circuit Switchers
- Reactors
- Capbanks
- Wave Traps
- Relaying
- Switches
- Bus Work, Leads
- FACTS Devices

Dominion Energy's Attachment M-3 End of Life Planning Criteria

- Infrastructure to be evaluated under this end-of-life criteria are all transmission lines below 500 kV
- Projects must satisfy the following two decision point metrics:
 - 1) Facility is nearing, or has already passed, its end of life, and
 - 2) Continued operation risks negatively impacting reliability of the transmission system, including our ability to serve local load.
- Projects will be classified as supplemental
- The Appendix lists transmission lines expected to be evaluated using the Form No. 715 and Attachment M-3 End of Life criteria in the 2020 RTEP cycle

Appendix: Transmission lines expected to be evaluated using **Form No. 715 and Attachment M-3 End of Life** criteria in 2020 RTEP cycle

Line A	Line B	Line Section	Line A kV	Line B kV	Line A Year	Line B Year
293		Staunton – Valley	230		1981/1971	
1001		Battleboro – Chestnut	115		1959	
1024		Chestnut – South Justice Branch	115		1959	
2019		Greenwich – Thalia	230		1970/1988	
87		Chesapeake Energy Center – Churchland	115		1957	
514		Goose Creek – Doubts	500		1966	
204	220	Gum Springs -Jefferson St, Gum Springs - Ox	230		1966	
579	2110	Septa – Yadkin, Suffolk – Thrasher	500	230	1975	1975
26		Balcony Falls – Lexington	115		1928	
2007		Lynnhaven – Thalia	230		1970	
2049		Chesterfield – Allied	230		1994	

Note: This list covers lines to be evaluated under Dominion's **Form No. 715 and Attachment M-3** End of Life criteria during the 2020 planning cycle. The evaluation could lead to some of these facilities being delayed, cancelled or removed from consideration as well as other facilities added.



Reliability Analysis Update

Transmission Expansion Advisory
Committee
December 13, 2018

Attachment I.A.3

Proposal Window Exclusion Definitions

- The following definitions explain the basis for excluding flowgates and/or projects from the competitive planning process and designating projects to the incumbent Transmission Owner.
- Flowgates/projects excluded from competition will include the underlined language on the corresponding slide.
 - Immediate Need Exclusion: Due to the immediate need of the violation (3 years or less), the timing required for an RTEP proposal window is infeasible. As a result, the local Transmission Owner will be the Designated Entity. - Operating Agreement, Schedule 6 § 1.5.8(m)
 - Below 200kV: Due to the lower voltage level of the identified violation(s), the driver(s) for this project are excluded from the competitive proposal window process. As a result, the local Transmission Owner will be the Designated Entity - Operating Agreement, Schedule 6 § 1.5.8(n)
 - FERC 715 (TO Criteria): Due to the violation need of this project resulting solely from FERC 715 TO Reliability Criteria, the driver(s) for this project are excluded from the competitive proposal window process. As a result, the local Transmission Owner will be the Designated Entity - Operating Agreement, Schedule 6 § 1.5.8(o)
 - Substation Equipment: Due to identification of the limiting element(s) as substation equipment, the driver(s) for this project are excluded from the competitive proposal window process. As a result, the local Transmission Owner will be the Designated Entity - Operating Agreement, Schedule 6 § 1.5.8(p)



2018 RTEP Analysis Update



Dominion End of Life Criteria



Dominion Transmission Zone: Baseline Line #224 Lanexa to Northern Neck Rebuild

Baseline Reliability: TO Criteria Violation

Problem Statement: Dominion “End of Life Criteria”

The 41 mile long Line #224 between Lanexa and Northern Neck was constructed in 1969 on predominately wood H-frames along with 32 weathering steel lattice towers. The existing summer emergency rating is 386 MVA.

Industry guidelines indicate equipment life for wood structures is 35-55 years, steel structures is 40 to 60 years, conductor and connectors is 40-60 years, and porcelain insulators is 50 years.

The 224 Line provides network transmission service to Dunnsville Substation which serves over 7500 customers including over 4650 Co-op customers at Howerton DP (REC).

Permanent removal of the 224 Line results in over 300MW load loss for a N-1-1 condition (loss of the 65 Line and the 2083 Line (Fredericksburg to Birchwood)).

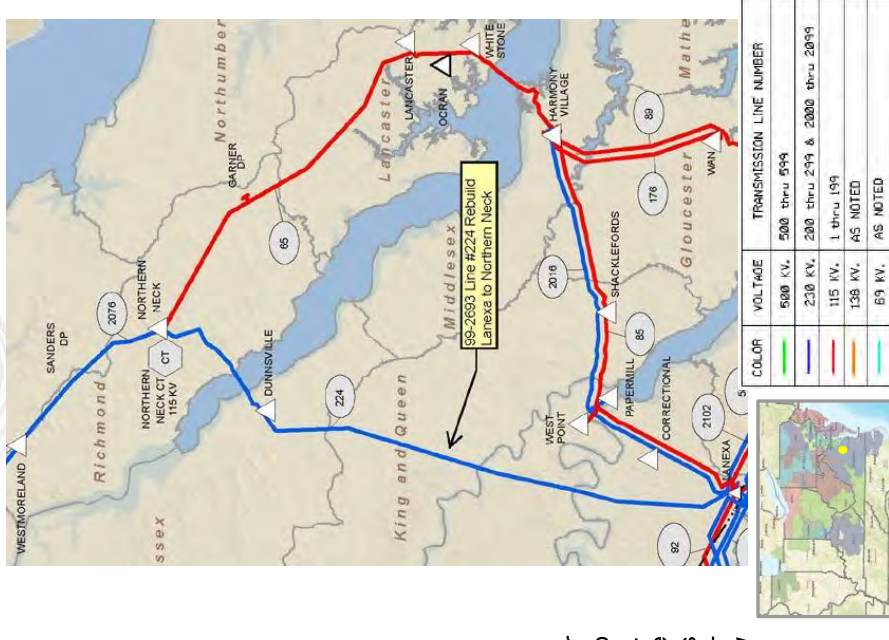
21

Recommended Solution:

Rebuild Line #224 between Lanexa and Northern Neck utilizing double circuit structures to current 230kV standards. Only one circuit is to be installed on the structures with this project with a minimum summer emergency rating of 1047 MVA. **(b3089)**

Rebuilding Line #224 with double circuit structures will prepare for a future project to resolve a N-1-1 300 MW load loss issue for the loss of the two 230kV sources into Northern Neck. Presently the 65 Line will be opened at Northern Neck between events to resolve thermal and voltage issues that occur when attempting to feed the 230kV from this 115kV line after the second event. VDOT maintenance on the White Stone Bridge across the Rappahannock River continues to require outages on the segment of the attached 65 Line due to delays to the project to remove it from the bridge attachments (b2505). These VDOT maintenance outages hamper the ability to resolve the N-1-1 issues and results in over 300MW load loss beginning in 2019 without the 65 Line river crossing in service. Even with the river crossing in service the load served from the 230kV lines is expected to exceed 300MW within the life expectancy of the rebuilt 224 Line.

Continued on next slide...





Dominion Transmission Zone: Baseline Line #224 Lanexa to Northern Neck Rebuild

Continued from previous slide...

Alternative: Rebuild Line #224 utilizing 230kV single circuit structures - \$56.5M.

Estimated Project Cost: \$86 M

Required In-service Date: Immediate Need

Projected In-service Date: 12/31/2023

Project Status: Conceptual





Transmission Expansion Advisory Committee (TEAC) Recommendations to the PJM Board

PJM Staff Whitepaper
Feb. 2019

For Public Use



Executive Summary

On December 5, 2018, the PJM Board of Managers approved changes to the Regional Transmission Expansion Plan (RTEP), totaling \$166.1 million, primarily to resolve baseline reliability criteria violations.

Since then, PJM has identified additional baseline reliability criteria violations and the transmission system enhancements needed to solve them, at an estimated cost of \$466.8 million. In addition, 21 previously approved baseline projects have been canceled resulting in a net cost decrease of \$309.33 million. Scope changes to existing projects will result in a net increase of \$114.45. This yields an overall RTEP net increase of \$271.92 million for which PJM is recommending Board approval. With these changes, RTEP projects will total \$38,505.16 million since the first Board approvals in 2000.

PJM seeks Board Reliability Committee consideration and full Board approval of the additional RTEP baseline projects summarized in this white paper.



FERC Form No. 715 Transmission Owner Criteria driven enhancements

Dominion Transmission Zone:

- Install a second 500-230 kV Transformer at Possum Point substation; replace 19 - 230kV breakers at Possum Point: \$40 million
- Rebuild Loudoun-Elklick 230 kV line: \$13.5 million
- Rebuild Elklick–Bull Run and Clifton–Walney 230 kV lines: \$15.5 million
- Rebuild 4.75 mile section of Lexington-Rockbridge 115 kV line: \$8 million
- Rebuild Lanexa-Northern Neck 230 kV line utilizing double circuit structures at current 230kV standards. Only one circuit is to be installed on the structures with this project with a minimum summer emergency rating of 1047 MVA: \$86 million
- Convert the overhead portion (approx. 1,500 Feet) of North Potomac Yards-Glebe 230 kV Lines to underground and convert Glebe 230 kV substation to gas insulated design: \$120 million

AEP Transmission Zone:

- Rebuild New Liberty–Findlay 34kV line structures 1 through 37 (1.5 miles); rebuild New Liberty–North Baltimore 34kV line structures 1 through 11 (0.5 miles); rebuild West Melrose–Whirlpool 34kV line structures 55 through 80 (1 mile); North Findlay substation: install one 138kV breaker and circuit switcher; Ebersole substation: Install second 138/69/34kV Transformer. Install two low side circuit breakers for transformers No. 1 and No. 2. 69kV 2000A 40kA: \$13 million
- Construct a new greenfield substation named Kewanee, to the west (~1.5 mi.) of the existing Fords Branch substation. This substation will consist of six 40kA 138 kV breakers in a ring arrangement, two 30 MVA 138/34.5 kV transformers, and two 30 MVA 138/12 kV transformers. The existing Fords Branch substation will be retired. Construct approximately 5 miles of new double circuit 138 kV line in order to loop the new Kewanee substation into the existing Beaver Creek–Cedar Creek 138 kV line. Remote end work will be required at Cedar Creek substation: \$23.3 million
- Rebuild Lakin – Racine Tap 69 kV line section (9.2 miles) to 69 kV standards: \$ 23.9 million

PJM is also recommending sixteen projects totaling \$29.9 million that include breaker replacements, line reconductoring and terminal equipment work whose individual cost estimates are less than \$5 million each.

A more detailed description of the larger-scope projects that PJM is recommending to the Board is provided below: Descriptions include criteria driving project need and required in-service date.



Dominion Transmission Zone End-of-life 230 kV Line Rebuilds

Baseline Projects b3059, b3060, b3089

Three 230 kV lines in the Dominion Transmission zone are at a point that they violate Dominion's FERC Form No. 715 filed "End of Life Criteria", Section C.2.9 regarding age and facility condition, including towers:

1. Loudoun-Elklick 230 kV Line
2. Elklick-Bull Run 230 kV Line
3. Lanexa-Northern Neck 230 kV line

The lines were built in the 1960s using Cor-Ten lattice and wood H-frame towers and now exhibit a number of aging issues that violate Dominion criteria.

Lanexa-Northern Neck 230 kV Line

The current state of this 41 mile long line - shown on **Map 6** - violates industry guidelines: equipment life for wood structures is 35-55 years, for steel structures is 40 to 60 years, for conductor and connectors is 40-60 years, and for porcelain insulators is 50 years. The line provides network transmission service to over 7,500 customers at Dunnsville substation, including over 4,650 Co-op customers at Howerton. Removing the line causes over 300 MW load loss under N-1-1 conditions.

Recommended solution – Baseline Project b3089: Rebuild Lanexa-Northern Neck line utilizing double circuit structures to current 230kV standards, stringing only one side of the towers. This project is estimated to cost \$86 million. The local transmission owner, Dominion, will be designated to complete this work.

Map 6: Lanexa-Northern Neck 230 kV line





Reliability Analysis Update

Aaron Berner, Manager

Transmission Expansion Advisory Committee
September 1, 2020

Attachment I.A.5



First Review

Baseline Reliability Projects



Dominion Transmission Zone: Baseline

Northern Neck Area

Process Stage: First Review

Criteria: Winter N-1-1 Thermal & Voltage, 300 MW Load Loss

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP winter case

Proposal Window Exclusion: Immediate Need

Problem Statement:

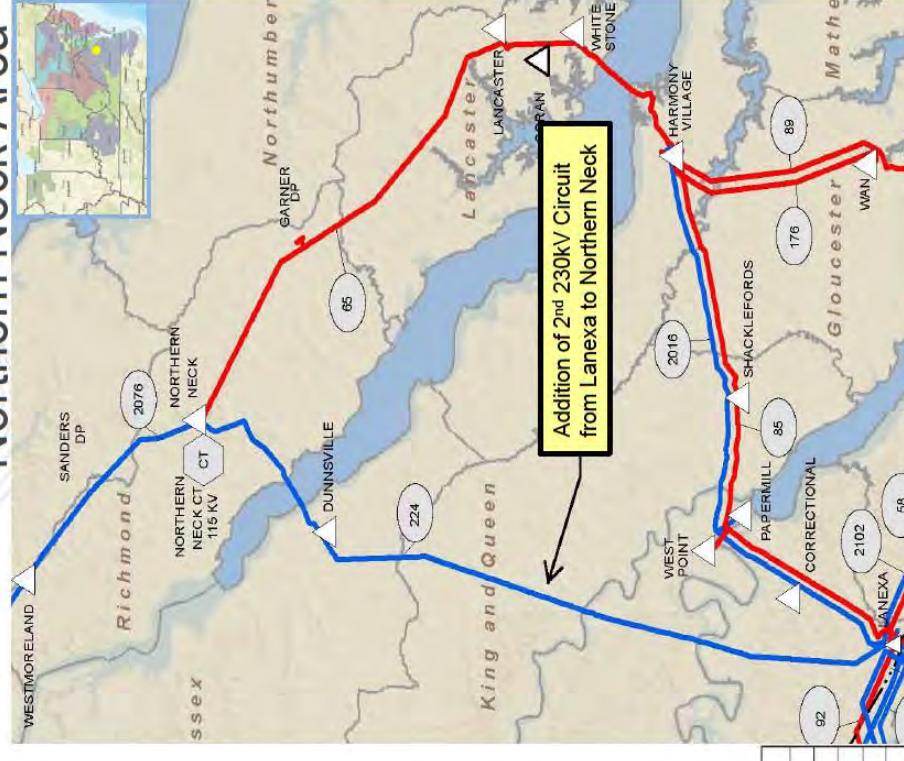
- Various voltage magnitude and drop violations in the Northern Neck area for the loss of 230kV Line #224 Lanexa – Northern Neck and 230kV Line #2145 Birchwood – Dahlgren. (N2-WVM28-N2-WVM63, N2-WVD1-N2-WVD60).

30

- Overload of 115kV Lines Rappahannock – Whitestone and Harmony Village – Greys Point for the loss of 230kV Line #224 Lanexa – Northern Neck and 230kV Line #2145 Birchwood – Dahlgren. (N2-WT9-N2-WT12)

- Continued use of operating procedure to open 115kV Line 65 at Northern Neck end to accommodate outages on one of the two 230 kV feeds into Northern Neck to mitigate thermal overloads on Line 65 and also to help control & mitigate voltage issues when either of the 230kV feeds are out going to the Northern Neck area results in a PJM planning criteria violation of dropping over 300 MW in the 2022/2023 timeframe based on the 2020 PJM load forecast.

Continued on next slide...



Dominion Transmission Zone: Baseline

Northern Neck Area

Proposed Solution:

Install a 2nd 230kV circuit with a minimum summer emergency rating of 1047 MVA between Lanexa and Northern Neck Substations. The 2nd circuit will utilize the vacant arms on the double-circuit structures that are being installed on the Line #224 (Lanexa-Northern Neck) End-of-Life rebuild project (b3089). The Northern Neck terminal will be expanded from a 230kV, 4-breaker ring bus to a 6-breaker ring bus while the Lanexa terminal will be expanded from a 6-breaker ring bus to a breaker-and-a-half arrangement.

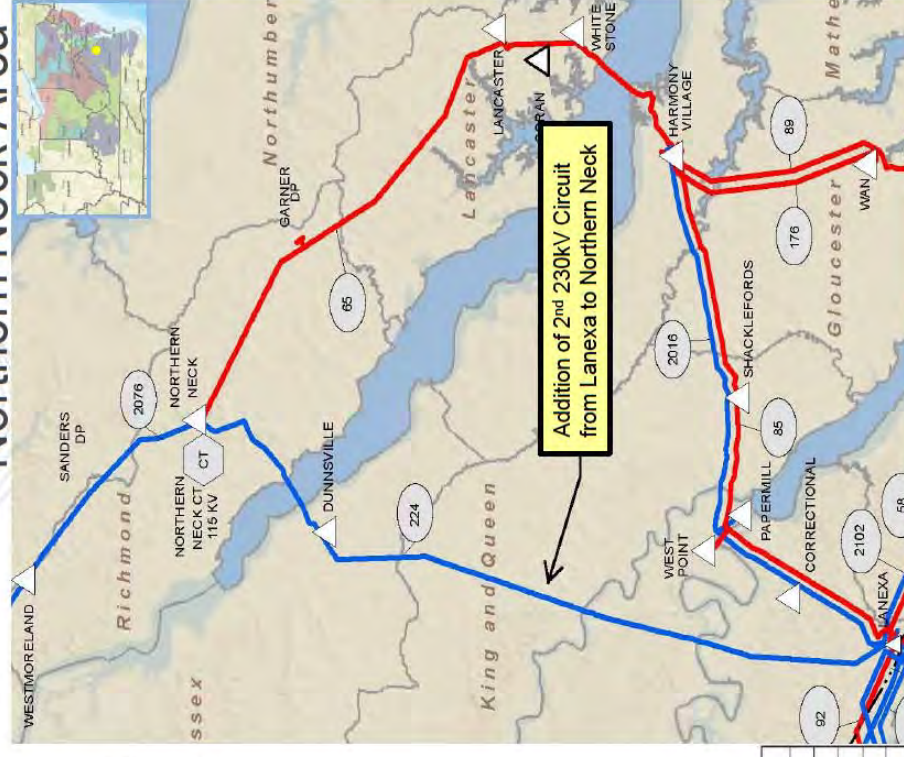
Estimated Cost: \$23.0 M

- New 230 kV Circuit: \$14.0 M
- Northern Neck Substation work: \$ 5.0 M
- Lanexa Substation work: \$ 4.0 M

31

Alternatives: N/A

Required In-Service: 6/1/2023



COLOR	VOLTAGE	TRANSMISSION LINE NUMBER
Green	500 kV	500 thru 599
Blue	230 kV	200 thru 299 & 2000 thru 2999
Red	115 kV	1 thru 199
Orange	138 kV	AS NOTED
Yellow	69 kV	AS NOTED



Reliability Analysis Update

Aaron Berner, Manager

Transmission Expansion Advisory Committee

October 6, 2020

Attachment I.A.6



Recommended Solution Baseline Reliability Projects



Dominion Transmission Zone: Baseline

Northern Neck Area

Process Stage: Second Review

Criteria: Winter N-1-1 Thermal & Voltage, 300 MW Load Loss

Assumption Reference: 2025 RTEP assumption

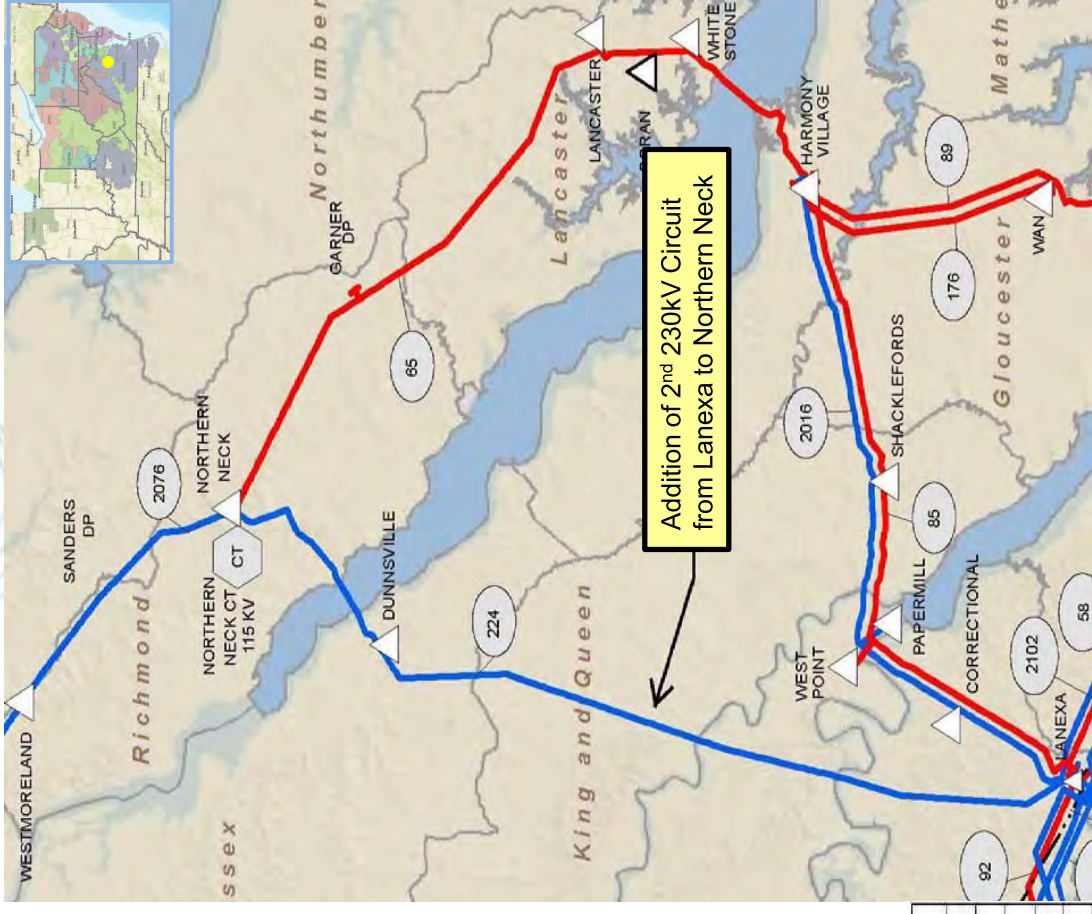
Model Used for Analysis: 2025 RTEP winter case

Proposal Window Exclusion: Immediate Need

Problem Statement:

- Various voltage magnitude and drop violations in the Northern Neck area for the loss of 230kv Line #224 Lanexa – Northern Neck and 230kv Line #2145 Birchwood – Dahlgren. (N2-WVM28-N2-WVM63, N2-WVD1-N2-WVD60).
- Overload of 115kv Lines Rappahannock – Whitestone and Harmony Village – Greys Point for the loss of 230kv Line #224 Lanexa – Northern Neck and 230kv Line #2145 Birchwood – Dahlgren. (N2-WT9-N2-WT12)
- Continued use of operating procedure to open 115kv Line 65 at Northern Neck end to accommodate outages on one of the two 230 kV feeds into Northern Neck to mitigate thermal overloads on Line 65 and also to help control & mitigate voltage issues when either of the 230kV feeds are out going to the Northern Neck area results in a PJM planning criteria violation of dropping over 300 MW in the 2022/2023 timeframe based on the 2020 PJM load forecast.

Continued on next slide...



COLOR	VOLTAGE	TRANSMISSION LINE NUMBER
Green	500 kV.	500 thru 599
Blue	230 kV.	200 thru 299 & 2000 thru 2099
Red	115 kV.	1 thru 199
Orange	138 kV.	AS NOTED
Teal	69 kV.	AS NOTED



Dominion Transmission Zone: Baseline

Northern Neck Area

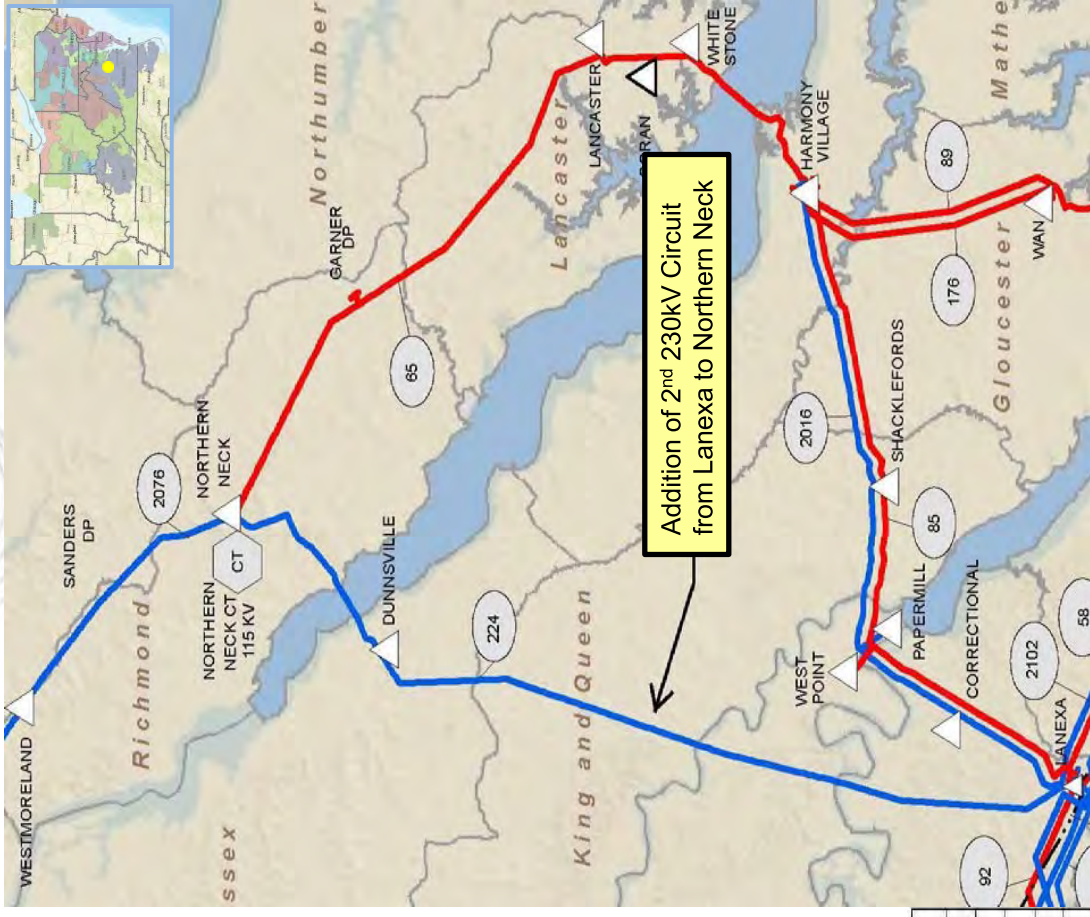
Recommended Solution:

Install a 2nd 230kV circuit with a minimum summer emergency rating of 1047 MVA between Lanexa and Northern Neck Substations. The 2nd circuit will utilize the vacant arms on the double-circuit structures that are being installed on the Line #224 (Lanexa-Northern Neck) End-of-Life rebuild project (b3089). The Northern Neck terminal will be expanded from a 230kV, 4-breaker ring bus to a 6-breaker ring bus while the Lanexa terminal will be expanded from a 6-breaker ring bus to a breaker-and-a-half arrangement.

Estimated Cost: \$23.0 M

- New 230 kV Circuit: \$14.0 M (b3223.1)
- Northern Neck Substation work: \$ 5.0 M (b3223.2)
- Lanexa Substation work: \$ 4.0 M (b3223.3)

Required In-Service: 6/1/2023



COLOR	VOLTAGE	TRANSMISSION LINE NUMBER
Green	500 KV.	500 thru 599
Blue	230 KV.	200 thru 299 & 2000 thru 2099
Red	115 KV.	1 thru 199
Orange	138 KV.	AS NOTED
Light Blue	69 KV.	AS NOTED

I. NECESSITY FOR THE PROPOSED PROJECT

- B. [1] Detail the engineering justifications for the proposed project (for example, provide narrative to support whether the proposed project is necessary to upgrade or replace an existing facility, to significantly increase system reliability, to connect a new generating station to the Applicant's system, etc.). [2] Describe any known future project(s), including but not limited to generation, transmission, delivery point or retail customer projects, that require the proposed project to be constructed. [3] Verify that the planning studies used to justify the need for the proposed project considered all other generation and transmission facilities impacting the affected load area, including generation and transmission facilities that have not yet been placed into service. [4] Provide a list of those facilities that are not yet in service.**

Response: [1] For a detailed description of the engineering justification for the Project, see Section I.A.

[2] The Project is necessary to rebuild Lanexa-Northern Neck Line #224 nearing its end of life, as well as resolve potential violations of NERC Reliability Standards with the installation of new Line #2208, as discussed in Section I.A. For approximately 3.0 miles along Line #224, Line #2208 will be collocated with new double circuit structures already approved by the Commission as part of the Partial Rebuild Project, which is currently under construction.¹³ There are no other future projects that require the proposed Project to be constructed. However, the Company is currently considering future solutions for the served distribution area.¹⁴

[3] See Section I.D.

[4] Not applicable.

¹³ See, *supra*, n. 1.

¹⁴ See, *supra*, n. 2.

I. NECESSITY FOR THE PROPOSED PROJECT

- C. Describe the present system and detail how the proposed project will effectively satisfy present and projected future electrical load demand requirements. Provide pertinent load growth data (at least five years of historical summer and winter peak demands and ten years of projected summer and winter peak loads where applicable). Provide all assumptions inherent within the projected data and describe why the existing system cannot adequately serve the needs of the Applicant (if that is the case). Indicate the date by which the existing system is projected to be inadequate.**

Response: Attachment I.G.1 shows the portion of the Company's existing transmission system in the area of the Project. The existing Line #224 is part of the Company's 230 kV network, which supports the delivery of generation to retail and wholesale customers.

Northern Neck Load Area

Line #224 is located in the Northern Neck load area, which, for purposes of this Appendix, is loosely defined as the area fed from the three transmission sources that terminate at the Company's Northern Neck Substation. These transmission sources, originating from Fredericksburg, Lanexa, and Harmony Village Substations, and the direct-connected loads they serve are described below.

Transmission Sources

Fredericksburg Substation

From the northwest, beginning at Fredericksburg Substation, a series of 230 kV lines (Lines #2083, #2145, and #2076) travel approximately 78.6 line-miles to Northern Neck Substation.

Birchwood-Fredericksburg Line #2083 travels a total length of approximately 15.3 miles between the Company's Fredericksburg Substation and the Birchwood Non-Utility Generator ("NUG") Substation. It presently has no direct-connected load; however, the Company's future Fines Corner Substation will be located near structure 2083/86, approximately 7.4 line-miles from Fredericksburg and 7.9 line-miles from Birchwood. The Fines Corner Substation was proposed to be in-service by May 15, 2020 but the target date has been pushed out indefinitely by the Company's Distribution Planning group.

At Birchwood NUG, Line #2083 terminates into a 230 kV straight-bus that also serves as the terminus for Line #2145 (Birchwood NUG-Dahlgren) and is the interconnection point for the 198 MVA Birchwood Generator. From Birchwood NUG, Line #2145 travels a total length of approximately 19.8 miles to the Company's Dahlgren Substation. There are two direct-connected loads on Line #2145 – Northern Neck Electric Cooperative's ("NNEC") Comorn DP and the Company's Arnold's Corner Substation.

The NNEC Comorn DP is located approximately 6.2 line-miles from Birchwood NUG and serves approximately 1,311 customers, while the Company's Arnold's Corner Substation is located approximately 7.7 line-miles from Birchwood NUG and serves approximately 6,067 customers, which includes approximately 896 cooperative customers.

At Dahlgren Substation, Line #2145 terminates into a 230 kV, four-breaker ring bus that also serves as the terminus for Line #2076 (Dahlgren-Northern Neck). There are also two 56 MVA, 230-34.5 kV distribution transformers fed from the ring bus that serve approximately 2,626 customers via three 34.5 kV distribution circuits.

Line #2076 leaves Dahlgren and travels a total length of approximately 43.5 miles to the Company's Northern Neck Substation. There are three direct-connected loads on Line #2076 – the Company's Oak Grove and Westmoreland Substations and NNEC's Sanders DP.

Oak Grove Substation is located approximately 20.0 line-miles from Dahlgren and serves approximately 7706 customers, which includes approximately 2,842 cooperative customers. Westmoreland Substation is located approximately 31.3 line-miles from Dahlgren and serves approximately 2,924 customers. NNEC's Sanders DP is located approximately 38.8 line-miles from Dahlgren and serves approximately 5,098 customers.

Lanexa Substation

From the southwest, 230 kV Line #224 travels approximately 41.3 line-miles from Lanexa Substation to Northern Neck.

Line #224 travels a total length of approximately 41.3 miles between the Company's Lanexa and Northern Neck Substations. There is one direct-connected load on Line #224—the Company's Dunnsville Substation—which is located approximately 31.5 line-miles from Lanexa and serves approximately 7,568 customers, which includes approximately 4,701 REC customers.

Harmony Village Substation

From the southeast, 115 kV Line #65 travels approximately 36.7 line-miles from Harmony Village to Northern Neck.

Presently, Harmony Village-Northern Neck Line #65 travels a total length of approximately 36.7 miles between the Company's Harmony Village and Northern Neck Substations; however, with the completion of the Norris Bridge River Crossing project (which will install approximately 2.4 miles of line under the Rappahannock River between Grey's Point and Rappahannock Terminal Stations), the 6.3-mile segment of Line #65 between Harmony Village Substation and Rappahannock Terminal Station will become Line #1021. The approximately

30.4 miles between Rappahannock Terminal Station and Northern Neck Substation will remain Line #65. There are four direct-connected loads on Line #65—the Company’s White Stone, Ocran, and Lancaster Substations and NNEC’s Garner DP.

White Stone Substation is located approximately 1.0 line-mile from the Rappahannock Switching Station and serves approximately 1708 customers. Ocran Substation is located approximately 2.3 line-miles from Rappahannock Switching Station and serves approximately 2,492 customers, while Lancaster Substation is located approximately 5.3 line-miles from Rappahannock Switching Station and serves approximately 6,662 customers, including approximately 413 cooperative customers. NNEC’s Garner DP is located approximately 20.2 line-miles from Rappahannock Switching Station and serves approximately 6,179 customers.

Transmission Termination

Northern Neck Substation

At Northern Neck Substation, Line #2076 from Dahlgren and Line #224 from Lanexa terminate into a 230 kV, four-breaker ring bus while Line #65 terminates into a 115 kV straight bus. There are also two 168 MVA, 230-115 kV transformers (a 3-phase unit and a bank of four single-phase units – three active and a spare) that are sourced from the 230 kV ring bus and terminate into 115 kV straight buses. There are also two 115-34.5 kV distribution transformers (a 20 MVA unit and a 33.6 MVA unit) that serve approximately 7,571 customers, including approximately 2104 co-op customers. In addition to the three transmission sources, there are four combustion turbines (“CTs”) with a combined total summer capacity of 47 MW and total winter capacity of 63 MW. The Northern Neck CTs started commercial operation in July 1971 and are projected to retire in 2022.

Historical and Projected Load

The tables in Attachments I.C.1-4 provide historical and projected summer and winter system peak loads (in MW) for the Northern Neck load area described above, including the Area Total, the Line #65 Total, and the 230 kV Load Total. Specifically, Attachments I.C.1 and I.C.3 show the historical peak summer and winter loads, respectively, and Attachments I.C.2 and I.C.4 show the projected peak summer and winter loads, respectively. The projected loads in Attachments I.C.2 and I.C.4 represent the Company’s forecasted peak based on actual load and the PJM 2020 Load Forecast. Over the period from 2020 to 2030, the summer peak electrical demand for the area is projected to grow from 271.1 MW to 333.1 MW, and the winter peak electrical demand for the area is projected to increase from 402.1 MW to 510.8 MW.

The Existing System is Inadequate

Line #224 is one of the two primary 230 kV sources to deliver power reliably to Northern Neck load area customers and is an important source to the 115 kV Northern Neck-Harmony Village Line #65. If Line #224 is modeled as out of service as a base case, an N-1-1 contingency with loss of Line #2083 (Birchwood-Fredericksburg) and Line #65 (Harmony Village-Northern Neck) results in a consequential load loss of approximately 465 MW based on PJM's 2020 Load Forecast for the winter of 2025, as shown in Attachment I.C.4. This exceeds the Company's 300 MW load loss limit and, in addition to violating the Company's Radial Transmission Line criteria by exceeding the 700 MW/mile criteria limit, as discussed in Section I.A, further supports the need to rebuild the full length of Line #224.

The Project proposes to rebuild Line #224 utilizing double circuit structures in order to support new Line #2208. PJM's 2020 Load Forecast has shown a 300 MW load loss violation in the 2022/2023 timeframe as well as violations seen in 2025. See Section I.A. Due to the limited number of transmission lines in the area, operating procedure requires Line #65 to be opened from Northern Neck Substation whenever there is a loss of 230 kV line in the area in order to continue to serve the loads on Line #65 reliably. The results of PJM's winter 2025 RTEP N-1-1 analysis show that, without utilizing the operating procedure described above, both thermal and voltage violations will occur for the loss of both 230 kV sources into the Northern Neck Area in 2025; however, continued use of the operating procedure to mitigate thermal and voltage issues on Line #65 will result in a potential PJM planning criteria violation of dropping over 300 MW in the 2022/2023 timeframe based on the 2020 PJM load forecast. From the winter projections shown in Attachment I.C.4, it can be seen that the total Northern Neck Area Load in winter 2022/23 is 436.2 MW, with 130.6 MW from stations directly connected to Line #65 and the remaining 305.6 MW from stations directly connected to the 230 kV sources into Northern Neck from Fredericksburg and Lanexa.

The existing Line #224 cannot continue to adequately serve the needs of the Company and its customers because of aging infrastructure, as discussed in Section I.A. Further, based on current load projections, the system is projected to be inadequate by the 2022/2023 timeframe because of a potential 300 MW violation. The Company has proposed the Project to resolve this violation, as well as to address its end-of-life facilities, in order to maintain the structural integrity and reliability of its transmission system.

Attachment I.C.1 – Northern Neck Load Area – Historical Summer Loads

	E	F	G	H	K	N	Q	T
89	SUMMER LOADS							
90				6/23/2015	7/25/2016	7/14/2017	7/2/2018	7/20/2019
91	Source			MW	MW	MW	MW	MW
92	2076/2145	Dahlgren #1		2.6	7.8	7.7	7.4	8.1
93	2076/2145	Dahlgren #2		18.5	25.3	25.0	25.0	23.6
94	65	Ocran #1		10.7	11.2	11.2	11.2	12.1
95	2145	Arnolds Corner #1		24.8	26.3	26.3	25.6	18.2
96	2145	Arnolds Corner #2		5.6	3.5	3.2	3.2	3.7
97	2076	Oak Grove #1		18.4	14.5	14.2	14.4	16.2
98	2076	Oak Grove #2		14.3	11.8	11.7	11.6	12.8
99	224	Dunnsville #1		15.4	14.9	16.3	16.6	12.7
100	224	Dunnsville #2		14.5	15.9	20.5	20.3	16.6
101	65	Garner DP		0.0	8.3	8.4	8.5	9.0
102	65	Garner #2 DP		17.7	11.0	16.1	11.2	12.1
103	2145	Comorn DP		4.9	5.3	5.1	5.1	5.7
104	65	Lancaster #1		6.5	6.4	6.7	6.3	6.0
105	65	Lancaster #2		14.7	13.3	17.2	13.9	14.5
106	65	Lancaster #3		12.3	12.5	10.6	10.2	10.4
107	65	Northern Neck #1		12.7	13.1	12.7	12.5	12.3
108	224/2076	Northern Neck #2		22.9	24.6	21.6	23.5	22.8
109	2076	Sanders DP		16.0	17.4	12.6	17.2	18.6
110	2076	Westmoreland #1		13.9	13.9	14.0	13.5	13.9
111	65	Whitestone #1		7.3	7.8	7.7	7.8	8.3
112	2083	Fines Corner #1						
113		AREA TOTAL (MW)		253.6	264.6	268.9	265.0	257.6
114		Line 65 Total (MW)		81.9	83.6	90.6	81.5	84.7
115		230kV Load Total (MW)		171.8	181.1	178.3	183.5	172.9

Attachment I.C.2 – Northern Neck Load Area – Summer Projections

	E	F	G	W	Z	AC	AF	AI	AL	AO	AR	AU	AX	BA
89	SUMMER LOADS													
90				2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
91	Source			MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW
92	2076/2145		Dahlgren #1	8.5	8.8	9.0	9.3	9.6	9.7	9.9	10.1	10.2	10.4	10.5
93	2076/2145		Dahlgren #2	24.8	25.6	26.2	26.9	27.8	28.3	28.8	29.2	29.6	30.1	30.5
94	65		Ocran #1	12.7	13.1	13.4	13.8	14.2	14.5	14.7	15.0	15.2	15.4	15.6
95	2145		Arnolds Corner #1	19.2	19.7	20.2	20.8	21.5	21.9	22.2	22.6	22.9	23.3	23.5
96	2145		Arnolds Corner #2	3.9	4.0	4.1	4.3	4.4	4.5	4.5	4.6	4.7	4.8	4.8
97	2076		Oak Grove #1	17.0	17.5	18.0	18.5	19.1	19.4	19.7	20.0	20.3	20.7	20.9
98	2076		Oak Grove #2	13.5	13.9	14.2	14.6	15.1	15.4	15.6	15.8	16.1	16.3	16.5
99	224		Dunnsville #1	13.4	13.8	14.1	14.5	15.0	15.3	15.5	15.7	16.0	16.2	16.4
100	224		Dunnsville #2	17.5	18.0	18.5	19.0	19.6	20.0	20.3	20.6	20.9	21.2	21.5
101	65		Garner DP	9.5	9.8	10.0	10.3	10.6	10.9	11.0	11.2	11.3	11.5	11.7
102	65		Garner #2 DP	12.7	14.1	14.4	14.8	15.3	15.6	15.8	16.1	16.3	16.6	16.8
103	2145		Comorn DP	6.0	6.1	6.3	6.5	6.7	6.8	6.9	7.0	7.1	7.2	7.3
104	65		Lancaster #1	6.3	6.5	6.7	6.9	7.1	7.2	7.3	7.5	7.6	7.7	7.8
105	65		Lancaster #2	15.3	14.8	15.1	15.5	16.1	16.4	16.6	16.9	17.1	17.4	17.6
106	65		Lancaster #3	11.0	11.3	11.6	11.9	12.3	12.6	12.7	12.9	13.1	13.3	13.5
107	65		Northern Neck #1	12.9	13.3	13.6	14.0	14.4	14.7	15.0	15.2	15.4	15.7	15.8
108	224/2076		Northern Neck #2	24.0	24.7	25.3	26.0	26.8	27.4	27.8	28.2	28.6	29.1	29.4
109	2076		Sanders DP	19.6	20.2	20.7	21.3	22.0	22.4	22.7	23.1	23.4	23.8	24.1
110	2076		Westmoreland #1	14.7	15.1	15.5	15.9	16.4	16.7	17.0	17.3	17.5	17.8	18.0
111	65		Whitestone #1	8.7	9.0	9.2	9.4	9.7	9.9	10.1	10.2	10.4	10.6	10.7
112	2083		Fines Corner #1											
113			AREA TOTAL (MW)	271.1	279.3	285.9	294.2	303.7	309.6	314.4	319.2	323.6	329.0	333.1
114			Line 65 Total (MW)	89.1	91.8	94.0	96.7	99.8	101.8	103.3	104.9	106.4	108.2	109.5
115			230kV Load Total (MW)	182.0	187.5	191.9	197.5	203.9	207.8	211.0	214.3	217.2	220.9	223.6

*Projected values are based on the PJM 2020 Load Forecast

Attachment I.C.3 – Northern Neck Load Area – Historical Winter Loads

	E	F	G	H	K	N	Q	T
118	WINTER LOADS			14/15	15/16	16/17	17/18	18/19
119				2/20/2015	1/19/2016	1/9/2017	1/7/2018	1/31/2019
120	Source			MW	MW	MW	MW	MW
121	2076/2145	Dahlgren #1		5.7	10.4	10.6	12.7	12.3
122	2076/2145	Dahlgren #2		17.4	25.7	24.1	24.4	26.3
123	65	Ocran #1		19.6	15.5	16.4	20.5	16.3
124	2145	Arnolds Corner #1		43.9	34.6	36.4	40.9	35.2
125	2145	Arnolds Corner #2		11.2	5.4	5.5	6.6	6.1
126	2076	Oak Grove #1		32.5	19.4	21.6	27.6	23.0
127	2076	Oak Grove #2		25.5	17.8	18.4	22.6	19.9
128	224	Dunnsville #1		25.8	22.8	23.6	24.5	22.2
129	224	Dunnsville #2		29.2	22.7	27.5	32.6	24.3
130	65	Garner DP		0.0	10.1	11.7	15.7	11.6
131	65	Garner #2 DP		31.5	13.6	9.2	16.9	11.3
132	2145	Comorn DP		9.9	7.5	8.3	10.1	9.0
133	65	Lancaster #1		9.8	8.0	8.7	9.8	8.6
134	65	Lancaster #2		18.7	15.0	18.2	21.7	17.9
135	65	Lancaster #3		21.0	16.9	15.9	17.6	14.5
136	65	Northern Neck #1		21.0	17.5	18.7	20.8	18.0
137	224/2076	Northern Neck #2		30.6	29.6	37.9	33.7	30.7
138	2076	Sanders DP		28.8	22.8	22.5	28.1	24.6
139	2076	Westmoreland #1		28.3	18.5	11.5	20.9	19.7
140	65	Whitestone #1		12.5	10.1	9.5	12.7	10.1
141	2083	Fines Corner #1		0.0				
142		AREA TOTAL (MW)		422.7	343.6	356.2	420.3	361.7
143		Line 65 Total (MW)		134.1	106.5	108.3	135.7	108.3
144		230kV Load Total (MW)		288.7	237.1	247.9	284.6	253.4

Attachment I.C.4 – Northern Neck Load Area – Winter Projections

	E	F	G	W	Z	AC	AF	AI	AL	AO	AR	AU	AX	BA
118	WINTER LOADS													
119				19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27	27/28	28/29	29/30
120	Source			MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW
121	2076/2145		Dahlgren #1	13.7	14.0	14.4	14.8	15.4	15.8	16.2	16.5	16.8	17.1	17.4
122	2076/2145		Dahlgren #2	29.3	30.0	30.8	31.7	32.9	33.9	34.7	35.3	35.9	36.6	37.2
123	65		Ocran #1	18.2	18.6	19.1	19.7	20.4	21.0	21.5	21.9	22.3	22.7	23.1
124	2145		Arnolds Corner #1	39.1	40.1	41.1	42.4	43.9	45.3	46.3	47.2	48.0	48.9	49.7
125	2145		Arnolds Corner #2	6.8	7.0	7.2	7.4	7.7	7.9	8.1	8.3	8.4	8.5	8.7
126	2076		Oak Grove #1	25.6	26.3	26.9	27.8	28.8	29.7	30.4	30.9	31.4	32.0	32.5
127	2076		Oak Grove #2	22.1	22.7	23.3	24.0	24.8	25.6	26.2	26.7	27.2	27.7	28.1
128	224		Dunnsville #1	24.6	25.3	25.9	26.7	27.7	28.5	29.2	29.8	30.3	30.8	31.3
129	224		Dunnsville #2	27.0	27.7	28.4	29.3	30.3	31.3	32.0	32.6	33.1	33.8	34.3
130	65		Garner DP	12.9	13.2	13.6	14.0	14.5	15.0	15.3	15.6	15.9	16.2	16.4
131	65		Garner #2 DP	12.5	13.8	14.2	14.6	15.2	15.6	16.0	16.3	16.6	16.9	17.2
132	2145		Comorn DP	10.0	10.3	10.6	10.9	11.3	11.6	11.9	12.1	12.3	12.6	12.8
133	65		Lancaster #1	9.5	9.8	10.0	10.4	10.7	11.1	11.3	11.5	11.7	11.9	12.1
134	65		Lancaster #2	19.9	19.4	19.9	20.6	21.3	21.9	22.5	22.9	23.3	23.7	24.1
135	65		Lancaster #3	16.1	16.5	17.0	17.5	18.1	18.7	19.1	19.5	19.8	20.2	20.5
136	65		Northern Neck #1	20.0	20.5	21.0	21.6	22.4	23.1	23.6	24.1	24.5	25.0	25.4
137	224/2076		Northern Neck #2	34.2	35.0	35.9	37.0	38.4	39.6	40.5	41.3	41.9	42.7	43.4
138	2076		Sanders DP	27.4	28.1	28.8	29.7	30.8	31.7	32.5	33.1	33.6	34.3	34.8
139	2076		Westmoreland #1	21.9	22.5	23.1	23.8	24.6	25.4	26.0	26.5	26.9	27.5	27.9
140	65		Whitestone #1	11.2	11.5	11.8	12.2	12.6	13.0	13.3	13.5	13.8	14.0	14.2
141	2083		Fines Corner #1											
142			AREA TOTAL (MW)	402.1	412.2	423.0	436.2	451.6	465.7	476.5	485.7	493.7	503.0	510.8
143			Line 65 Total (MW)	120.3	123.4	126.6	130.6	135.2	139.4	142.6	145.4	147.8	150.6	152.9
144			230kV Load Total (MW)	281.8	288.8	296.4	305.6	316.5	326.3	333.9	340.4	346.0	352.5	357.9

*Projected values are based on the PJM 2020 Load Forecast

I. NECESSITY FOR THE PROPOSED PROJECT

- D. If power flow modeling indicates that the existing system is, or will at some future time be, inadequate under certain contingency situations, provide a list of all these contingencies and the associated violations. Describe the critical contingencies including the affected elements and the year and season when the violation(s) is first noted in the planning studies. Provide the applicable computer screenshots of single-line diagrams from power flow simulations depicting the circuits and substations experiencing thermal overloads and voltage violations during the critical contingencies described above.**

Response: See Attachment I.D.1 for a summary of PJM's 2025 RTEP contingency analysis results where thermal and voltage violations in the Northern Neck Area have been identified for various N-1-1 contingencies. The various violations are also referenced in the Problem Statement on the slides presented at the September and October TEAC Meetings. See Attachments I.A.5 and I.A.6. Attachment I.D.2 is the Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715" that is referenced in the Comment Column for the various violations in Attachment I.D.1.

	A	B	C	D	E	F	G	H	I	J	K	L	M
	PJM N-1-1 Voltage Magnitude Results (2025 Winter)												
1	FG#	Bus #	Bus Name	Base kV	Area	Min Volt Limit	Max Volt Limit	Contingency 1	Contingency 2	Base Volt	Cont Volt	PJM Accepting Proposals	Comment
2	N2-WVM28	314173	3GARNER	115	345	0.93	1.05	DVP_P1-2: LN 2145	DVP_P1-2: LN 224	0.9958	0.8332	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
30	N2-WVM29	314400	3LANCA_1	115	345	0.93	1.05	DVP_P1-2: LN 2145	DVP_P1-2: LN 224	0.9909	0.8922	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
31	N2-WVM30	314178	3LANCAST	115	345	0.93	1.05	DVP_P1-2: LN 2145	DVP_P1-2: LN 224	0.9909	0.8922	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
32	N2-WVM31	314181	3NORNECK	115	345	0.93	1.05	DVP_P1-2: LN 2145	DVP_P1-2: LN 224	1.0014	0.8292	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
33	N2-WVM32	313810	6DAHLGREN	230	345	0.93	1.05	DVP_P1-2: LN 2145	DVP_P1-2: LN 224	1.0007	0.7521	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
34	N2-WVM33	314182	6NORNECK	230	345	0.93	1.05	DVP_P1-2: LN 2145	DVP_P1-2: LN 224	1.0001	0.7525	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
35	N2-WVM34	314139	6OAKGROV	230	345	0.93	1.05	DVP_P1-2: LN 2145	DVP_P1-2: LN 224	1.0021	0.7542	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
36	N2-WVM35	314183	6SANDERS	230	345	0.93	1.05	DVP_P1-2: LN 2145	DVP_P1-2: LN 224	0.9999	0.752	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
37	N2-WVM36	314190	6WESTMOR	230	345	0.93	1.05	DVP_P1-2: LN 2145	DVP_P1-2: LN 224	1.0006	0.7525	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
38	N2-WVM37	926472	AC1-118 E	230	345	0.93	1.05	DVP_P1-2: LN 2145	DVP_P1-2: LN 224	1.0006	0.7526	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
39	N2-WVM38	316077	AC2-138 C	115	345	0.93	1.05	DVP_P1-2: LN 2145	DVP_P1-2: LN 224	1.0015	0.8293	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
40	N2-WVM39	316078	AC2-138 E	115	345	0.93	1.05	DVP_P1-2: LN 2145	DVP_P1-2: LN 224	1.0015	0.8293	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
41	N2-WVM40	316148	AD1-046 C	230	345	0.93	1.05	DVP_P1-2: LN 2145	DVP_P1-2: LN 224	1.0024	0.7546	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
42	N2-WVM41	316149	AD1-046 E	230	345	0.93	1.05	DVP_P1-2: LN 2145	DVP_P1-2: LN 224	1.0026	0.7548	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
43	N2-WVM42	938961	AE1-124 C	230	345	0.93	1.05	DVP_P1-2: LN 2145	DVP_P1-2: LN 224	1.0022	0.7544	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
44	N2-WVM43	938962	AE1-124 E	230	345	0.93	1.05	DVP_P1-2: LN 2145	DVP_P1-2: LN 224	1.0023	0.7544	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
45	N2-WVM44	939241	AE1-155 MAIN	115	345	0.93	1.05	DVP_P1-2: LN 2145	DVP_P1-2: LN 224	0.9959	0.8332	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
46	N2-WVM45	939240	AE1-155 TAP	115	345	0.93	1.05	DVP_P1-2: LN 2145	DVP_P1-2: LN 224	0.9959	0.8332	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
47	N2-WVM46	314173	3GARNER	115	345	0.93	1.05	DVP_P1-2: LN 224	DVP_P1-2: LN 2145	0.9983	0.8332	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
48	N2-WVM46	314173	3GARNER	115	345	0.93	1.05	DVP_P1-2: LN 224	DVP_P1-2: LN 2145	0.9983	0.8332	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
	Winter N-1-1 Voltage Mag												
	Winter N-1-1 Voltage Drop												

	A	B	C	D	E	F	G	H	I	J	K	L	M
PJM N-1-1 Voltage Magnitude Results (2025 Winter)													
1													
2	FG#	Bus #	Bus Name	Base kV	Area	Min Volt Limit	Max Volt Limit	Contingency 1	Contingency 2	Base Volt	Cont Volt	PJM Accepting Proposals	Comment
49	N2-WVM47	314400	3LANCA_1	115	345	0.93	1.05	DVP_P1-2:LN 224	DVP_P1-2:LN 2145	0.9933	0.8922	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
50	N2-WVM48	314178	3LANCAST	115	345	0.93	1.05	DVP_P1-2:LN 224	DVP_P1-2:LN 2145	0.9933	0.8922	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
51	N2-WVM49	314181	3NORNECK	115	345	0.93	1.05	DVP_P1-2:LN 224	DVP_P1-2:LN 2145	1.0039	0.8292	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
52	N2-WVM50	313810	60AHLGREN	230	345	0.93	1.05	DVP_P1-2:LN 224	DVP_P1-2:LN 2145	0.9999	0.7521	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
53	N2-WVM51	314182	6NORNECK	230	345	0.93	1.05	DVP_P1-2:LN 224	DVP_P1-2:LN 2145	1.0033	0.7525	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
54	N2-WVM52	314139	60AKGROV	230	345	0.93	1.05	DVP_P1-2:LN 224	DVP_P1-2:LN 2145	1.0031	0.7542	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
55	N2-WVM53	314183	6SANDERS	230	345	0.93	1.05	DVP_P1-2:LN 224	DVP_P1-2:LN 2145	1.0027	0.752	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
56	N2-WVM54	314190	6WESTMOR	230	345	0.93	1.05	DVP_P1-2:LN 224	DVP_P1-2:LN 2145	1.0027	0.7525	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
57	N2-WVM55	926472	AC1-118 E	230	345	0.93	1.05	DVP_P1-2:LN 224	DVP_P1-2:LN 2145	1.0027	0.7526	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
58	N2-WVM56	316077	AC2-138 C	115	345	0.93	1.05	DVP_P1-2:LN 224	DVP_P1-2:LN 2145	1.0039	0.8293	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
59	N2-WVM57	316078	AC2-138 E	115	345	0.93	1.05	DVP_P1-2:LN 224	DVP_P1-2:LN 2145	1.004	0.8293	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
60	N2-WVM58	316148	AD1-046 C	230	345	0.93	1.05	DVP_P1-2:LN 224	DVP_P1-2:LN 2145	1.0034	0.7546	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
61	N2-WVM59	316149	AD1-046 E	230	345	0.93	1.05	DVP_P1-2:LN 224	DVP_P1-2:LN 2145	1.0036	0.7548	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
62	N2-WVM60	938961	AE1-124 C	230	345	0.93	1.05	DVP_P1-2:LN 224	DVP_P1-2:LN 2145	1.0032	0.7544	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
63	N2-WVM61	938962	AE1-124 E	230	345	0.93	1.05	DVP_P1-2:LN 224	DVP_P1-2:LN 2145	1.0033	0.7544	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
64	N2-WVM62	939241	AE1-155 MAIN	115	345	0.93	1.05	DVP_P1-2:LN 224	DVP_P1-2:LN 2145	0.9983	0.8332	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
65	N2-WVM63	939240	AE1-155 TAP	115	345	0.93	1.05	DVP_P1-2:LN 224	DVP_P1-2:LN 2145	0.9983	0.8332	No	Immediate Need, Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
66													
67													
68													
69													
70													
Winter N-1-1 Voltage Mag Winter N-1-1 Voltage Drop													

PJM N-1-1 Voltage Drop Results (2025 Winter)

	A	B	C	D	E	F	G	H	I	J	K	L	M
	FG#	Bus #	Bus Name	Base kV	Area	%Vdrop Limit	Contingency 1	Contingency 2	Base Volt	Cont Volt	%Vdrop	PJM Accepting Proposals	Comment
2	N2-WVD1	314173	3GARNER	115	345	10 DVP P1-2: LN 2145	10 DVP P1-2: LN 2145	DVP P1-2: LN 224	0.9958	0.754	24.183	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
3	N2-WVD2	313886	3GREYSPT	115	345	10 DVP P1-2: LN 2145	10 DVP P1-2: LN 2145	DVP P1-2: LN 224	0.9952	0.759	24.183	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
4	N2-WVD3	314385	3SHARMO_1	115	345	10 DVP P1-2: LN 2145	10 DVP P1-2: LN 2145	DVP P1-2: LN 224	1.004	0.898	10.414	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
5	N2-WVD4	314395	3SHARMO_2	115	345	10 DVP P1-2: LN 2145	10 DVP P1-2: LN 2145	DVP P1-2: LN 224	1.004	0.898	10.414	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
6	N2-WVD5	314174	3SHARMONY	115	345	10 DVP P1-2: LN 2145	10 DVP P1-2: LN 2145	DVP P1-2: LN 224	1.004	0.898	10.414	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
7	N2-WVD6	314400	3BLANCA_1	115	345	10 DVP P1-2: LN 2145	10 DVP P1-2: LN 2145	DVP P1-2: LN 224	0.9909	0.808	17.015	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
8	N2-WVD7	314178	3BLANCA_2	115	345	10 DVP P1-2: LN 2145	10 DVP P1-2: LN 2145	DVP P1-2: LN 224	0.9909	0.808	17.015	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
9	N2-WVD8	314181	3BNORNECK	115	345	10 DVP P1-2: LN 2145	10 DVP P1-2: LN 2145	DVP P1-2: LN 224	1.0014	0.748	25.161	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
10	N2-WVD9	313813	3BOCAN	115	345	10 DVP P1-2: LN 2145	10 DVP P1-2: LN 2145	DVP P1-2: LN 224	0.9919	0.867	15.528	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
11	N2-WVD10	313870	3BRAPAHNCK	115	345	10 DVP P1-2: LN 2145	10 DVP P1-2: LN 2145	DVP P1-2: LN 224	0.9943	0.854	14.092	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
12	N2-WVD11	313842	3BRAPAHNCK_1	115	345	10 DVP P1-2: LN 2145	10 DVP P1-2: LN 2145	DVP P1-2: LN 224	0.9938	0.853	14.084	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
13	N2-WVD12	313843	3BRAPAHNCK_2	115	345	10 DVP P1-2: LN 2145	10 DVP P1-2: LN 2145	DVP P1-2: LN 224	0.9943	0.854	14.092	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
14	N2-WVD13	314187	3SWAN 176	115	345	10 DVP P1-2: LN 2145	10 DVP P1-2: LN 2145	DVP P1-2: LN 224	0.9874	0.808	10.66	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
15	N2-WVD14	314191	3WHIT STONE	115	345	10 DVP P1-2: LN 2145	10 DVP P1-2: LN 2145	DVP P1-2: LN 224	0.993	0.855	14.754	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
16	N2-WVD15	313810	3DOAHGREN	230	345	8 DVP P1-2: LN 2145	8 DVP P1-2: LN 2145	DVP P1-2: LN 224	1.0007	0.756	24.404	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
17	N2-WVD16	314182	3BNORNECK	230	345	8 DVP P1-2: LN 2145	8 DVP P1-2: LN 2145	DVP P1-2: LN 224	1.0001	0.757	24.307	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
18	N2-WVD17	314199	3BOAGROV	230	345	8 DVP P1-2: LN 2145	8 DVP P1-2: LN 2145	DVP P1-2: LN 224	1.0021	0.787	24.339	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
19	N2-WVD18	314183	3GSANDERS	230	345	8 DVP P1-2: LN 2145	8 DVP P1-2: LN 2145	DVP P1-2: LN 224	0.9999	0.765	24.335	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
20	N2-WVD19	314190	3WESTMOR	230	345	8 DVP P1-2: LN 2145	8 DVP P1-2: LN 2145	DVP P1-2: LN 224	1.0006	0.7571	24.349	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
21	N2-WVD20	926472	AC1-118 E	230	345	8 DVP P1-2: LN 2145	8 DVP P1-2: LN 2145	DVP P1-2: LN 224	1.0006	0.7571	24.349	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
22	N2-WVD21	316077	AC2-138 C	115	345	10 DVP P1-2: LN 2145	10 DVP P1-2: LN 2145	DVP P1-2: LN 224	1.0015	0.7499	25.158	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
23	N2-WVD22	316078	AC2-138 E	115	345	10 DVP P1-2: LN 2145	10 DVP P1-2: LN 2145	DVP P1-2: LN 224	1.0015	0.75	25.157	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
24	N2-WVD23	316148	AD1-046 C	230	345	8 DVP P1-2: LN 2145	8 DVP P1-2: LN 2145	DVP P1-2: LN 224	1.0024	0.7592	24.328	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
25	N2-WVD24	316149	AD1-046 E	230	345	8 DVP P1-2: LN 2145	8 DVP P1-2: LN 2145	DVP P1-2: LN 224	1.0026	0.7593	24.323	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
26	N2-WVD25	316150	AD2-030 C	115	345	10 DVP P1-2: LN 2145	10 DVP P1-2: LN 2145	DVP P1-2: LN 224	0.9875	0.809	10.659	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
27	N2-WVD26	316157	AD2-030 E	115	345	10 DVP P1-2: LN 2145	10 DVP P1-2: LN 2145	DVP P1-2: LN 224	0.9876	0.881	10.658	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
28	N2-WVD27	938961	AET-124 C	230	345	8 DVP P1-2: LN 2145	8 DVP P1-2: LN 2145	DVP P1-2: LN 224	1.0022	0.7589	24.334	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
29	N2-WVD28	938962	AET-124 E	230	345	8 DVP P1-2: LN 2145	8 DVP P1-2: LN 2145	DVP P1-2: LN 224	1.0023	0.7589	24.334	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
30	N2-WVD29	939240	AET-155 MAIN	115	345	10 DVP P1-2: LN 2145	10 DVP P1-2: LN 2145	DVP P1-2: LN 224	0.9959	0.7539	24.195	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
31	N2-WVD30	939240	AET-155 TAP	115	345	10 DVP P1-2: LN 2145	10 DVP P1-2: LN 2145	DVP P1-2: LN 224	0.9959	0.7539	24.195	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
32	N2-WVD31	314173	3GARNER	115	345	10 DVP P1-2: LN 224	10 DVP P1-2: LN 224	DVP P1-2: LN 2145	0.9883	0.735	24.481	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
33	N2-WVD32	313886	3GREYSPT	115	345	10 DVP P1-2: LN 224	10 DVP P1-2: LN 224	DVP P1-2: LN 2145	0.9971	0.8563	14.074	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
34	N2-WVD33	314395	3SHARMO_1	115	345	10 DVP P1-2: LN 224	10 DVP P1-2: LN 224	DVP P1-2: LN 2145	1.0058	0.8992	10.658	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
35	N2-WVD34	314395	3SHARMO_2	115	345	10 DVP P1-2: LN 224	10 DVP P1-2: LN 224	DVP P1-2: LN 2145	1.0058	0.8992	10.658	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
36	N2-WVD35	314174	3SHARMONY	115	345	10 DVP P1-2: LN 224	10 DVP P1-2: LN 224	DVP P1-2: LN 2145	1.0058	0.8992	10.658	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
37	N2-WVD36	314400	3BLANCA_1	115	345	10 DVP P1-2: LN 224	10 DVP P1-2: LN 224	DVP P1-2: LN 2145	0.9933	0.8202	17.312	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
38	N2-WVD37	314178	3BLANCA_2	115	345	10 DVP P1-2: LN 224	10 DVP P1-2: LN 224	DVP P1-2: LN 2145	0.9933	0.8202	17.312	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
39	N2-WVD38	314181	3BNORNECK	115	345	10 DVP P1-2: LN 224	10 DVP P1-2: LN 224	DVP P1-2: LN 2145	1.0039	0.7493	25.457	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
40	N2-WVD39	313810	3DOAHGREN	115	345	10 DVP P1-2: LN 224	10 DVP P1-2: LN 224	DVP P1-2: LN 2145	0.994	0.861	15.791	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"
41	N2-WVD40	313870	3BRAPAHNCK	115	345	10 DVP P1-2: LN 224	10 DVP P1-2: LN 224	DVP P1-2: LN 2145	0.9953	0.8328	14.338	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"

Winter N-1-1 Voltage Drop

Winter N-1-1 Voltage Mag

PJM N-1-1 Voltage Drop Results (2025 Winter)

	A	B	C	D	E	F	G	H	I	J	K	L	M	
1														
2	FG#	Bus #	Bus Name	Base kV	Area	%Vdrop Limit	Contingency 1	Contingency 2	Base Volt	Cont Volt	%Vdrop	PJM Accepting Proposals	Comment	
41	N2-WVD39	313813	30CRAN	115	345	10	DVP P1-2: LN 224	DVP P1-2: LN 2145	0.994	0.9361	15.791	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"	
42	N2-WVD40	313870	3RAPPAHNCX	115	345	10	DVP P1-2: LN 224	DVP P1-2: LN 2145	0.9962	0.9328	14.339	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"	
43	N2-WVD41	313842	3RAPPAHNCX_1	115	345	10	DVP P1-2: LN 224	DVP P1-2: LN 2145	0.9957	0.9524	14.332	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"	
44	N2-WVD42	313843	3RAPPAHNCX_2	115	345	10	DVP P1-2: LN 224	DVP P1-2: LN 2145	0.9962	0.9524	14.339	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"	
45	N2-WVD43	314187	3WANI 176	115	345	10	DVP P1-2: LN 224	DVP P1-2: LN 2145	0.9883	0.8802	10.909	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"	
46	N2-WVD44	314191	3WHIT STONE	115	345	10	DVP P1-2: LN 224	DVP P1-2: LN 2145	0.995	0.8449	15.003	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"	
47	N2-WVD45	313810	6DAHNGREN	230	345	8	DVP P1-2: LN 224	DVP P1-2: LN 2145	0.9999	0.7561	24.372	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"	
48	N2-WVD46	314182	6NORNECK	230	345	8	DVP P1-2: LN 224	DVP P1-2: LN 2145	1.0033	0.7565	24.681	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"	
49	N2-WVD47	314139	6OAKGROV	230	345	8	DVP P1-2: LN 224	DVP P1-2: LN 2145	1.0031	0.7582	24.49	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"	
50	N2-WVD48	314183	6SANDERS	230	345	8	DVP P1-2: LN 224	DVP P1-2: LN 2145	1.0027	0.756	24.668	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"	
51	N2-WVD49	314190	6WESTMOR	230	345	8	DVP P1-2: LN 224	DVP P1-2: LN 2145	1.0027	0.7566	24.611	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"	
52	N2-WVD50	926472	AC1-118 E	230	345	8	DVP P1-2: LN 224	DVP P1-2: LN 2145	1.0033	0.7566	24.691	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"	
53	N2-WVD51	316077	AC2-138 C	115	345	10	DVP P1-2: LN 224	DVP P1-2: LN 2145	1.0039	0.7494	25.654	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"	
54	N2-WVD52	316078	AC2-138 E	115	345	10	DVP P1-2: LN 224	DVP P1-2: LN 2145	1.004	0.7495	25.453	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"	
55	N2-WVD53	316148	AD1-046 C	230	345	8	DVP P1-2: LN 224	DVP P1-2: LN 2145	1.0036	0.7586	24.479	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"	
56	N2-WVD54	316149	AD1-046 E	230	345	8	DVP P1-2: LN 224	DVP P1-2: LN 2145	1.0036	0.7588	24.475	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"	
57	N2-WVD55	316156	AD2-030 C	115	345	10	DVP P1-2: LN 224	DVP P1-2: LN 2145	0.9894	0.8803	10.907	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"	
58	N2-WVD56	316157	AD2-030 E	115	345	10	DVP P1-2: LN 224	DVP P1-2: LN 2145	0.9894	0.8804	10.907	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"	
59	N2-WVD57	938961	AE1-124 C	230	345	8	DVP P1-2: LN 224	DVP P1-2: LN 2145	1.0032	0.7584	24.486	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"	
60	N2-WVD58	938962	AE1-124 E	230	345	8	DVP P1-2: LN 224	DVP P1-2: LN 2145	1.0033	0.7584	24.486	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"	
61	N2-WVD59	939241	AE1-155 MAIN	115	345	10	DVP P1-2: LN 224	DVP P1-2: LN 2145	0.9983	0.7534	24.493	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"	
62	N2-WVD60	939240	AE1-155 TAP	115	345	10	DVP P1-2: LN 224	DVP P1-2: LN 2145	0.9983	0.7534	24.493	No	Immediate Need. Refer to Northern Neck addendum document "Dominion Northern Neck Area Violations Immediate Need 20200715"	
63	N2-WVD61	314763	3KODUSTO	115	345	10	DVP P1-3: 6BREMO-TW9	DVP P1-3: 6FORK UNION-TW1	0.9937	0.8882	11.999	No	Reliability Violations on Transmission Facilities Below 200 kV exclusion	
64	N2-WVD62	313708	3FORK UNION	115	345	10	DVP P1-3: 6BREMO-TW9	DVP P1-3: 6FORK UNION-TW1	0.9937	0.8877	12.602	No	Reliability Violations on Transmission Facilities Below 200 kV exclusion	
65	N2-WVD63	313872	3FORK UNIO_1	115	345	10	DVP P1-3: 6BREMO-TW9	DVP P1-3: 6FORK UNION-TW1	0.9944	0.8883	12.611	No	Reliability Violations on Transmission Facilities Below 200 kV exclusion	
66	N2-WVD64	314746	4BREMO	138	345	10	DVP P1-3: 6BREMO-TW9	DVP P1-3: 6FORK UNION-TW1	0.9915	0.8649	12.648	No	Reliability Violations on Transmission Facilities Below 200 kV exclusion	
67	N2-WVD65	314744	4BREMO	115	345	10	DVP P1-3: 6BREMO-TW9	DVP P1-3: 6FORK UNION-TW1	0.9915	0.8649	12.653	No	Reliability Violations on Transmission Facilities Below 200 kV exclusion	
68	N2-WVD66	314868	3BREMO_1	115	345	10	DVP P1-3: 6BREMO-TW9	DVP P1-3: 6FORK UNION-TW1	0.9921	0.8555	12.662	No	Reliability Violations on Transmission Facilities Below 200 kV exclusion	
69	N2-WVD67	314754	3CUNNING	115	345	10	DVP P1-3: 6BREMO-TW9	DVP P1-3: 6FORK UNION-TW1	0.9835	0.8557	12.786	No	Reliability Violations on Transmission Facilities Below 200 kV exclusion	
70	N2-WVD68	313874	3JAMES RI TP	115	345	10	DVP P1-3: 6BREMO-TW9	DVP P1-3: 6FORK UNION-TW1	0.981	0.8325	12.851	No	Reliability Violations on Transmission Facilities Below 200 kV exclusion	
71	N2-WVD69	313875	3TRICESLK	115	345	10	DVP P1-3: 6BREMO-TW9	DVP P1-3: 6FORK UNION-TW1	0.9807	0.8521	12.855	No	Reliability Violations on Transmission Facilities Below 200 kV exclusion	
72	N2-WVD70	313871	3COBBS CREEK	115	345	10	DVP P1-3: 6BREMO-TW9	DVP P1-3: 6FORK UNION-TW1	0.9701	0.8398	13.034	No	Reliability Violations on Transmission Facilities Below 200 kV exclusion	
73	N2-WVD71	314762	3JAMES R	115	345	10	DVP P1-3: 6BREMO-TW9	DVP P1-3: 6FORK UNION-TW1	0.9602	0.8284	13.189	No	Reliability Violations on Transmission Facilities Below 200 kV exclusion	
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4	N2-WT1	314171	6BRAMB	313827	BEVERGR MILL	2	230/230	345/345	1160.0							
5	N2-WT2	314171	6BRAMB	313827	BEVERGR MILL	1	230/230	345/345	1160.0							
6	N2-WT3	314171	6BRAMB	313827	BEVERGR MILL	1	230/230	345/345	1160.0							
7	N2-WT8	314171	6BRAMB	313827	BEVERGR MILL	2	230/230	345/345	1160.0							
8	N2-WT9	313870	3RAPPAHNC	314191	3WHIT STONE	1	115/115	345/345	185.0							
9	N2-WT10	313870	3RAPPAHNC	314191	3WHIT STONE	1	115/115	345/345	185.0							
10	N2-WT11	314174	3HARMONY	313886	3GREVSPT	1	115/115	345/345	185.0							
11	N2-WT12	314174	3HARMONY	313886	3GREVSPT	1	115/115	345/345	185.0							
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DOMINION NORTHERN NECK AREA VIOLATIONS

The Northern Neck Load pocket is provided power from 3 sources. (2083 from Fredericksburg, 224 from Lanexa, and 65 from Harmony Village). Historically, Dominion has employed an operating procedure to open the 115kV LN 65 at the Northern Neck end to accommodate outages on one of the two 230 kV feeds into Northern Neck to mitigate thermal overloads on Dominion Line 65 and also to help control & mitigate voltage issues when either of the 230kV feeds are out going to the Northern Neck area.

The results of the winter 2025 RTEP N-1-1 analysis show that both thermal and voltage violations will occur on the loss of both 230 kV feeds (230kV Line 224 and 230kV Line 2145) that go into the Northern Neck area in 2025.

However, continued use of the operating procedure by Dominion Operations to mitigate thermal and voltage issues on Line 65 will result in a PJM planning criteria violation of dropping over 300 MW in the 2022/2023 timeframe based on the 2020 PJM load forecast. Increases in load and a shift in the load profile in Dominion to better match the winter peaking condition in Dominion has resulted in the increase in the magnitude of the load in this area of Dominion at an accelerated rate, leading to exceeding 300 MW load loss in this timeframe.

As a result, this project will be designated immediate need to address the near term violation of dropping more than 300 MW in the 2022/2023 timeframe as well as those violations seen in 2025. Given the configuration of the facilities in the area, Dominion will be designated the entity to mitigate these violations.

I. NECESSITY FOR THE PROPOSED PROJECT

E. Describe the feasible project alternatives, if any, considered for meeting the identified need including any associated studies conducted by the Applicant or analysis provided to the RTO. Explain why each alternative was rejected.

Response: One alternative solution was submitted to PJM with the recommended solution for the EOL criteria rebuild that was presented at the December 2018 TEAC, as shown in Attachment I.A.3. The alternative is to rebuild Line #224 utilizing single circuit structures. This alternative does not support a potential second circuit and cannot solve the recently identified 300 MW load loss limit violation in the Northern Neck area. Ultimately, the alternative solution was not selected by the PJM Board for approval. See Section I.C.

Pursuant to the Commission's November 26, 2013, Order entered in Case No. PUE-2012-00029, and its November 1, 2018, Final Order entered in Case No. PUR-2018-00075 ("2018 Final Order"), the Company is required to provide analysis of demand-side resources ("DSM") incorporated into the Company's planning studies. DSM is the broad term that includes both energy efficiency ("EE") and demand response ("DR"). In this case, PJM and the Company have identified a need for the proposed Project based on aging infrastructure that is at the end of its service life to maintain the overall long-term reliability of its transmission system and to resolve potential violations of mandatory NERC Reliability Criteria, as identified through the PJM 2025 RTEP analysis.¹⁵ Notwithstanding, when performing an analysis based on PJM's 50/50 load forecast, there is no adjustment in load for DR programs that are bid into the PJM reliability pricing model ("RPM") auction because PJM only dispatches DR when the system is under stress (i.e., a system emergency). Accordingly, while existing DSM is considered to the extent the load forecast accounts for it, DR that has been bid into PJM's RPM market is not a factor in this particular application because of the identified need for the Project. Based on these considerations, the evaluation of the Project demonstrated that despite accounting for DSM consistent with PJM's methods, the Project is necessary. As noted in the 2018 Final Order, pursuant to the Grid Transformation and Modernization Act of 2018, the Company must propose \$870 million of EE programs by 2028. Since July 1, 2018, the Company has proposed approximately \$344 million for the design, implementation, and operation of energy efficiency programs in the Commonwealth. This amount includes approximately \$173.5 million of new energy efficiency programs, designated as "Phase VIII" of the Company's DSM portfolio, which the Commission approved on July 30, 2020. These programs have not been accounted for in PJM's load forecast, and thus, were not part of the Company's planning studies.

¹⁵ While the PJM load forecast does not directly incorporate DR, its load forecast incorporates variables derived from Itron that reflect EE by modeling the stock of end-use equipment and its usages. Further, because PJM's load forecast considers the historical non-coincident peak ("NCP") for each load serving entity ("LSE") within PJM, it reflects the actual load reductions achieved by DSM programs to the extent an LSE has used DSM to reduce its NCPs.

I. NECESSITY FOR THE PROPOSED PROJECT

F. Describe any lines or facilities that will be removed, replaced, or taken out of service upon completion of the proposed project, including the number of circuits and normal and emergency ratings of the facilities.

Response: The Project includes the removal or replacement of existing facilities approximately 38.3 miles of the existing 41.3-mile long Lanexa-Northern Neck Line #224.

In addition, existing double circuit Structure #224/297, 2016/6, which currently supports both Line #224 and Harmony Village-Lanexa Line #2016, will be removed and replaced with Structure #224/297, which will support rebuilt Line #224 and new Line #2208. Line #2016 will be moved to one new structure (Structure #2016/6), which will support that line. There will be no lines permanently taken out of service as part of the proposed Project.

The existing normal and emergency ratings of Line #224 are 386 MVA summer and 542 MVA winter. The proposed normal and emergency ratings of Line #224 and new Line #2208 are 1047 MVA summer and 1160 MVA winter.

The span of Line #2016 being moved to Structure #2016/6 will be reused; therefore, the normal and emergency ratings of that line will remain unchanged at 476 MVA summer and 604 MVA winter.

Substations

The expansion of Northern Neck Substation will require the installation of one 3-pole structure outside of the substation fence along Line #2076 in order to accommodate the expanded bus at the substation.

The expansion of Lanexa Substation will require the installation of two 3-pole structures, one on Line #2113 and one on Line #2129 in order to accommodate the expanded bus at the substation.

Transmission Structures

The rebuild of Line #224 is a structure-for-structure replacement in generally the same vicinity of the existing structures.

Section II.B.5 provides a chart detailing the existing and proposed structures on Line #224 and Attachment II.B.5.a provides a map of the locations of such structures. Attachments II.A.5.i-j provide details of the existing and proposed structure on Line #2016. Sections II.B.2, II.B.3, and II.B.5 address the line design and operational features of the proposed structures and conductors.

Northern Neck Substation to Structure #224/51 (Rappahannock River Crossing)

From Northern Neck Substation to existing Structure #224/51, the Company will remove the following structures on Line #224:

- 34 single circuit wooden H-frame suspension structures;
- 4 single circuit wooden 3-pole running angle structures;
- 2 single circuit wooden 3-pole dead end angle structures;
- 2 single circuit wooden H-frame dead end structures;
- 1 single circuit wooden H-frame structure with floating dead-ends;
- 3 single circuit weathering steel H-frame suspension structures;
- 1 single circuit weathering steel 3-pole running angle structure;
- 1 single circuit wooden/weathering steel 3-pole dead end structure;
- 2 double circuit weathering steel lattice suspension structures crossing Totusky Creek; and
- 1 static pole within Northern Neck Substation.

These structures will be replaced with:

- 36 double circuit weathering steel monopole suspension structures;
- 10 double circuit weathering steel monopole dead end structures;
- 2 double circuit weathering steel 2-pole dead end structures;
- 2 double circuit galvanized steel suspension lattice structure;
- 1 single circuit 230 kV backbone in the Northern Neck Substation for the new 230 kV line; and
- 1 single circuit 230 kV weathering steel 3-pole structure outside of Northern Neck Substation along Line #2076.

Rappahannock River Crossing (Structures #224/52 – #224/59)

The Rappahannock River Crossing is a structure-for-structure replacement (Structures #224/52 – #224/59) in the same location as the existing structures on the existing foundations. The new structures are to be galvanized steel. There will be no height increase to the structures crossing the Rappahannock River.

Rappahannock River to Lanexa Substation

From existing Structure #224/59 on the Rappahannock River to Lanexa Substation, the Company will remove the following structures on Line #224:

- 183 single circuit wooden H-frame suspension structures;
- 3 single circuit wooden 3-pole running angle structures;
- 3 single circuit wooden 3-pole dead end angle structures;
- 10 single circuit wooden H-frame dead end structures;
- 2 single circuit wooden H-frame structure with floating dead-ends;

- 2 single circuit wooden static poles within Dunnsville Substation;
- 2 single circuit wooden single pole dead end structures;
- 1 single circuit concrete single pole dead end structure;
- 21 single circuit weathering steel H-frame suspension structures;
- 5 single circuit weathering steel 3-pole running angle structure;
- 2 single circuit weathering steel H-frame dead end structures;
- 1 single circuit weathering steel H-frame structure with floating dead-ends;
- 2 single circuit double circuit weathering steel lattice suspension structures crossing Interstate 64 (“I-64”); and,
- 1 double circuit weathering steel lattice dead end structure crossing the Diascund River (double circuit with Line #2016).

These structures will be replaced with:

- 210 double circuit weathering steel monopole suspension structures;
- 17 double circuit weathering steel monopole dead end structures;
- 5 double circuit weathering steel 2-pole dead end structures;
- 3 single circuit weathering steel monopole dead end structures (one of which is along Line #2016);
- 2 galvanized static poles within Dunnsville Substation;
- 2 double circuit galvanized steel suspension lattice structures crossing I-64;
- 11 single circuit 230 kV backbones (one in Lanexa Substation for the new 230 kV line);
- 1 single circuit weathering steel 3 pole dead end structure along Line #2113; and
- 1 single circuit weathering steel 3-pole dead end structure that was relocated from Line #2113 to Line #2129 (new foundations will be installed).

As noted above, the Project is a structure-for-structure replacement in generally the same vicinity of the existing structures. The lattice towers crossing I-64 and Totuskey Creek will be rebuilt in the same location and utilize the existing foundations. There will be no increase in the height of the structures crossing I-64 or Totuskey Creek.

Conductors and Shield Wires

In addition to the structure replacements for Line #224, the existing 3-phase 1033 ACSS and 1109 ACAR conductors will be replaced with 3-phase twin-bundled 636 ACSR conductors, except along the Rappahannock River where 3-phase twin-bundled 768 ACSS TW (HS285) conductor will be installed. The existing bundled 768 ACSS TW (HS285) along the Mattaponi and Pamunkey Rivers will

remain in place. On the Mattaponi River, the vacant side of the existing towers will be installed with 768 ACSS TW (HS285).

One new span of 3-phase twin-bundled 636 ACSR conductor will be installed along Line #2076 from the new backbone in Northern Neck Substation and the proposed single circuit 3-pole dead end structure.

One new span of 3-phase twin-bundled 636 ACSR conductor will be installed along Line #2129 from the new backbone in Lanexa Substation and the relocated single circuit 3-pole dead end structure along Line #2129.

One 80-foot span of 3-phase 1033 ACSR conductor will be installed along Line #2113 between an existing 3-pole dead end pole and the proposed single circuit 3-pole dead end pole along Line #2113 outside of Lanexa Substation.

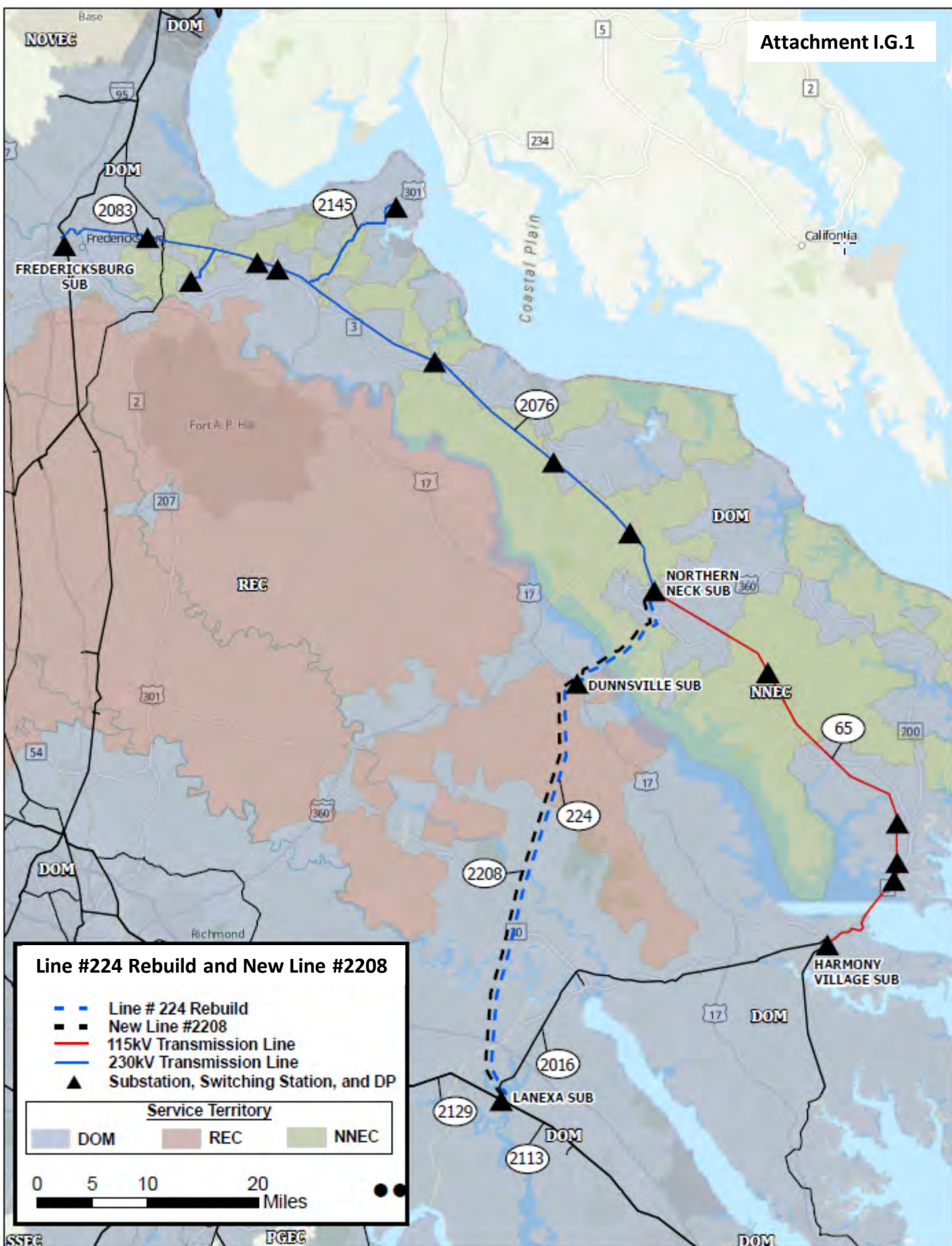
Finally, the existing steel shield wire over Line #224 will be replaced with two fiber optic shield wires. One span of wire between the existing wood static poles within Dunnsville Substation will be replaced with one 7#7 alumoweld shield wire. The existing two fiber optic shield wires along the Mattaponi and Pamunkey Rivers will remain in place.

One span of dual 7#7 alumoweld shield wire will be installed along Line #2076 outside of Northern Neck Substation, and two spans of dual 7#7 alumoweld will be installed over the proposed backbone in Northern Neck Substation and the relocated pole along Line #2129.

I. NECESSITY FOR THE PROPOSED PROJECT

- G. Provide a system map, in color and of suitable scale, showing the location and voltage of the Applicant's transmission lines, substations, generating facilities, etc., that would affect or be affected by the new transmission line and are relevant to the necessity for the proposed line. Clearly label on this map all points referenced in the necessity statement.**

Response: See Attachment I.G.1.



I. NECESSITY FOR THE PROPOSED PROJECT

H. Provide the desired in-service date of the proposed project and the estimated construction time.

Response: The desired in-service date for the Project is December 31, 2023.

The Company estimates it will take approximately 27 months for detailed engineering, scheduled outages, materials procurement, permitting, and construction of the Project after a final order from the Commission on the Project. Accordingly, to support this estimated construction timeline and construction plan, the Company respectfully requests a final order on the Project by September 1, 2021. Should the Commission issue a final order by September 1, 2021, the Company estimates that construction of the Project should begin on September 15, 2021, and be completed by December 31, 2023. This construction timeline will enable the Company to meet the targeted in-service date for the Project. This schedule is contingent upon obtaining the necessary permits. Dates may need to be adjusted based on permitting delays or design modifications to comply with additional agency requirements identified during the permitting application process.

I. NECESSITY FOR THE PROPOSED PROJECT

- I. Provide the estimated total cost of the project as well as total transmission-related costs and total substation-related costs. Provide the total estimated cost for each feasible alternative considered. Identify and describe the cost classification (e.g. “conceptual cost,” “detailed cost,” etc.) for each cost provided.**

Response: The total estimated conceptual cost of the Project is approximately \$96.7 million, which includes approximately \$87.1 million for transmission-related work, and approximately \$9.6 million for substation-related work (2020 dollars).

The transmission-related costs include the following:

- Approximately \$76.2 million for transmission-related work taking place on land, including the removal and replacement of the existing 230 kV transmission Line #224 facilities; the installation of Line #2208; and the work related to Lines #2016, #2076, #2113, and #2129, as described in Section I.F.
- Approximately \$8.3 million for the removal and replacement of the existing 230 kV transmission Line #224 facilities on the Rappahannock River, as described in Section I.F.
- Approximately \$2.6 million for the installation of Line #2208 on the vacant side of the existing towers along the Pamunkey River.

The substation-related costs include the following:

- Approximately \$4.9 million for substation work at the existing Northern Neck Substation, as described in Section II.C.
- Approximately \$146,805 for substation work at the existing Dunnsville Substation, as described in Section II.C.
- Approximately \$4.6 million for substation work at the existing Lanexa Substation, as described in Section II.C.

I. NECESSITY FOR THE PROPOSED PROJECT

- J. If the proposed project has been approved by the RTO, provide the line number, regional transmission expansion plan number, cost responsibility assignments, and cost allocation methodology. State whether the proposed project is considered to be a baseline or supplemental project.**

Response: The proposed full rebuild of Line #224 was approved by the PJM Board on February 11, 2019, as a baseline project (b3089). See Attachment I.A.4. Based on subsequent discussions with PJM, the Line #224 rebuild component of the Project will remain as a baseline project (b3089) with an expanded scope to include the need for a new 230 kV line. While the PJM Board approved the rebuild of Line #224 as a baseline project, the rebuild would have been considered a supplemental project under the M-3 EOL Planning Criteria effective March 24, 2020. See Section I.A.

PJM also issued an additional, separate baseline project number (b3223) for the new 230 kV line component of the Project. The new line component was presented at the September 2020 TEAC Meeting. See Attachment I.A.5. Because PJM has designated the Project as “immediate need,” the Company is expecting to receive PJM Board approval following the second review in a two-phase review process, which occurred at the October 2020 TEAC Meeting. See Attachment I.A.6.

The Project is presently 100% cost allocated to the DOM Zone.

I. NECESSITY FOR THE PROPOSED PROJECT

- K. If the need for the proposed project is due in part to reliability issues and the proposed project is a rebuild of an existing transmission line(s), provide five years of outage history for the line(s), including for each outage the cause, duration and number of customers affected. Include a summary of the average annual number and duration of outages. Provide the average annual number and duration of outages on all Applicant circuits of the same voltage, as well as the total number of such circuits. In addition to outage history, provide five years of maintenance history on the line(s) to be rebuilt including a description of the work performed as well as the cost to complete the maintenance. Describe any system work already undertaken to address this outage history.**

Response: The need for the Project is not driven by outage history, but rather by the need to replace transmission infrastructure approaching its end of life, and to address potential violations of NERC Reliability Standards. See Section I.A of this Appendix.

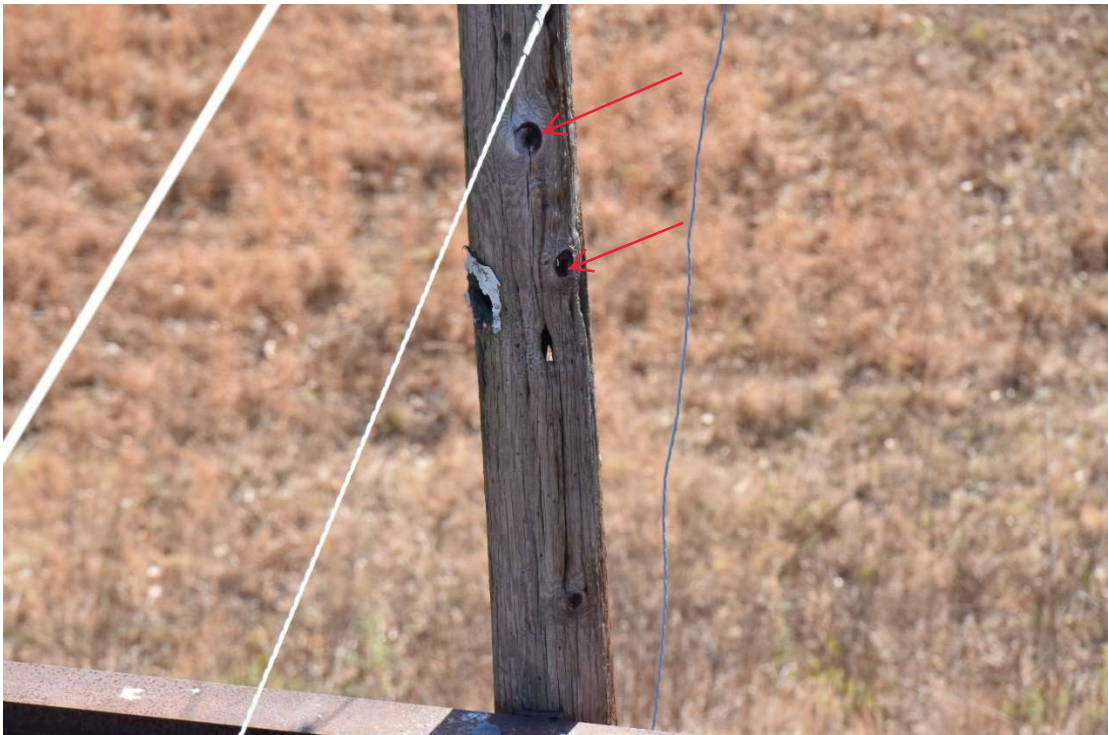
I. NECESSITY FOR THE PROPOSED PROJECT

- L. If the need for the proposed project is due in part to deterioration of structures and associated equipment, provide representative photographs and inspection records detailing their condition.**

Response: See Attachment I.L.1 for pictures of the deterioration of structures on Line #224, and Attachment I.L.2 for open maintenance notifications. In addition, see Attachment I.L.3 as it pertains to deterioration of structures on Line #224 along the Rappahannock River crossing. The 2016 Quanta Report, discussed in Section I.A of the Appendix, also details the condition of these deteriorating structures.



Str 224/5, Woodpecker Holes



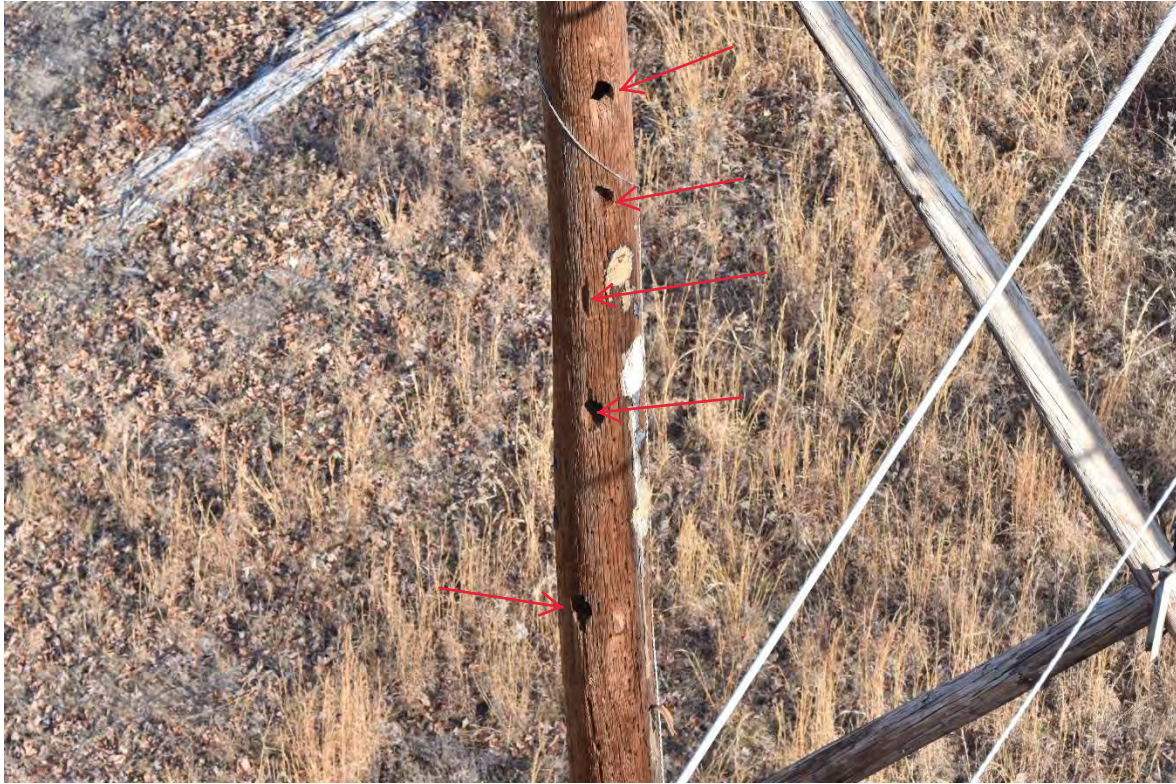
Str 224/15, Woodpecker Holes



Str 224/23, Woodpecker Holes



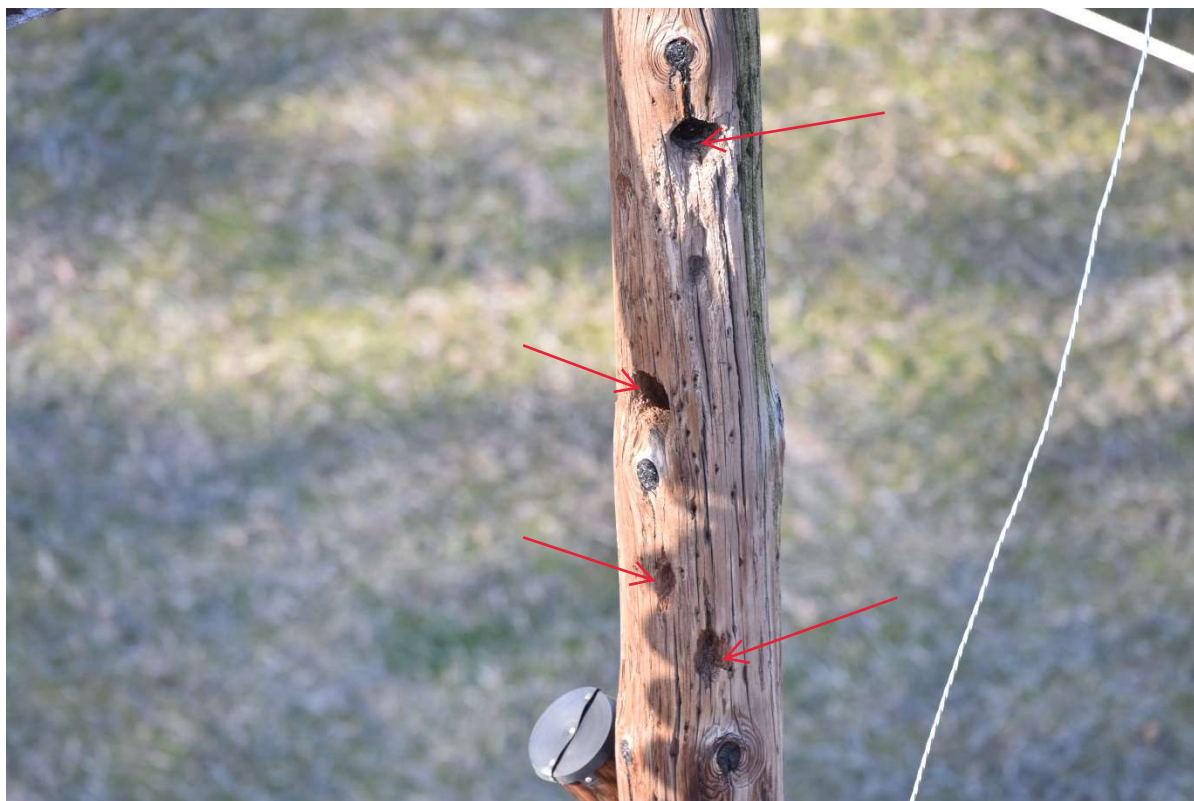
Str 224/24, Rotted Pole



Str 224/35, Woodpecker Holes



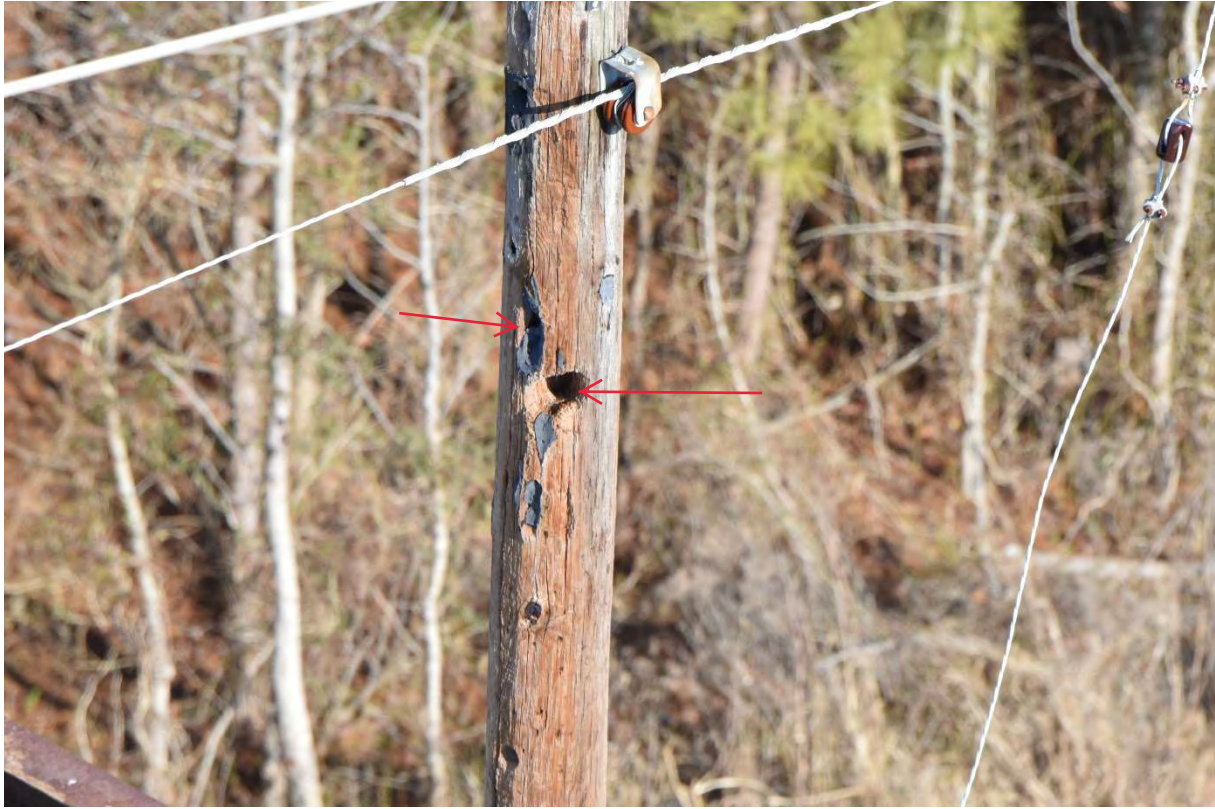
Str 224/39, Woodpecker Holes



Str 224/40, Woodpecker Holes



Str 224/42, Vines growing on wood poles



Str

224/46, Woodpecker Holes



Str

224/48, Woodpecker Holes



224/48, Preform thimble out of lay



224/49, Woodpecker Holes



224/50, Woodpecker Holes



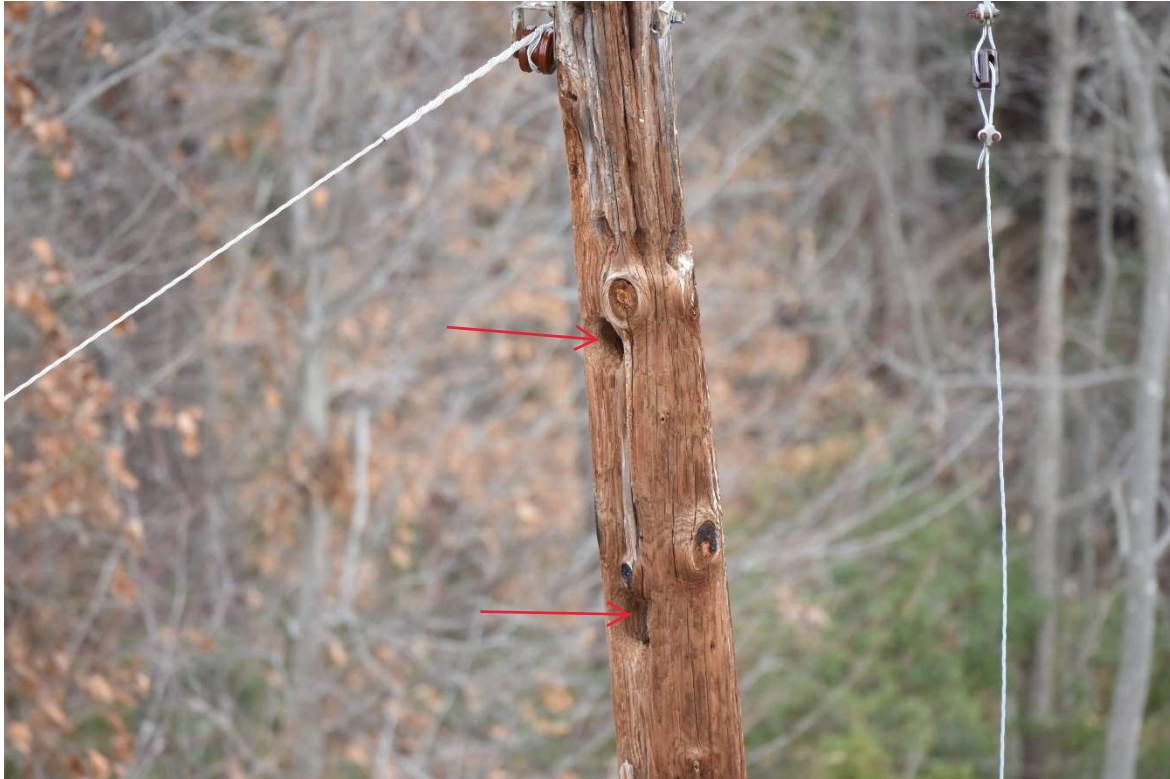
Str 224/51



Str 224/66, Broken Static Insulator



Str 224/78, Woodpecker Holes



Str 224/80, Woodpecker Holes



Str 224/80, Flashed Insulator



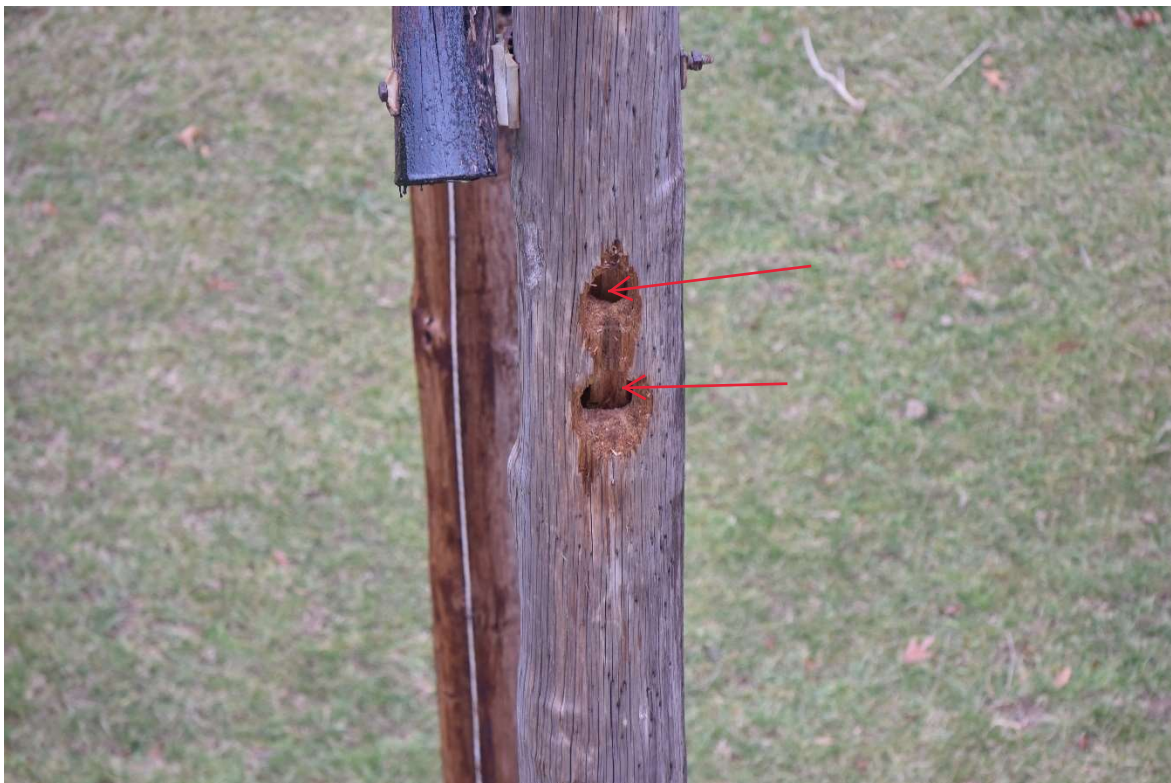
Str 224/81, Rotted cross-brace



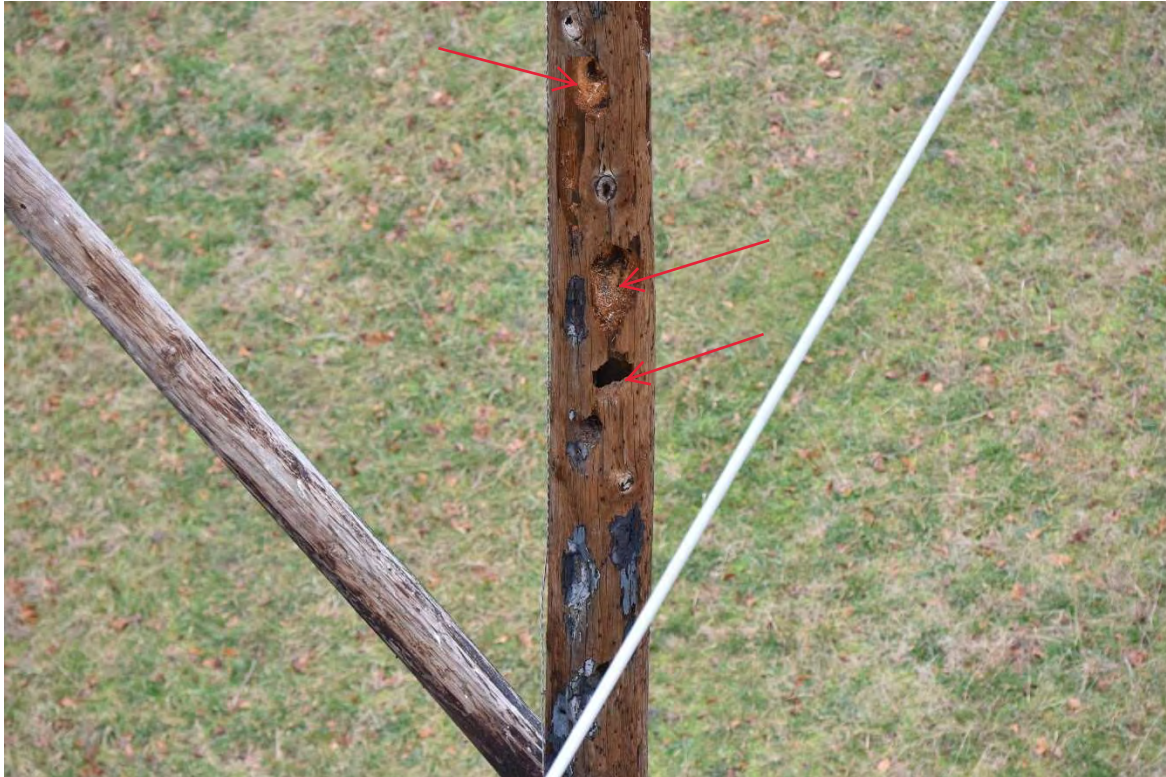
Str 224/83, Rusty Guy Wire



Str 224/88, Woodpecker Holes



Str 224/89, Woodpecker Holes



Str 224/90, Woodpecker Holes



Str 224/92, Woodpecker Hole



Str 224/92, Animal borrow at the pole base



Str 224/113, Woodpecker Holes



Str 224/117, Guy Wire out of thimble



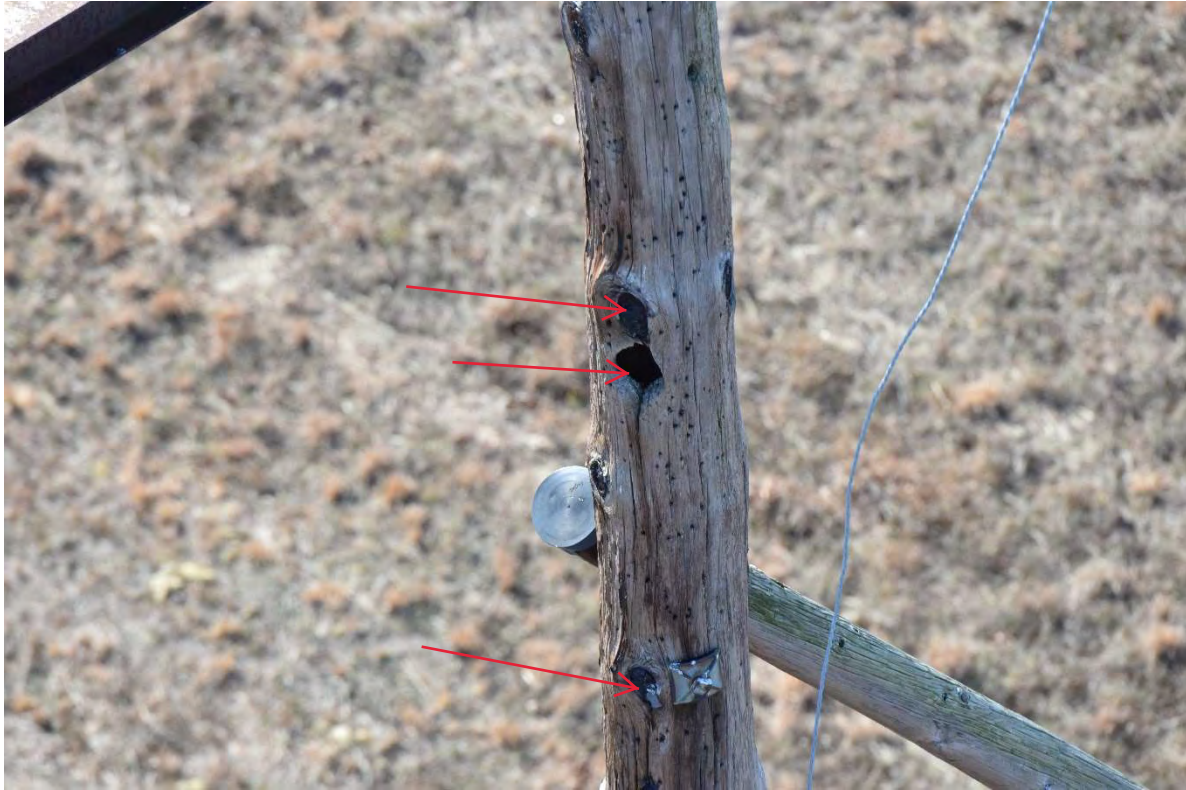
Str 224/122, Weathered static attachment



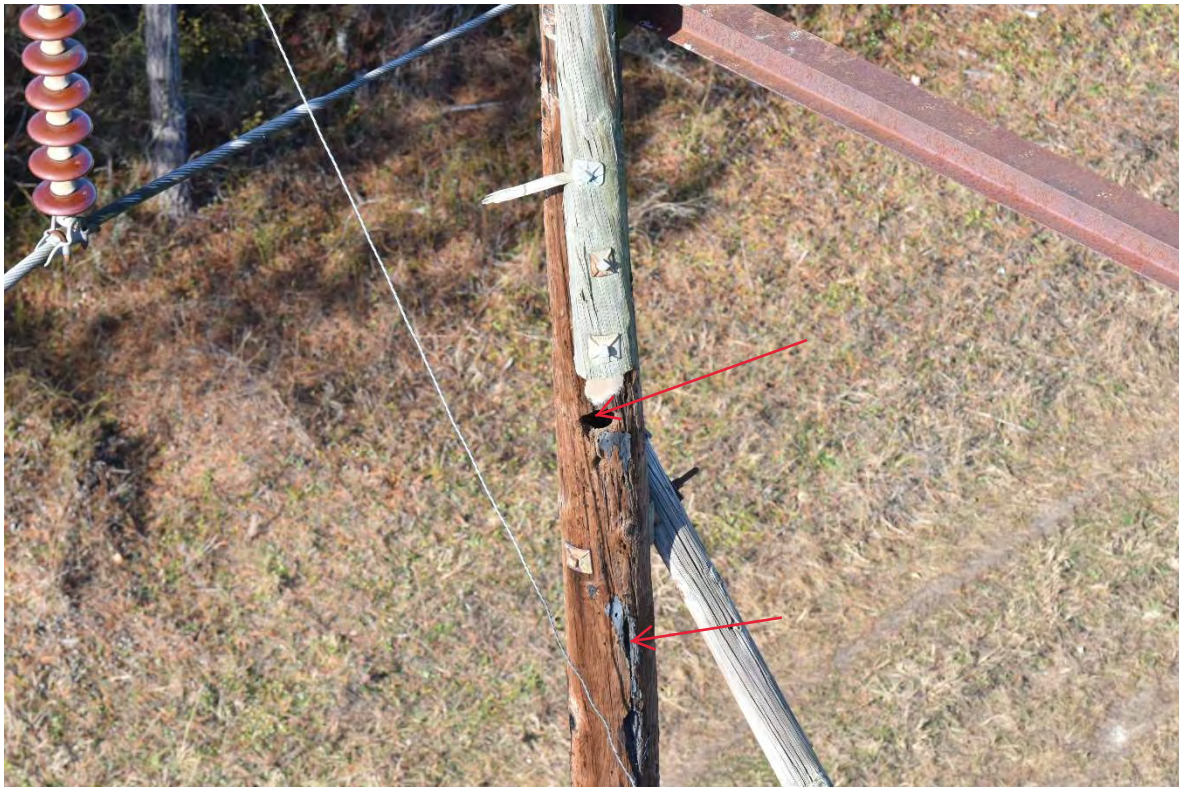
Str 224/124, Woodpecker Holes



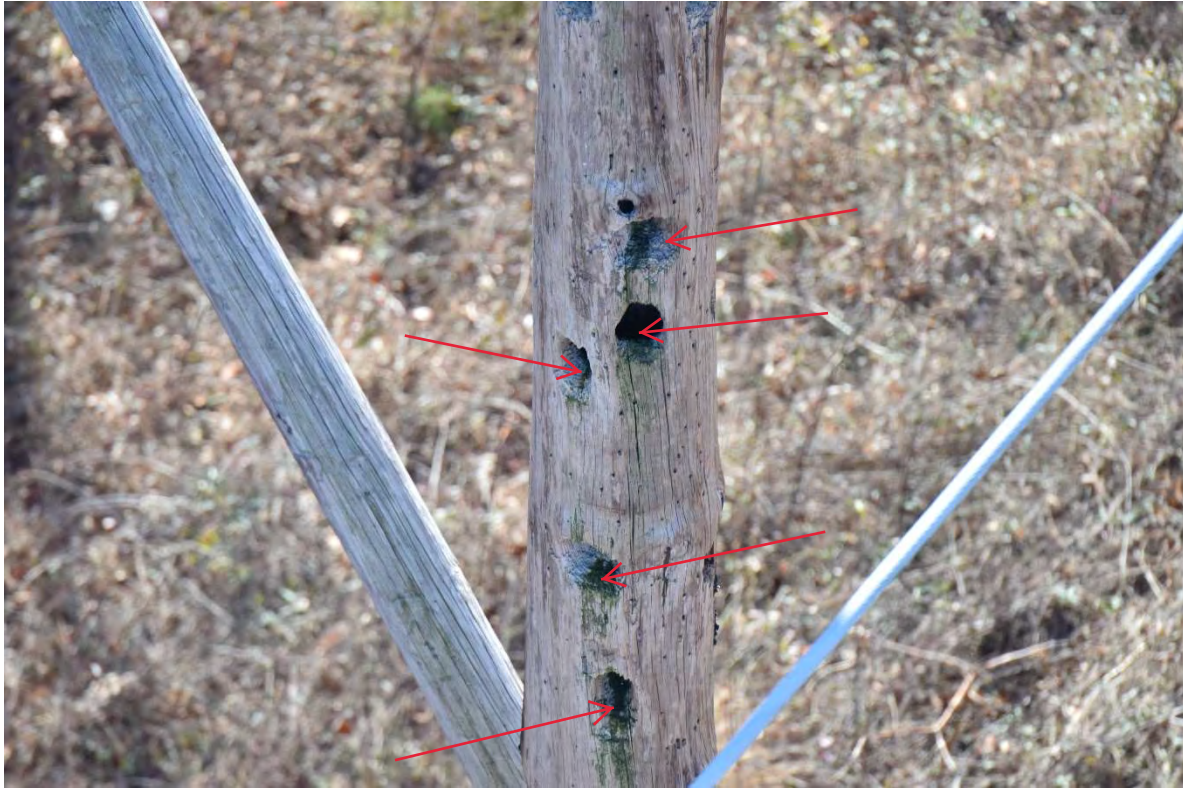
Str 224/133, Woodpecker Holes



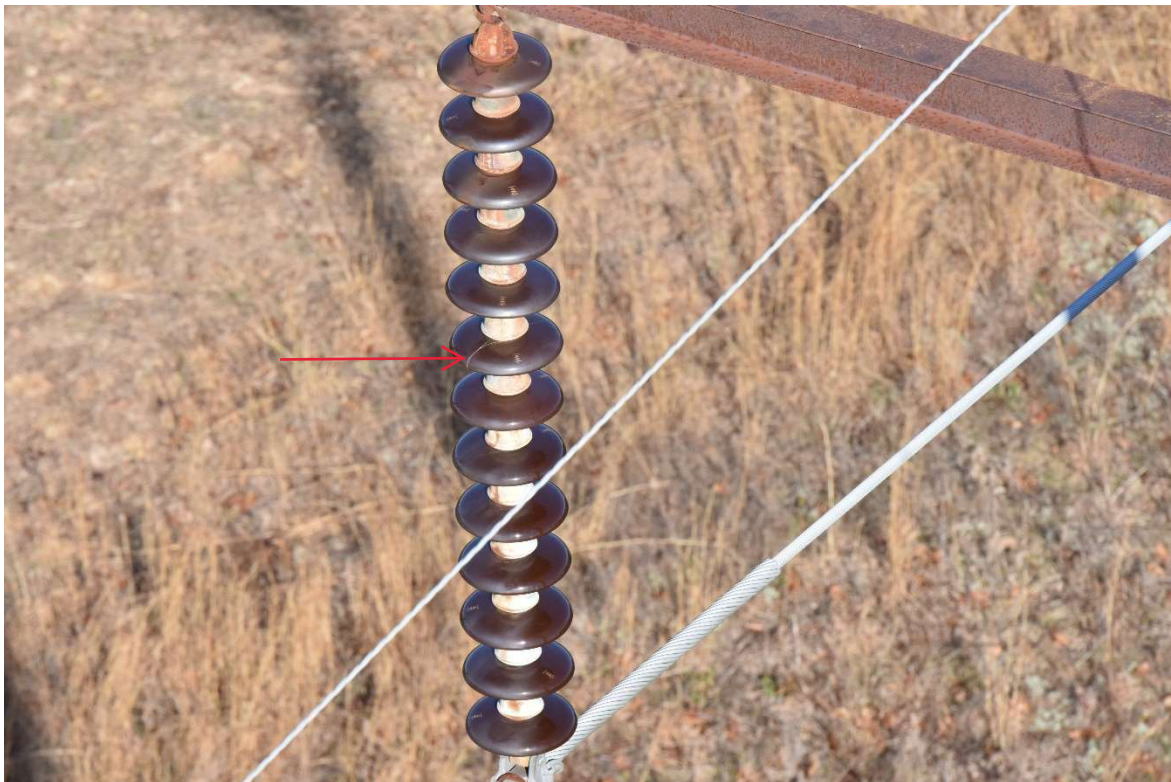
Str 224/138, Woodpecker Holes



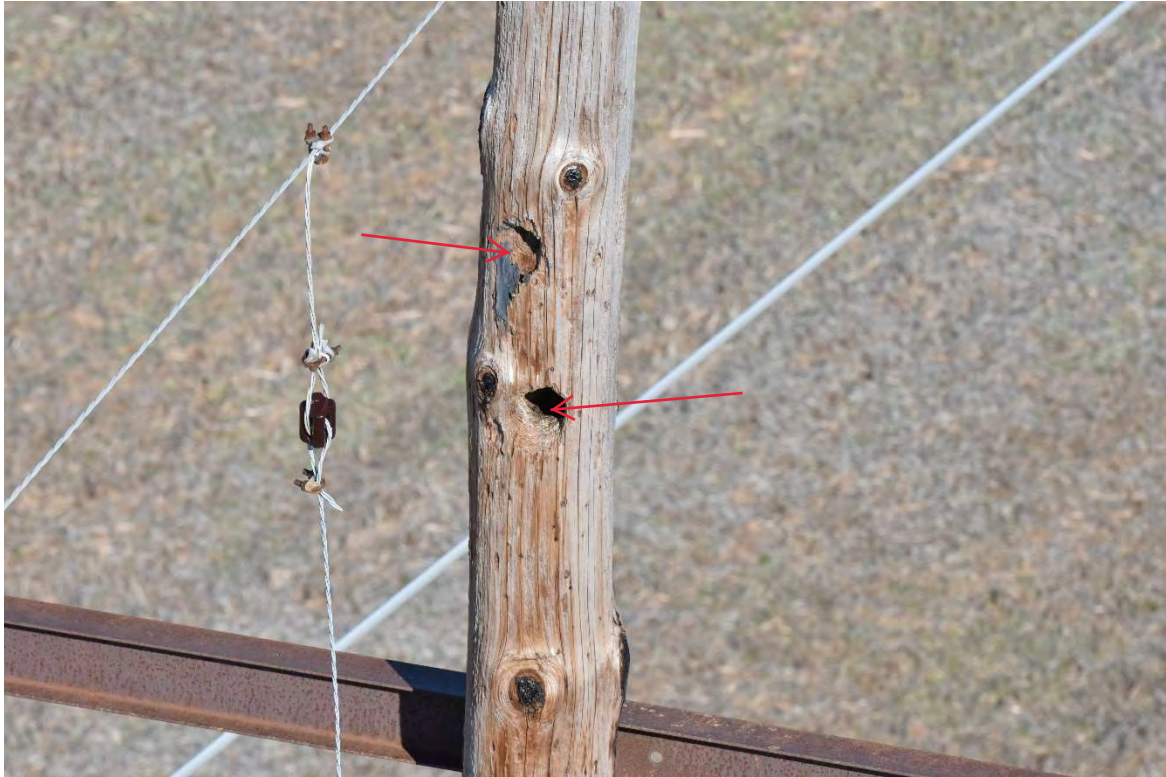
Str 224/141, Woodpecker Holes



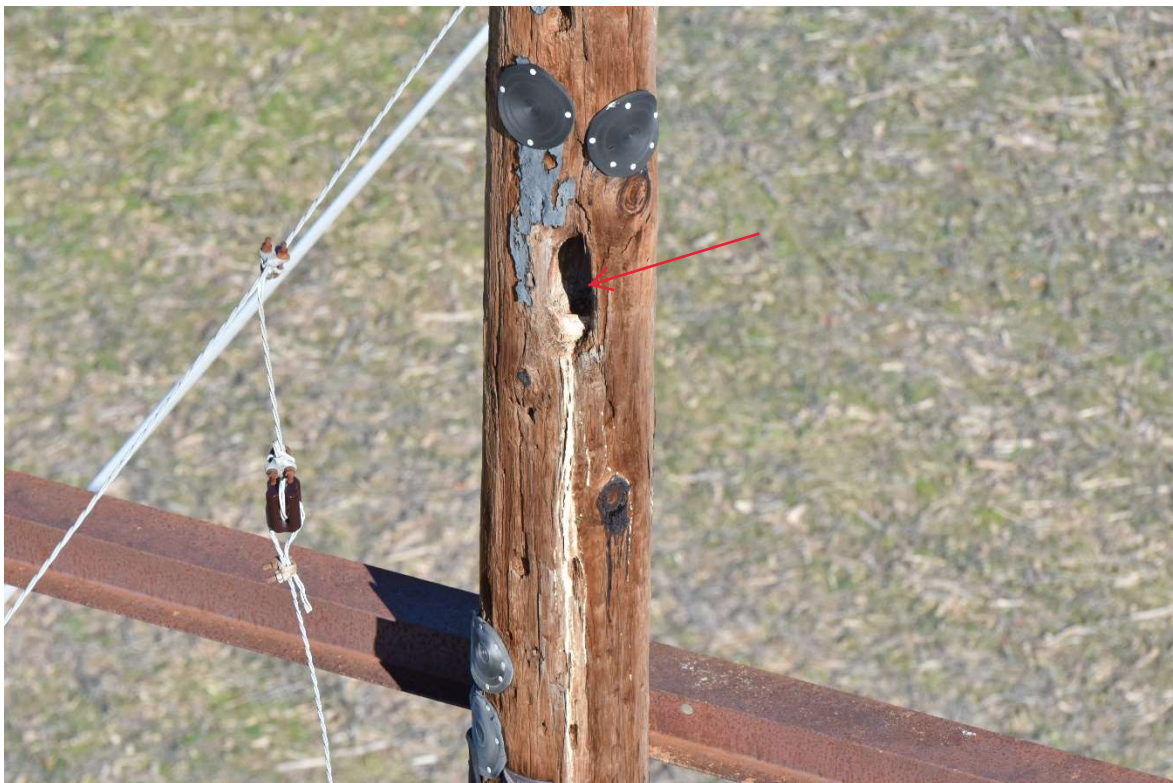
Str 224/166, Woodpecker Holes



Str 224/166, Cracked Insulator



Str 224/167, Woodpecker Holes



Str 224/177, Woodpecker Holes



Str 224/188, Woodpecker Holes



Str 224/193, Woodpecker Holes, Right Pole



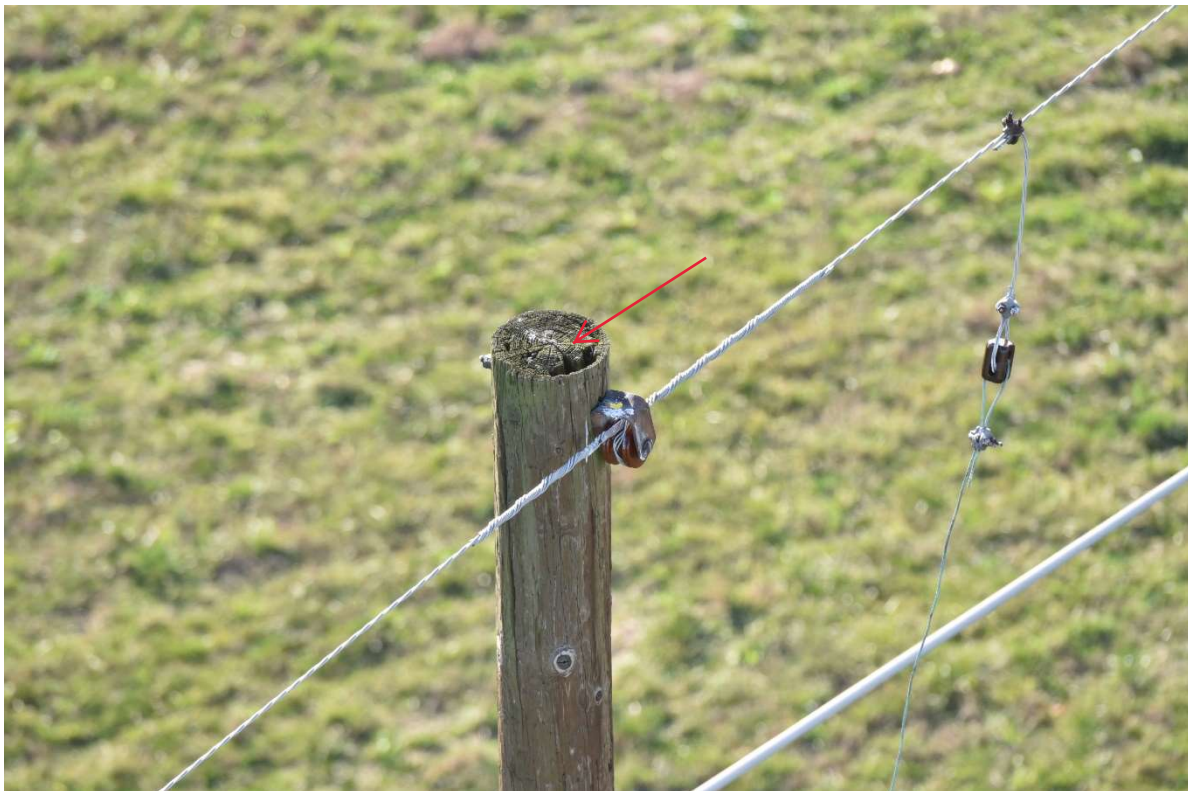
Str 224/193, Woodpecker Holes, Left Pole



Str 224/194, Woodpecker Holes



Str 224/210, Woodpecker Holes



Str 224/214, Rotted Pole



Str 224/240, Woodpecker Holes



Str 224/273, Woodpecker Holes



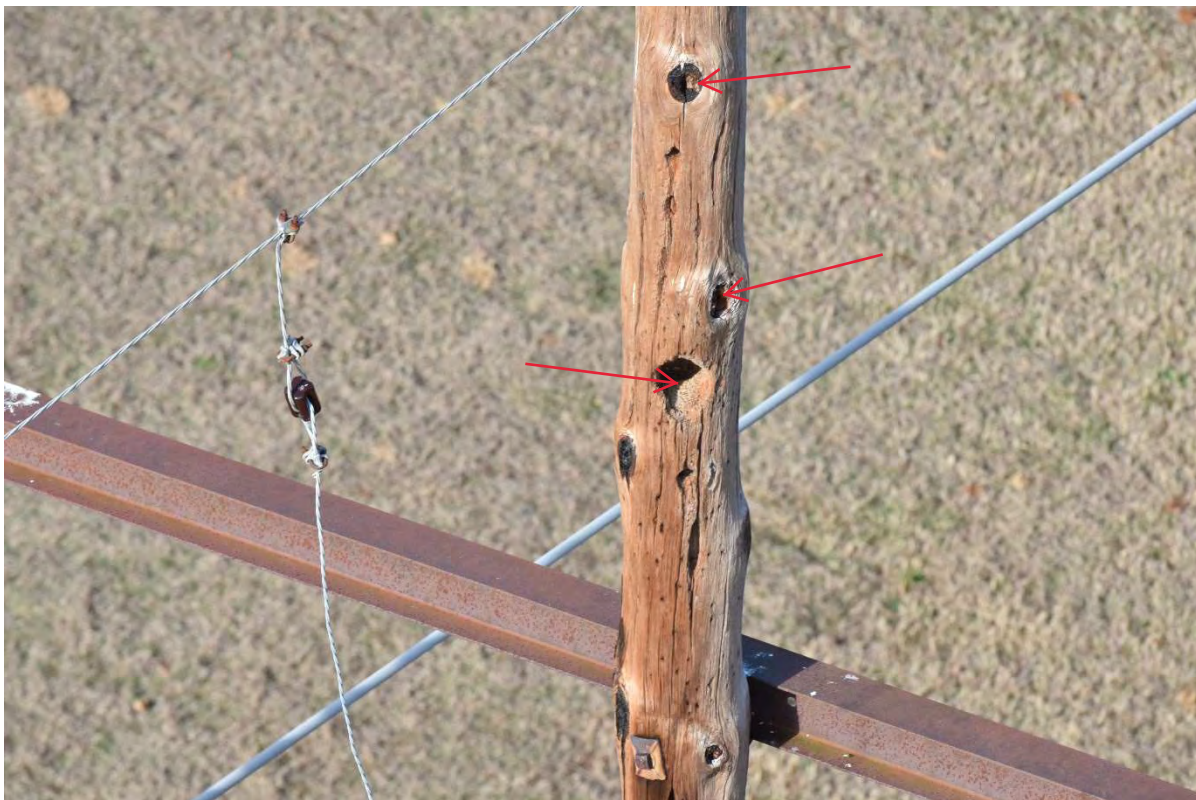
Str 224/280, Woodpecker Holes



Str 224/286, Woodpecker Holes



Str 224/287, Rotted Pole



Str 224/291, Woodpecker Holes



Str 224/292, Woodpecker Holes



Str 224/302, Woodpecker Holes

LINE #224 OPEN MAINTENANCE/INSPECTION NOTIFICATIONS					
Structure Number	Cause grp. text	Cause code text	Cause Text	Notif.Date	Reported By
224/5	Wood Pole	WP Damage-MI=Minor, MA=Major	Woodpecker Holes	01/20/2020	HAVERFIELD
			L	01/20/2020	HAVERFIELD
	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	Prioritized by Evan VanBrackle on 3/23	01/20/2020	HAVERFIELD
	Wood Pole	WP Damage-MI=Minor, MA=Major	Woodpecker Holes	01/20/2020	HAVERFIELD
224/15			R	01/20/2020	HAVERFIELD
	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	Prioritized by Evan VanBrackle on 3/23	01/20/2020	HAVERFIELD
224/23	Wood Pole	WP Damage-MI=Minor, MA=Major	Woodpecker Holes	01/20/2020	HAVERFIELD
			L	01/20/2020	HAVERFIELD
	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	Prioritized by Evan VanBrackle on 3/23	01/20/2020	HAVERFIELD
224/24	Wood Pole	Rot/Decay-Location/Type=	Rotten	01/20/2020	HAVERFIELD
			L	01/20/2020	HAVERFIELD
	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	Prioritized by Evan VanBrackle on 3/23	01/20/2020	HAVERFIELD
224/34	Wood Pole	Pole Position=	L	02/28/2017	ROBE980
	Wood Pole	WP Damage-MI=Minor, MA=Major	MI	02/28/2017	ROBE980
	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	RP	02/28/2017	ROBE980
	Wood Pole	WP Damage-MI=Minor, MA=Major	Woodpecker Holes	01/20/2020	HAVERFIELD
224/35			R	01/20/2020	HAVERFIELD
	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	Prioritized by Evan VanBrackle on 3/23	01/20/2020	HAVERFIELD
224/38	Wood Pole	WP Damage-MI=Minor, MA=Major	Moderate damage	02/28/2017	ROBE980
	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	RP	02/28/2017	ROBE980
224/39	Wood Pole	WP Damage-MI=Minor, MA=Major	Woodpecker Holes	02/28/2017	ROBE980
	Wood Pole	Pole Position=	R	02/28/2017	ROBE980
224/40	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	Prioritized by E. VanBrackle on 3/23/20	02/28/2017	ROBE980
	Wood Pole	WP Damage-MI=Minor, MA=Major	Woodpecker Holes	01/20/2020	HAVERFIELD
			L	01/20/2020	HAVERFIELD
	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	Prioritized by E. VanBrackle on 3/23/20	01/20/2020	HAVERFIELD
224/41	Wood Pole	Rot/Decay-Location/Type=		02/28/2017	ROBE980
	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	RP	02/28/2017	ROBE980
224/42	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	RP	02/28/2017	ROBE980
	Wood Pole	WP Damage-MI=Minor, MA=Major	MA (SEVERE)	02/28/2017	ROBE980
224/46	Wood Pole	Brace Other=	Woodpecker Holes	01/20/2020	HAVERFIELD
			L	01/20/2020	HAVERFIELD

LINE #224 OPEN MAINTENANCE/INSPECTION NOTIFICATIONS						
Structure Number	Cause grp. text	Cause code text	Cause Text	Notif.Date	Reported By	
224/48	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	Prioritized by E. VanBrackle on 3/23/20	01/20/2020	HAVERFIELD	
	Wood Pole	Pole Position=	R	02/28/2017	ROBE980	
	Guy	Guy Other=	Preform Thimble Out of Lay	01/20/2020	HAVERFIELD	
	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	Prioritized by E. VanBrackle on 3/23/20	02/28/2017	ROBE980	
	Wood Pole	WP Damage-MI=Minor, MA=Major	Moderate damage	02/28/2017	ROBE980	
224/49			L	01/20/2020	HAVERFIELD	
	Wood Pole	Pole Position=	R, L	02/28/2017	ROBE980	
	Wood Pole	Pole Other=	Weathered	01/20/2020	HAVERFIELD	
	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	RP	02/28/2017	ROBE980	
	Wood Pole	WP Damage-MI=Minor, MA=Major	MI	02/28/2017	ROBE980	
224/50			Prioritized by E. VanBrackle on 3/23/20	02/28/2017	ROBE980	
	Wood Pole	Pole Position=	L	01/20/2020	HAVERFIELD	
	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	Prioritized by E. VanBrackle on 3/23/20	01/20/2020	HAVERFIELD	
	Wood Pole	WP Damage-MI=Minor, MA=Major	Woodpecker Holes	01/20/2020	HAVERFIELD	
	Wood Pole	Pole Position=	R, L	02/28/2017	ROBE980	
224/51			R	01/20/2020	HAVERFIELD	
	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	RP	02/28/2017	ROBE980	
	Wood Pole	WP Damage-MI=Minor, MA=Major	MI	02/28/2017	ROBE980	
	Wood Pole	WP Damage-MI=Minor, MA=Major	Woodpecker Holes	01/20/2020	HAVERFIELD	
			M	01/20/2020	HAVERFIELD	
224/66	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	Prioritized by E. VanBrackle on 3/23/20	01/20/2020	HAVERFIELD	
	Wood Pole	Pole Position=	M	03/22/2017	CHRI641	
	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	RP	03/22/2017	CHRI641	
	Wood Pole	WP Damage-MI=Minor, MA=Major	MA (SEVERE)	03/22/2017	CHRI641	
	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	RP	09/16/2020	CECIL03	
224/73D	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	RP	09/16/2020	CECIL03	
224/78	Wood Pole	WP Damage-MI=Minor, MA=Major	Woodpecker Holes	01/18/2020	HAVERFIELD	
			L	01/18/2020	HAVERFIELD	
224/80	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	Prioritized by E. VanBrackle on 3/23/20	01/18/2020	HAVERFIELD	
	Wood Pole	WP Damage-MI=Minor, MA=Major	Woodpecker Holes	01/18/2020	HAVERFIELD	
			R	01/18/2020	HAVERFIELD	
	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	Prioritized by E. VanBrackle on 3/23/20	01/18/2020	HAVERFIELD	

LINE #224 OPEN MAINTENANCE/INSPECTION NOTIFICATIONS					
Structure Number	Cause grp. text	Cause code text	Cause Text	Notif.Date	Reported By
224/81	Wood Pole	Rot/Decay-Location/Type=	Rotten	01/18/2020	HAVERFIELD
			R	01/18/2020	HAVERFIELD
	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	Prioritized by E. VanBrackle on 3/23/20	01/18/2020	HAVERFIELD
224/83	Guy	Guy Other=	Corrosion/Rust (Heavy)	01/18/2020	HAVERFIELD
224/88	Wood Pole	WP Damage-MI=Minor, MA=Major	Woodpecker Holes	01/18/2020	HAVERFIELD
			R	01/18/2020	HAVERFIELD
	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	Prioritized by E. VanBrackle on 3/23/20	01/18/2020	HAVERFIELD
224/89	Wood Pole	WP Damage-MI=Minor, MA=Major	Woodpecker Holes	01/18/2020	HAVERFIELD
			L	01/18/2020	HAVERFIELD
	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	Prioritized by E. VanBrackle on 3/23/20	01/18/2020	HAVERFIELD
224/90	Wood Pole	WP Damage-MI=Minor, MA=Major	Woodpecker Holes	01/18/2020	HAVERFIELD
			L	01/18/2020	HAVERFIELD
	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	Prioritized by E. VanBrackle on 3/23/20	01/18/2020	HAVERFIELD
224/92	Wood Pole	WP Damage-MI=Minor, MA=Major	Woodpecker Holes	01/18/2020	HAVERFIELD
			R	01/18/2020	HAVERFIELD
	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	Prioritized by E. VanBrackle on 3/23/20	01/18/2020	HAVERFIELD
224/113	Wood Pole	WP Damage-MI=Minor, MA=Major	Woodpecker Holes	01/17/2020	HAVERFIELD
			R	01/17/2020	HAVERFIELD
	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	Prioritized by E. VanBrackle on 3/23/20	01/17/2020	HAVERFIELD
224/117	Guy	Guy Other=	Bridal Guy Preform Out of Thimble	01/17/2020	HAVERFIELD
			L	01/17/2020	HAVERFIELD
	Wood Pole	Pole Other=	Weathered	01/17/2020	HAVERFIELD
224/122			L	01/17/2020	HAVERFIELD
	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	Prioritized by E. VanBrackle on 3/23/20	01/17/2020	HAVERFIELD
	Wood Pole	WP Damage-MI=Minor, MA=Major	Woodpecker Holes	01/17/2020	HAVERFIELD
224/124			L	01/17/2020	HAVERFIELD
	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	Prioritized by E. VanBrackle on 3/23/20	01/17/2020	HAVERFIELD
	Wood Pole	WP Damage-MI=Minor, MA=Major	Woodpecker Holes	01/17/2020	HAVERFIELD
224/133			L	01/17/2020	HAVERFIELD
	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	Prioritized by E. VanBrackle on 3/23/20	01/17/2020	HAVERFIELD
	Wood Pole	WP Damage-MI=Minor, MA=Major	Woodpecker Holes	01/17/2020	HAVERFIELD

LINE #224 OPEN MAINTENANCE/INSPECTION NOTIFICATIONS					
Structure Number	Cause grp. text	Cause code text	Cause Text	Notif.Date	Reported By
224/138			L	01/17/2020	HAVERFIELD
	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	Prioritized by E. VanBrackle on 3/23/20	01/17/2020	HAVERFIELD
	Wood Pole	Pole Position=	Left	07/30/2018	HELOAIR
	Wood Pole	Pole Other=	Repair at base	07/30/2018	HELOAIR
224/141	Wood Pole	WP Damage-MI=Minor, MA=Major	Woodpecker Holes	01/17/2020	HAVERFIELD
			R	01/17/2020	HAVERFIELD
	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	Prioritized by E. VanBrackle on 3/23/20	01/17/2020	HAVERFIELD
	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	RP	03/15/2017	ROBE980
224/161	Wood Pole	WP Damage-MI=Minor, MA=Major	MI	03/15/2017	ROBE980
	Wood Pole	WP Damage-MI=Minor, MA=Major	Woodpecker Holes	01/17/2020	HAVERFIELD
	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	Prioritized by E. VanBrackle on 3/23/20	01/17/2020	HAVERFIELD
	Wood Pole	WP Damage-MI=Minor, MA=Major	Woodpecker Holes	01/17/2020	HAVERFIELD
224/167			L	01/17/2020	HAVERFIELD
	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	Prioritized by E. VanBrackle on 3/23/20	01/17/2020	HAVERFIELD
	Wood Pole	WP Damage-MI=Minor, MA=Major	Woodpecker Holes	01/17/2020	HAVERFIELD
			L	01/17/2020	HAVERFIELD
224/177	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	Prioritized by E. VanBrackle on 3/23/20	01/17/2020	HAVERFIELD
	Wood Pole	WP Damage-MI=Minor, MA=Major	Woodpecker Holes MI	01/17/2020	HAVERFIELD
	Wood Pole	Pole Position=	R	01/17/2020	HAVERFIELD
	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	Prioritized by E. VanBrackle on 3/23/20	01/17/2020	HAVERFIELD
224/188	Wood Pole	WP Damage-MI=Minor, MA=Major	Woodpecker Holes	03/09/2017	ROBE980
	Wood Pole	Pole Position=	R	03/09/2017	ROBE980
	Wood Pole	Pole Position=	L	03/09/2017	ROBE980
	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	Prioritized by E. VanBrackle on 3/23/20	03/09/2017	ROBE980
224/194	Wood Pole	WP Damage-MI=Minor, MA=Major	Woodpecker Holes	01/17/2020	HAVERFIELD
			L	01/17/2020	HAVERFIELD
	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	Prioritized by E. VanBrackle on 3/23/20	01/17/2020	HAVERFIELD
	Wood Pole	R/R(RP=Replace,RE=Repair) Severity=	RP	03/09/2017	ROBE980
224/196	Wood Pole	WP Damage-MI=Minor, MA=Major	MI, damage near static	03/09/2017	ROBE980



**T/L No. 224 Strs. No. 53-58, 182-184, 228-232
T/L 224**

LANEXA-NORTHERN NECK

**RAPPAHANNOCK RIVER CROSSING
MATTAPONI RIVER CROSSING
PAMUNKEY RIVER CROSSING**

INSPECTION FINDINGS

Introduction

Towers within the Line 224 inspection requirements this year run from the Rappahannock River to the North, Crossing the Pamunkey and Mattaponi Rivers to the south. The final report for Line 224 will indicate several towers that require further investigation and rehabilitation efforts.

Overall Summary

Rappahannock River Crossing: Strs. 53-58

The structures crossing the Rappahannock River near Tappahannock, VA seemed to have stabilized with the recent repairs however Tower 58 onshore to the south (neither previously inspected nor rehabilitated) exhibits 100% loss of section to structural steel pile flanges beneath the concrete cap.

Mattaponi River Crossing: Strs. 182-184

These structures exhibit minor loss of steel section but heavy cracking and efflorescence at the concrete caps.

Pamunkey River Crossing: Strs. 228-232

These structures exhibit some of the same concrete cap degradation indicated above in addition to loss of steel section to the supporting piles beneath. Towers 228 through 231 all exhibit 100% loss of steel section to structural steel pile flanges.

Recommendations

Near immediate rehabilitation efforts are recommended for towers 58 and 228 through 231. It is apparent that each of these structures requires structural rehabilitation and protection of the structural members from further corrosion.

Further investigation is recommended for structures 182-184 that exhibit extensive cracking to the concrete foundation caps.

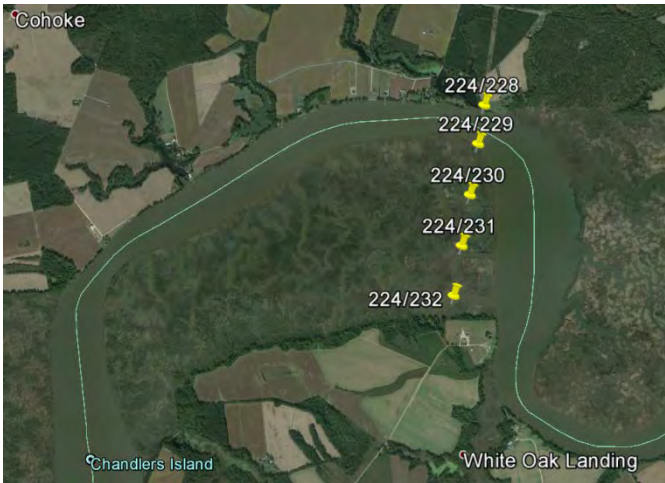
Rappahannock River Crossing



Mattaponi River Crossing



Pamunkey River Crossing



LEVEL I
FOUNDATION INSPECTION FORM

Attachment I.L.3
Page 3 of 75

TOWER LINE/STRUCTURE #: 224/53

DATE OF INSPECTION: 9-29-2014

SITE CONDITIONS

MARSH

OPEN ~~WATER~~

FRESH/SALT ~~WATER~~

TIDAL 08:10

WATER DEPTH 53"

(Record Time)

FOUNDATION COMPOSITION

WOOD

STEEL

CONCRETE

STEEL PILE SUPPORTED
CONCRETE ~~CAP~~

FOUNDATION INVENTORY

NUMBER OF FOUNDATIONS 4

NUMBER OF SUPPORT PILES PER FOUNDATION 3

PILE ENCAPSULATIONS ~~YES~~ NO TYPE FIBER GLASS JACKETS

TOWER PHOTOGRAPH

(INCLUDE IN FINAL REPORT)



OVERALL CONDITION OF FOUNDATION

GOOD

~~FAIR~~

POOR

NOTES:

PILES ARE JACKETED FROM CAP TO 1' BELOW MUDLINE

CAPS HAVE GOOD REPAIRS AT BASE, UPWARDS UP TO 16"

FOUNDATION INSPECTION FORM

FOUNDATION DESCRIPTION: 3 STEEL H PILES UNDER A CONCRETE CAP

FOUNDATION EVALUATIONS

FOUNDATION 1:

LOSS OF SECTION/PILE		RUNNING RUST/PILE		IMPACT DAMAGE/PILE		ENCAPSULATION/PILE	
NONE	A B C D	NONE	A B C D	NONE	A B C D	MISSING	A B C D
MINOR	A B C D	MINOR	A B C D	MINOR	A B C D	CRACKED	A B C D
MODERATE	A B C D	MODERATE	A B C D	MODERATE	A B C D	OVERALL	117"
SEVERE	A B C D	SEVERE	A B C D	SEVERE	A B C D	LENGTH	

COMMENTS

105" CAP TO MUD LINE. 53" WATER DEPTH.

PILES ARE JACKETED FROM CAP TO 1' BELOW MUDLINE

FOUNDATION 2:

LOSS OF SECTION/PILE		RUNNING RUST/PILE		IMPACT DAMAGE/PILE		ENCAPSULATION/PILE	
NONE	A B C D	NONE	A B C D	NONE	A B C D	MISSING	A B C D
MINOR	A B C D	MINOR	A B C D	MINOR	A B C D	CRACKED	A B C D
MODERATE	A B C D	MODERATE	A B C D	MODERATE	A B C D	OVERALL	112"
SEVERE	A B C D	SEVERE	A B C D	SEVERE	A B C D	LENGTH	

COMMENTS

100" CAP TO MUD LINE. 48" WATER DEPTH.

PILES ARE JACKETED FROM CAP TO 1' BELOW MUDLINE

FOUNDATION 3:

LOSS OF SECTION/PILE		RUNNING RUST/PILE		IMPACT DAMAGE/PILE		ENCAPSULATION/PILE	
NONE	A B C D	NONE	A B C D	NONE	A B C D	MISSING	A B C D
MINOR	A B C D	MINOR	A B C D	MINOR	A B C D	CRACKED	A B C D
MODERATE	A B C D	MODERATE	A B C D	MODERATE	A B C D	OVERALL	107"
SEVERE	A B C D	SEVERE	A B C D	SEVERE	A B C D	LENGTH	

COMMENTS

95" CAP TO MUD LINE. 43" WATER DEPTH.

PILES ARE JACKETED FROM CAP TO 1' BELOW MUDLINE

FOUNDATION 4:

LOSS OF SECTION/PILE		RUNNING RUST/PILE		IMPACT DAMAGE/PILE		ENCAPSULATION/PILE	
NONE	A B C D	NONE	A B C D	NONE	A B C D	MISSING	A B C D
MINOR	A B C D	MINOR	A B C D	MINOR	A B C D	CRACKED	A B C D
MODERATE	A B C D	MODERATE	A B C D	MODERATE	A B C D	OVERALL	126"
SEVERE	A B C D	SEVERE	A B C D	SEVERE	A B C D	LENGTH	

COMMENTS

114" CAP TO MUD LINE. 62" WATER DEPTH.

PILES ARE JACKETED FROM CAP TO 1' BELOW MUDLINE

ENCAPSULATION DIMENSIONS

PILE	FOUNDATION 1-DISTANCES		FOUNDATION 2-DISTANCES		FOUNDATION 3-DISTANCES		FOUNDATION 4-DISTANCES	
	FROM CAP	**FROM MUDLINE	FROM CAP	**FROM MUDLINE	FROM CAP	**FROM MUDLINE	FROM CAP	**FROM MUDLINE
A	0"	1' BELOW	0"	1' BELOW	0"	1' BELOW	0"	1' BELOW
B	0"	1' BELOW	0"	1' BELOW	0"	1' BELOW	0"	1' BELOW
C	0"	1' BELOW	0"	1' BELOW	0"	1' BELOW	0"	1' BELOW
D								

STEEL H-PILE INSPECTION
RAPPAHANNOCK RIVER

DATE INSPECTED
9-29-2014

TOWER NO.
224/53

**FOUNDATION
& PILE NO.**

RECORDED MEASUREMENTS

NDT MEASUREMENT

DISTANCE FROM CAP

N1

N2

N3

N1

N2

N3

1A

1B

1C

1D

2A

2B

2C

2D

3A

3B

3C

3D

4A

4B

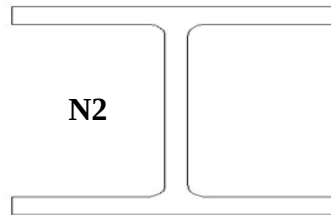
4C

4D

COMMENTS:

PILES ARE JACKETED FROM CAP TO 1' BELOW MUDLINE. UNABLE TO TAKE NDT READINGS

N1



N3

CONCRETE FOUNDATION INSPECTION
CHECKLIST
STR. # 224/53 LEG # 1

1.) GENERAL CONDITION OF THE CONCRETE FOUNDATION:

- ☐ GOOD
- ☒ SATISFACTORY
- ☐ POOR

**FND. TO BE SOUNDED TO DETERMINE VOIDS, LAMINATIONS,
SOUNDNESS, ETC.**

2.) SURFACE DEFECTS:

- ☐ SPALLING / SCALING
- ☐ POPOUTS
- ☒ CRACKS $\leq 1/16$ " WIDE
- ☐ CRACKS $\geq 1/16$ " TO $1/4$ " WIDE
- ☐ SHRINKAGE CRACKS
- ☐ EFFLORESCENCE
- ☐ EVIDENCE OF ALKALI – AGGREGATE REACTION
- ☐ EXPOSED REINFORCEMENT / CORROSION
- ☐ VISIBLE DAMAGE

3.) COMMENTS:

RUNNING RUST.

HAIRLINE MAP CRACKING

GOOD REPAIR ON BOTTOM OF CAP, UPWARDS TO 11"

INSPECTED BY: CURTIS WADE

DATE: 9-29-2014

CONCRETE FOUNDATION INSPECTION
CHECKLIST
STR. # 224/53 LEG # 2

1.) GENERAL CONDITION OF THE CONCRETE FOUNDATION:

- ☐ GOOD
- ☒ SATISFACTORY
- ☐ POOR

**FND. TO BE SOUNDED TO DETERMINE VOIDS, LAMINATIONS,
SOUNDNESS, ETC.**

2.) SURFACE DEFECTS:

- ☐ SPALLING / SCALING
- ☐ POPOUTS
- ☒ CRACKS $\leq 1/16$ " WIDE
- ☐ CRACKS $\geq 1/16$ " TO $1/4$ " WIDE
- ☐ SHRINKAGE CRACKS
- ☐ EFFLORESCENCE
- ☐ EVIDENCE OF ALKALI – AGGREGATE REACTION
- ☐ EXPOSED REINFORCEMENT / CORROSION
- ☐ VISIBLE DAMAGE

3.) COMMENTS:

RUNNING RUST.

SOUTH FACE BOTTOM SOUTH WEST CORNER SPALL REPAIRED 13"W x 3.5"H

HAIR LINE MAP CRACKING

GOOD REPAIR ON BOTTOM OF CAP, UPWARDS TO 16"

INSPECTED BY: CURTIS WADE

DATE: 9-29-2014

CONCRETE FOUNDATION INSPECTION
CHECKLIST
STR. # 224/53 LEG # 3

1.) GENERAL CONDITION OF THE CONCRETE FOUNDATION:

- ☐ GOOD
- ☒ SATISFACTORY
- ☐ POOR

**FND. TO BE SOUNDED TO DETERMINE VOIDS, LAMINATIONS,
SOUNDNESS, ETC.**

2.) SURFACE DEFECTS:

- ☐ SPALLING / SCALING
- ☐ POPOUTS
- ☒ CRACKS $\leq 1/16$ " WIDE
- ☐ CRACKS $\geq 1/16$ " TO $1/4$ " WIDE
- ☐ SHRINKAGE CRACKS
- ☐ EFFLORESCENCE
- ☐ EVIDENCE OF ALKALI – AGGREGATE REACTION
- ☐ EXPOSED REINFORCEMENT / CORROSION
- ☐ VISIBLE DAMAGE

3.) COMMENTS:

RUNNING RUST

HAIR LINE MAP CRACKING

GOOD REPAIR ON BOTTOM OF CAP, UPWARDS TO 14"

INSPECTED BY: CURTIS WADE

DATE: 9-29-2014

CONCRETE FOUNDATION INSPECTION
CHECKLIST
STR. # 224/53 LEG # 4

1.) GENERAL CONDITION OF THE CONCRETE FOUNDATION:

- ☐ GOOD
- ☒ SATISFACTORY
- ☐ POOR

**FND. TO BE SOUNDED TO DETERMINE VOIDS, LAMINATIONS,
SOUNDNESS, ETC.**

2.) SURFACE DEFECTS:

- ☒ SPALLING / SCALING
- ☐ POPOUTS
- ☒ CRACKS $\leq 1/16$ " WIDE
- ☐ CRACKS $\geq 1/16$ " TO $1/4$ " WIDE
- ☐ SHRINKAGE CRACKS
- ☒ EFFLORESCENCE
- ☐ EVIDENCE OF ALKALI – AGGREGATE REACTION
- ☐ EXPOSED REINFORCEMENT / CORROSION
- ☐ VISIBLE DAMAGE

3.) COMMENTS:

RUNNING RUST.

HAIR LINE MAP CRACKING. WEST SIDE HAS MINOR EFFLORESCENCE
NORTH EAST CORNER SPALL 1.5"W x 2"H x 1/2"D
GOOD REPAIR ON BOTTOM OF CAP, UPWARDS TO 16"

INSPECTED BY: CURTIS WADE

DATE: 9-29-2014

STRUCTURE INVESTIGATION PHOTOGRAPHIC LOG

T/L No. 224 Structure No. 53



STRUCTURE INVESTIGATION PHOTOGRAPHIC LOG
T/L No. 224 Structure No. 53



FOUNDATION 1



FOUNDATION 1



STRUCTURE INVESTIGATION PHOTOGRAPHIC LOG
T/L No. 224 Structure No. 53



FOUNDATION 2



FOUNDATION 2

STRUCTURE INVESTIGATION PHOTOGRAPHIC LOG
T/L No. 224 Structure No. 53



FOUNDATION 3



FOUNDATION 3



STRUCTURE INVESTIGATION PHOTOGRAPHIC LOG
T/L No. 224 Structure No. 53



FOUNDATION 4



FOUNDATION 4



LEVEL I
FOUNDATION INSPECTION FORM

Attachment I.L.3
Page 15 of 75

TOWER LINE/STRUCTURE #: 224/54

DATE OF INSPECTION: 9-29-2014

SITE CONDITIONS MARSH OPEN ~~WATER~~ FRESH/~~SALT~~ WATER TIDAL 09:55
WATER DEPTH 18' 6" (Record Time)

FOUNDATION COMPOSITION

WOOD STEEL CONCRETE STEEL PILE ~~SUPPORTED~~
CONCRETE ~~CAP~~

FOUNDATION INVENTORY

NUMBER OF FOUNDATIONS 4
NUMBER OF SUPPORT PILES PER FOUNDATION 3
PILE ENCAPSULATIONS ~~YES~~ NO TYPE FIBER GLASS TOP 30" AND CONCRETE BAG JACKET

TOWER PHOTOGRAPH (INCLUDE IN FINAL REPORT)



OVERALL CONDITION OF FOUNDATION GOOD ~~FAIR~~ POOR

NOTES: _____

FOUNDATION INSPECTION FORM

FOUNDATION DESCRIPTION: 3 STEEL H PILES UNDER A CONCRETE CAP**FOUNDATION EVALUATIONS****FOUNDATION 1:**

LOSS OF SECTION/PILE		RUNNING RUST/PILE		IMPACT DAMAGE/PILE		ENCAPSULATION/PILE	
NONE	A B C D	NONE	A B C D	NONE	A B C D	MISSING	A B C D
MINOR	A B C D	MINOR	A B C D	MINOR	A B C D	CRACKED	A B C D
MODERATE	A B C D	MODERATE	A B C D	MODERATE	A B C D	OVERALL	30"
SEVERE	A B C D	SEVERE	A B C D	SEVERE	A B C D	LENGTH	

COMMENTS

23' 6" CAP TO MUD LINE. 18' 6" WATER DEPTH. FIBERGLASS JACKET EXTENDS 30" DOWN FROM CAP.

A BAG JACKET STOPS 11' BELOW CAP. B BAG JACKET STOPS 14' BELOW CAP. C BAG JACKET STOPS 12' BELOW CAP.

FOUNDATION 2:

LOSS OF SECTION/PILE		RUNNING RUST/PILE		IMPACT DAMAGE/PILE		ENCAPSULATION/PILE	
NONE	A B C D	NONE	A B C D	NONE	A B C D	MISSING	A B C D
MINOR	A B C D	MINOR	A B C D	MINOR	A B C D	CRACKED	A B C D
MODERATE	A B C D	MODERATE	A B C D	MODERATE	A B C D	OVERALL	27"
SEVERE	A B C D	SEVERE	A B C D	SEVERE	A B C D	LENGTH	

COMMENTS

23' 6" CAP TO MUD LINE. 18' 6" WATER DEPTH. FIBERGLASS JACKET EXTENDS 27" DOWN FROM CAP.

A, B AND C BAG JACKETS STOP 60" FROM CAP WITH EXPOSED REBAR.

FOUNDATION 3:

LOSS OF SECTION/PILE		RUNNING RUST/PILE		IMPACT DAMAGE/PILE		ENCAPSULATION/PILE	
NONE	A B C D	NONE	A B C D	NONE	A B C D	MISSING	A B C D
MINOR	A B C D	MINOR	A B C D	MINOR	A B C D	CRACKED	A B C D
MODERATE	A B C D	MODERATE	A B C D	MODERATE	A B C D	OVERALL	31"
SEVERE	A B C D	SEVERE	A B C D	SEVERE	A B C D	LENGTH	

COMMENTS

23' 6" CAP TO MUD LINE. 18' 6" WATER DEPTH. FIBERGLASS JACKET EXTENDS 31" DOWN FROM CAP.

A, B AND C BAG JACKETS STOP 58" FROM CAP WITH EXPOSED REBAR.

FOUNDATION 4:

LOSS OF SECTION/PILE		RUNNING RUST/PILE		IMPACT DAMAGE/PILE		ENCAPSULATION/PILE	
NONE	A B C D	NONE	A B C D	NONE	A B C D	MISSING	A B C D
MINOR	A B C D	MINOR	A B C D	MINOR	A B C D	CRACKED	A B C D
MODERATE	A B C D	MODERATE	A B C D	MODERATE	A B C D	OVERALL	31"
SEVERE	A B C D	SEVERE	A B C D	SEVERE	A B C D	LENGTH	

COMMENTS

23' 6" CAP TO MUD LINE. 18' 6" WATER DEPTH. FIBERGLASS JACKET EXTENDS 31" DOWN FROM CAP.

A BAG JACKET 3' OF JACKET REMAINING. B BAG JACKET 5' OF JACKET REMAINING. C BAG JACKET 26" OF JACKET REMAINING

ENCAPSULATION DIMENSIONS

PILE	FOUNDATION 1-DISTANCES		FOUNDATION 2-DISTANCES		FOUNDATION 3-DISTANCES		FOUNDATION 4-DISTANCES	
	FROM CAP	**FROM MUDLINE	FROM CAP	**FROM MUDLINE	FROM CAP	**FROM MUDLINE	FROM CAP	**FROM MUDLINE
A	0"	5'	0"	15"	0"	15"	0"	15"
B	0"	6'	0"	15"	0"	6"	0"	6"
C	0"	6'	0"	15"	0"	6"	0"	28"
D								

STEEL H-PILE INSPECTION
RAPPAHANNOCK RIVER

DATE INSPECTED
9-29-2014

TOWER NO. 224/54	FOUNDATION & PILE NO.	RECORDED MEASUREMENTS					
		NDT MEASUREMENT			DISTANCE FROM CAP		
		N1	N2	N3	N1	N2	N3
	1A						
	1B	0.445	0.495	0.445	38"	38"	38"
	1C						
	1D						
	2A	0.410	0.525	0.440	33"	33"	33"
	2B						
	2C						
	2D						
	3A						
	3B						
	3C	0.590	0.500	0.505	40"	40"	40"
	3D						
	4A	0.490	0.505	0.495	41"	41"	41"
	4B						
	4C						
	4D						

COMMENTS:

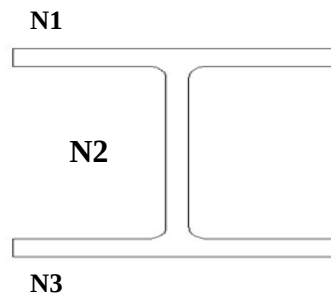
NDT READINGS TAKEN 1" BELOW DOUBLER PLATES NEAR CAP. SUPPLEMENTAL NDT READINGS TAKEN AT MUD LINE.

NDT READINGS PILE 1 B AT MUD LINE 0.585, 0.575, 0.575

NDT READINGS PILE 2 A AT MUD LINE 0.605, 0.570, 0.620

NDT READINGS PILE 3 C AT MUD LINE 0.590, 0.590, 0.625

NDT READINGS PILE 4 A, 5' ABOVE MUD LINE, 1' ABOVE FAILING CONCRETE BAG JACKET 0.575, 0.565, 0.575



CONCRETE FOUNDATION INSPECTION
CHECKLIST
STR. # 224/54 LEG # 1

1.) GENERAL CONDITION OF THE CONCRETE FOUNDATION:

- ☐ GOOD
- ☒ SATISFACTORY
- ☐ POOR

**FND. TO BE SOUNDED TO DETERMINE VOIDS, LAMINATIONS,
SOUNDNESS, ETC.**

2.) SURFACE DEFECTS:

- ☐ SPALLING / SCALING
- ☐ POPOUTS
- ☒ CRACKS $\leq 1/16$ " WIDE
- ☐ CRACKS $\geq 1/16$ " TO $1/4$ " WIDE
- ☐ SHRINKAGE CRACKS
- ☐ EFFLORESCENCE
- ☐ EVIDENCE OF ALKALI – AGGREGATE REACTION
- ☐ EXPOSED REINFORCEMENT / CORROSION
- ☐ VISIBLE DAMAGE

3.) COMMENTS:

RUNNING RUST.

HAIR LINE MAP CRACKING

GOOD REPAIR ON BOTTOM OF CAP, UPWARDS TO 16"

INSPECTED BY: CURTIS WADE

DATE: 9-29-2014

CONCRETE FOUNDATION INSPECTION
CHECKLIST
STR. # 224/54 LEG # 2

1.) GENERAL CONDITION OF THE CONCRETE FOUNDATION:

- ☐ GOOD
- ☒ SATISFACTORY
- ☐ POOR

**FND. TO BE SOUNDED TO DETERMINE VOIDS, LAMINATIONS,
SOUNDNESS, ETC.**

2.) SURFACE DEFECTS:

- ☐ SPALLING / SCALING
- ☐ POPOUTS
- ☒ CRACKS $\leq 1/16$ " WIDE
- ☐ CRACKS $\geq 1/16$ " TO $1/4$ " WIDE
- ☐ SHRINKAGE CRACKS
- ☐ EFFLORESCENCE
- ☐ EVIDENCE OF ALKALI – AGGREGATE REACTION
- ☐ EXPOSED REINFORCEMENT / CORROSION
- ☐ VISIBLE DAMAGE

3.) COMMENTS:

RUNNING RUST.

HAIR LINE MAP CRACKING

GOOD REPAIR ON BOTTOM OF CAP, UPWARDS TO 27"

INSPECTED BY: CURTIS WADE

DATE: 9-29-2014

CONCRETE FOUNDATION INSPECTION
CHECKLIST
STR. # 224/54 LEG # 3

1.) GENERAL CONDITION OF THE CONCRETE FOUNDATION:

- ☐ GOOD
- ☒ SATISFACTORY
- ☐ POOR

**FND. TO BE SOUNDED TO DETERMINE VOIDS, LAMINATIONS,
SOUNDNESS, ETC.**

2.) SURFACE DEFECTS:

- ☐ SPALLING / SCALING
- ☐ POPOUTS
- ☒ CRACKS $\leq 1/16$ " WIDE
- ☐ CRACKS $\geq 1/16$ " TO $1/4$ " WIDE
- ☐ SHRINKAGE CRACKS
- ☐ EFFLORESCENCE
- ☐ EVIDENCE OF ALKALI – AGGREGATE REACTION
- ☐ EXPOSED REINFORCEMENT / CORROSION
- ☐ VISIBLE DAMAGE

3.) COMMENTS:

RUNNING RUST

HAIR LINE MAP CRACKING

GOOD REPAIR ON BOTTOM OF CAP, UPWARDS TO 18"

INSPECTED BY: CURTIS WADE

DATE: 9-29-2014

CONCRETE FOUNDATION INSPECTION
CHECKLIST
STR. # 224/54 LEG # 4

1.) **GENERAL CONDITION OF THE CONCRETE FOUNDATION:**

- ☐ **GOOD**
- ☒ **SATISFACTORY**
- ☐ **POOR**

**FND. TO BE SOUNDED TO DETERMINE VOIDS, LAMINATIONS,
SOUNDNESS, ETC.**

2.) **SURFACE DEFECTS:**

- ☒ **SPALLING / SCALING**
- ☐ **POPOUTS**
- ☒ **CRACKS $\leq 1/16$ " WIDE**
- ☐ **CRACKS $\geq 1/16$ " TO $1/4$ " WIDE**
- ☐ **SHRINKAGE CRACKS**
- ☐ **EFFLORESCENCE**
- ☐ **EVIDENCE OF ALKALI – AGGREGATE REACTION**
- ☐ **EXPOSED REINFORCEMENT / CORROSION**
- ☐ **VISIBLE DAMAGE**

3.) **COMMENTS:**

RUNNING RUST.

HAIR LINE MAP CRACKING

NORTH WEST EDGE SPALL 3.5"W x 3"H x 1/4"D, 17" UP FROM BASE

GOOD REPAIR ON BOTTOM OF CAP, UPWARDS TO 17"

INSPECTED BY: CURTIS WADE

DATE: 9-29-2014

STRUCTURE INVESTIGATION PHOTOGRAPHIC LOG

T/L No. 224 Structure No. 54



STRUCTURE INVESTIGATION PHOTOGRAPHIC LOG
T/L No. 224 Structure No. 54



FOUNDATION 1



FOUNDATION 1



STRUCTURE INVESTIGATION PHOTOGRAPHIC LOG

T/L No. 224 Structure No. 54



FOUNDATION 2



FOUNDATION 2



STRUCTURE INVESTIGATION PHOTOGRAPHIC LOG
T/L No. 224 Structure No. 54



FOUNDATION 3



FOUNDATION 3



STRUCTURE INVESTIGATION PHOTOGRAPHIC LOG

T/L No. 224 Structure No. 54



FOUNDATION 4



FOUNDATION 4

LEVEL I
FOUNDATION INSPECTION FORM

Attachment I.L.3
Page 27 of 75

TOWER LINE/STRUCTURE #: 224/55

DATE OF INSPECTION: 9-29-2014

SITE CONDITIONS MARSH OPEN ~~WATER~~ FRESH/~~SALT~~ WATER TIDAL 13:40
WATER DEPTH 26' (Record Time)

FOUNDATION COMPOSITION

WOOD STEEL CONCRETE STEEL PILE ~~SUPPORTED~~
CONCRETE ~~CAP~~

FOUNDATION INVENTORY

NUMBER OF FOUNDATIONS 4
NUMBER OF SUPPORT PILES PER FOUNDATION 3
PILE ENCAPSULATIONS ~~YES~~ NO TYPE FIBER GLASS TOP 30" AND CONCRETE BAG JACKET

TOWER PHOTOGRAPH (INCLUDE IN FINAL REPORT)



OVERALL CONDITION OF FOUNDATION GOOD ~~FAIR~~ POOR

NOTES: _____

FOUNDATION INSPECTION FORM

FOUNDATION DESCRIPTION: 3 STEEL H PILES UNDER A CONCRETE CAP

FOUNDATION EVALUATIONS

FOUNDATION 1:

LOSS OF SECTION/PILE		RUNNING RUST/PILE		IMPACT DAMAGE/PILE		ENCAPSULATION/PILE	
NONE	A B C D	NONE	A B C D	NONE	A B C D	MISSING	A B C D
MINOR	A B C D	MINOR	A B C D	MINOR	A B C D	CRACKED	A B C D
MODERATE	A B C D	MODERATE	A B C D	MODERATE	A B C D	OVERALL	36"
SEVERE	A B C D	SEVERE	A B C D	SEVERE	A B C D	LENGTH	

COMMENTS

32' CAP TO MUD LINE. 26' WATER DEPTH. FIBERGLASS JACKET EXTENDS 36" DOWN FROM CAP.

A, B AND C BAG JACKETS STOP 64" FROM CAP WITH EXPOSED REBAR.

FOUNDATION 2:

LOSS OF SECTION/PILE		RUNNING RUST/PILE		IMPACT DAMAGE/PILE		ENCAPSULATION/PILE	
NONE	A B C D	NONE	A B C D	NONE	A B C D	MISSING	A B C D
MINOR	A B C D	MINOR	A B C D	MINOR	A B C D	CRACKED	A B C D
MODERATE	A B C D	MODERATE	A B C D	MODERATE	A B C D	OVERALL	26"
SEVERE	A B C D	SEVERE	A B C D	SEVERE	A B C D	LENGTH	

COMMENTS

32' CAP TO MUD LINE. 26' WATER DEPTH. FIBERGLASS JACKET EXTENDS 26" DOWN FROM CAP.

A, B AND C BAG JACKETS STOP 54" FROM CAP WITH EXPOSED REBAR.

FOUNDATION 3:

LOSS OF SECTION/PILE		RUNNING RUST/PILE		IMPACT DAMAGE/PILE		ENCAPSULATION/PILE	
NONE	A B C D	NONE	A B C D	NONE	A B C D	MISSING	A B C D
MINOR	A B C D	MINOR	A B C D	MINOR	A B C D	CRACKED	A B C D
MODERATE	A B C D	MODERATE	A B C D	MODERATE	A B C D	OVERALL	30"
SEVERE	A B C D	SEVERE	A B C D	SEVERE	A B C D	LENGTH	

COMMENTS

32' CAP TO MUD LINE. 26' WATER DEPTH. FIBERGLASS JACKET EXTENDS 30" DOWN FROM CAP.

A, B AND C BAG JACKETS STOP 52" FROM CAP WITH EXPOSED REBAR.

FOUNDATION 4:

LOSS OF SECTION/PILE		RUNNING RUST/PILE		IMPACT DAMAGE/PILE		ENCAPSULATION/PILE	
NONE	A B C D	NONE	A B C D	NONE	A B C D	MISSING	A B C D
MINOR	A B C D	MINOR	A B C D	MINOR	A B C D	CRACKED	A B C D
MODERATE	A B C D	MODERATE	A B C D	MODERATE	A B C D	OVERALL	27"
SEVERE	A B C D	SEVERE	A B C D	SEVERE	A B C D	LENGTH	

COMMENTS

32' CAP TO MUD LINE. 26' WATER DEPTH. FIBERGLASS JACKET EXTENDS 27" DOWN FROM CAP.

A, B AND C BAG JACKETS STOP 52" FROM CAP WITH EXPOSED REBAR.

ENCAPSULATION DIMENSIONS

PILE	FOUNDATION 1-DISTANCES		FOUNDATION 2-DISTANCES		FOUNDATION 3-DISTANCES		FOUNDATION 4-DISTANCES	
	FROM CAP	**FROM MUDLINE	FROM CAP	**FROM MUDLINE	FROM CAP	**FROM MUDLINE	FROM CAP	**FROM MUDLINE
A	0"	7"	0"	0"	0"	4"	0"	0"
B	0"	10"	0"	0"	0"	4"	0"	7"
C	0"	6"	0"	0"	0"	0"	0"	7"
D								

STEEL H-PILE INSPECTION
RAPPAHANNOCK RIVER

DATE INSPECTED
9-29-2014

TOWER NO. 224/55	FOUNDATION & PILE NO.	RECORDED MEASUREMENTS					
		NDT MEASUREMENT			DISTANCE FROM CAP		
		N1	N2	N3	N1	N2	N3
	1A						
	1B						
	1C	0.530	0.565	0.550	41"	41"	41"
	1D						
	2A	0.500	0.560	0.460	39"	39"	39"
	2B						
	2C						
	2D						
	3A						
	3B	0.495	0.565	0.565	39"	39"	39"
	3C						
	3D						
	4A	0.580	0.520	0.540	38"	38'	38"
	4B						
	4C						
	4D						

COMMENTS:

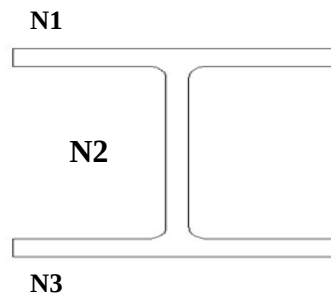
NDT READINGS TAKEN 1" BELOW DOUBLER PLATES NEAR CAP. SUPPLEMENTAL NDT READINGS TAKEN AT MUD LINE.

NDT READINGS PILE 1 C AT MUD LINE 0.675, 0.680, 0.695

NDT READINGS PILES 2 DEBRIS ON BOTTOM OF ALL PILES

NDT READINGS PILES 3 DEBRIS ON BOTTOM OF ALL PILES

NDT READINGS PILE 4 B AT MUD LINE 0.665, 0.630, 0.665. READINGS TAKEN ON PILE 4 B BECAUSE PILE 4 A HAD DEBRIS AT MUD LINE



CONCRETE FOUNDATION INSPECTION
CHECKLIST
STR. # 224/55 LEG # 1

1.) GENERAL CONDITION OF THE CONCRETE FOUNDATION:

- ☐ GOOD
- ☒ SATISFACTORY
- ☐ POOR

**FND. TO BE SOUNDED TO DETERMINE VOIDS, LAMINATIONS,
SOUNDNESS, ETC.**

2.) SURFACE DEFECTS:

- ☐ SPALLING / SCALING
- ☐ POPOUTS
- ☒ CRACKS $\leq 1/16$ " WIDE
- ☐ CRACKS $\geq 1/16$ " TO $1/4$ " WIDE
- ☐ SHRINKAGE CRACKS
- ☐ EFFLORESCENCE
- ☐ EVIDENCE OF ALKALI – AGGREGATE REACTION
- ☐ EXPOSED REINFORCEMENT / CORROSION
- ☐ VISIBLE DAMAGE

3.) COMMENTS:

RUNNING RUST.

HAIR LINE MAP CRACKING

GOOD REPAIR ON BOTTOM OF CAP, UPWARDS TO 16"

INSPECTED BY: CURTIS WADE

DATE: 9-29-2014

CONCRETE FOUNDATION INSPECTION
CHECKLIST
STR. # 224/55 LEG # 2

1.) GENERAL CONDITION OF THE CONCRETE FOUNDATION:

- ☐ GOOD
- ☒ SATISFACTORY
- ☐ POOR

**FND. TO BE SOUNDED TO DETERMINE VOIDS, LAMINATIONS,
SOUNDNESS, ETC.**

2.) SURFACE DEFECTS:

- ☐ SPALLING / SCALING
- ☐ POPOUTS
- ☒ CRACKS $\leq 1/16$ " WIDE
- ☐ CRACKS $\geq 1/16$ " TO $1/4$ " WIDE
- ☐ SHRINKAGE CRACKS
- ☐ EFFLORESCENCE
- ☐ EVIDENCE OF ALKALI – AGGREGATE REACTION
- ☐ EXPOSED REINFORCEMENT / CORROSION
- ☐ VISIBLE DAMAGE

3.) COMMENTS:

RUNNING RUST.

HAIR LINE MAP CRACKING

GOOD REPAIR ON BOTTOM OF CAP, UPWARDS TO 16"

INSPECTED BY: CURTIS WADE

DATE: 9-29-2014

CONCRETE FOUNDATION INSPECTION
CHECKLIST
STR. # 224/55 LEG # 3

1.) GENERAL CONDITION OF THE CONCRETE FOUNDATION:

- ☐ GOOD
- ☒ SATISFACTORY
- ☐ POOR

**FND. TO BE SOUNDED TO DETERMINE VOIDS, LAMINATIONS,
SOUNDNESS, ETC.**

2.) SURFACE DEFECTS:

- ☐ SPALLING / SCALING
- ☐ POPOUTS
- ☒ CRACKS $\leq 1/16$ " WIDE
- ☐ CRACKS $\geq 1/16$ " TO $1/4$ " WIDE
- ☐ SHRINKAGE CRACKS
- ☐ EFFLORESCENCE
- ☐ EVIDENCE OF ALKALI – AGGREGATE REACTION
- ☐ EXPOSED REINFORCEMENT / CORROSION
- ☐ VISIBLE DAMAGE

3.) COMMENTS:

RUNNING RUST

HAIR LINE MAP CRACKING

GOOD REPAIR ON BOTTOM OF CAP, UPWARDS TO 18"

INSPECTED BY: CURTIS WADE

DATE: 9-29-2014

CONCRETE FOUNDATION INSPECTION
CHECKLIST
STR. # 224/55 LEG # 4

1.) GENERAL CONDITION OF THE CONCRETE FOUNDATION:

- ☐ GOOD
- ☒ SATISFACTORY
- ☐ POOR

**FND. TO BE SOUNDED TO DETERMINE VOIDS, LAMINATIONS,
SOUNDNESS, ETC.**

2.) SURFACE DEFECTS:

- ☐ SPALLING / SCALING
- ☐ POPOUTS
- ☒ CRACKS $\leq 1/16$ " WIDE
- ☐ CRACKS $\geq 1/16$ " TO $1/4$ " WIDE
- ☐ SHRINKAGE CRACKS
- ☐ EFFLORESCENCE
- ☐ EVIDENCE OF ALKALI – AGGREGATE REACTION
- ☐ EXPOSED REINFORCEMENT / CORROSION
- ☐ VISIBLE DAMAGE

3.) COMMENTS:

RUNNING RUST.

HAIR LINE MAP CRACKING

GOOD REPAIR ON BOTTOM OF CAP, UPWARDS TO 19"

INSPECTED BY: CURTIS WADE

DATE: 9-29-2014

STRUCTURE INVESTIGATION PHOTOGRAPHIC LOG

T/L No. 224 Structure No. 55



STRUCTURE INVESTIGATION PHOTOGRAPHIC LOG
T/L No. 224 Structure No. 55



FOUNDATION 1



FOUNDATION 1



STRUCTURE INVESTIGATION PHOTOGRAPHIC LOG

T/L No. 224 Structure No. 55



FOUNDATION 2



FOUNDATION 2

STRUCTURE INVESTIGATION PHOTOGRAPHIC LOG
T/L No. 224 Structure No. 55



FOUNDATION 3



FOUNDATION 3



STRUCTURE INVESTIGATION PHOTOGRAPHIC LOG
T/L No. 224 Structure No. 55



FOUNDATION 4



FOUNDATION 4



LEVEL I
FOUNDATION INSPECTION FORM

Attachment I.L.3
Page 39 of 75

TOWER LINE/STRUCTURE #: 224/56

DATE OF INSPECTION: 9-29-2014

SITE CONDITIONS

MARSH

OPEN ~~WATER~~

FRESH/~~SALT~~ WATER

TIDAL 15:20

WATER DEPTH 16'

(Record Time)

FOUNDATION COMPOSITION

WOOD

STEEL

CONCRETE

STEEL PILE ~~SUPPORTED~~
CONCRETE ~~CAP~~

FOUNDATION INVENTORY

NUMBER OF FOUNDATIONS 4

NUMBER OF SUPPORT PILES PER FOUNDATION 3

PILE ENCAPSULATIONS ~~YES~~ NO TYPE FIBER GLASS JACKETS

TOWER PHOTOGRAPH

(INCLUDE IN FINAL REPORT)



OVERALL CONDITION OF FOUNDATION

GOOD

~~FAIR~~

POOR

NOTES:

PILES ARE JACKETED FROM CAP TO 1' BELOW MUDLINE

CAPS HAVE GOOD REPAIRS AT BASE, UPWARDS UP TO 25"

FOUNDATION INSPECTION FORM

FOUNDATION DESCRIPTION: 3 STEEL H PILES UNDER A CONCRETE CAP**FOUNDATION EVALUATIONS****FOUNDATION 1:**

LOSS OF SECTION/PILE		RUNNING RUST/PILE		IMPACT DAMAGE/PILE		ENCAPSULATION/PILE	
NONE	A B C D	NONE	A B C D	NONE	A B C D	MISSING	A B C D
MINOR	A B C D	MINOR	A B C D	MINOR	A B C D	CRACKED	A B C D
MODERATE	A B C D	MODERATE	A B C D	MODERATE	A B C D	OVERALL	20'
SEVERE	A B C D	SEVERE	A B C D	SEVERE	A B C D	LENGTH	

COMMENTS

19' CAP TO MUD LINE. 16' WATER DEPTH.

PILES ARE JACKETED FROM CAP TO 1' BELOW MUDLINE

FOUNDATION 2:

LOSS OF SECTION/PILE		RUNNING RUST/PILE		IMPACT DAMAGE/PILE		ENCAPSULATION/PILE	
NONE	A B C D	NONE	A B C D	NONE	A B C D	MISSING	A B C D
MINOR	A B C D	MINOR	A B C D	MINOR	A B C D	CRACKED	A B C D
MODERATE	A B C D	MODERATE	A B C D	MODERATE	A B C D	OVERALL	20'
SEVERE	A B C D	SEVERE	A B C D	SEVERE	A B C D	LENGTH	

COMMENTS

19' CAP TO MUD LINE. 16' WATER DEPTH.

PILES ARE JACKETED FROM CAP TO 1' BELOW MUDLINE

FOUNDATION 3:

LOSS OF SECTION/PILE		RUNNING RUST/PILE		IMPACT DAMAGE/PILE		ENCAPSULATION/PILE	
NONE	A B C D	NONE	A B C D	NONE	A B C D	MISSING	A B C D
MINOR	A B C D	MINOR	A B C D	MINOR	A B C D	CRACKED	A B C D
MODERATE	A B C D	MODERATE	A B C D	MODERATE	A B C D	OVERALL	20'
SEVERE	A B C D	SEVERE	A B C D	SEVERE	A B C D	LENGTH	

COMMENTS

19' CAP TO MUD LINE. 16' WATER DEPTH.

PILES ARE JACKETED FROM CAP TO 1' BELOW MUDLINE

FOUNDATION 4:

LOSS OF SECTION/PILE		RUNNING RUST/PILE		IMPACT DAMAGE/PILE		ENCAPSULATION/PILE	
NONE	A B C D	NONE	A B C D	NONE	A B C D	MISSING	A B C D
MINOR	A B C D	MINOR	A B C D	MINOR	A B C D	CRACKED	A B C D
MODERATE	A B C D	MODERATE	A B C D	MODERATE	A B C D	OVERALL	20'
SEVERE	A B C D	SEVERE	A B C D	SEVERE	A B C D	LENGTH	

COMMENTS

19' CAP TO MUD LINE. 16' WATER DEPTH.

PILES ARE JACKETED FROM CAP TO 1' BELOW MUDLINE

ENCAPSULATION DIMENSIONS

PILE	FOUNDATION 1-DISTANCES		FOUNDATION 2-DISTANCES		FOUNDATION 3-DISTANCES		FOUNDATION 4-DISTANCES	
	FROM CAP	**FROM MUDLINE	FROM CAP	**FROM MUDLINE	FROM CAP	**FROM MUDLINE	FROM CAP	**FROM MUDLINE
A	0"	1' BELOW	A	0"	1' BELOW	A	0"	1' BELOW
B	0"	1' BELOW	B	0"	1' BELOW	B	0"	1' BELOW
C	0"	1' BELOW	C	0"	1' BELOW	C	0"	1' BELOW
D			D		D		D	

STEEL H-PILE INSPECTION
RAPPAHANNOCK RIVER

DATE INSPECTED
9-29-2014

TOWER NO.
224/56

**FOUNDATION
& PILE NO.**

RECORDED MEASUREMENTS

NDT MEASUREMENT

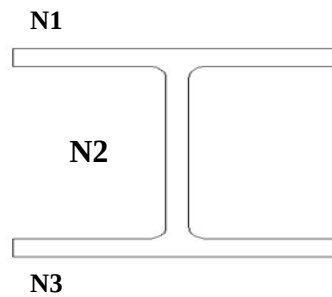
DISTANCE FROM CAP

N1 N2 N3 N1 N2 N3

1A						
1B						
1C						
1D						
2A						
2B						
2C						
2D						
3A						
3B						
3C						
3D						
4A						
4B						
4C						
4D						

COMMENTS:

PILES ARE JACKETED FROM CAP TO 1' BELOW MUDLINE. UNABLE TO TAKE NDT READINGS



CONCRETE FOUNDATION INSPECTION
CHECKLIST
STR. # 224/56 LEG # 1

1.) GENERAL CONDITION OF THE CONCRETE FOUNDATION:

- ☐ GOOD
- ☒ SATISFACTORY
- ☐ POOR

**FND. TO BE SOUNDED TO DETERMINE VOIDS, LAMINATIONS,
SOUNDNESS, ETC.**

2.) SURFACE DEFECTS:

- ☐ SPALLING / SCALING
- ☐ POPOUTS
- ☒ CRACKS $\leq 1/16$ " WIDE
- ☐ CRACKS $\geq 1/16$ " TO $1/4$ " WIDE
- ☐ SHRINKAGE CRACKS
- ☐ EFFLORESCENCE
- ☐ EVIDENCE OF ALKALI – AGGREGATE REACTION
- ☐ EXPOSED REINFORCEMENT / CORROSION
- ☐ VISIBLE DAMAGE

3.) COMMENTS:

RUNNING RUST.

HAIRLINE MAP CRACKING

GOOD REPAIR ON BOTTOM OF CAP, UPWARDS TO 17"

INSPECTED BY: CURTIS WADE

DATE: 9-29-2014

CONCRETE FOUNDATION INSPECTION
CHECKLIST
STR. # 224/56 LEG # 2

1.) GENERAL CONDITION OF THE CONCRETE FOUNDATION:

- ☐ GOOD
- ☒ SATISFACTORY
- ☐ POOR

**FND. TO BE SOUNDED TO DETERMINE VOIDS, LAMINATIONS,
SOUNDNESS, ETC.**

2.) SURFACE DEFECTS:

- ☐ SPALLING / SCALING
- ☐ POPOUTS
- ☒ CRACKS $\leq 1/16$ " WIDE
- ☐ CRACKS $\geq 1/16$ " TO $1/4$ " WIDE
- ☐ SHRINKAGE CRACKS
- ☐ EFFLORESCENCE
- ☐ EVIDENCE OF ALKALI – AGGREGATE REACTION
- ☐ EXPOSED REINFORCEMENT / CORROSION
- ☐ VISIBLE DAMAGE

3.) COMMENTS:

RUNNING RUST.

HAIR LINE MAP CRACKING

GOOD REPAIR ON BOTTOM OF CAP, UPWARDS TO 22"

INSPECTED BY: CURTIS WADE

DATE: 9-29-2014

CONCRETE FOUNDATION INSPECTION
CHECKLIST
STR. # 224/56 LEG # 3

1.) GENERAL CONDITION OF THE CONCRETE FOUNDATION:

- ☐ GOOD
- ☒ SATISFACTORY
- ☐ POOR

**FND. TO BE SOUNDED TO DETERMINE VOIDS, LAMINATIONS,
SOUNDNESS, ETC.**

2.) SURFACE DEFECTS:

- ☐ SPALLING / SCALING
- ☐ POPOUTS
- ☒ CRACKS $\leq 1/16$ " WIDE
- ☐ CRACKS $\geq 1/16$ " TO $1/4$ " WIDE
- ☐ SHRINKAGE CRACKS
- ☐ EFFLORESCENCE
- ☐ EVIDENCE OF ALKALI – AGGREGATE REACTION
- ☐ EXPOSED REINFORCEMENT / CORROSION
- ☐ VISIBLE DAMAGE

3.) COMMENTS:

RUNNING RUST

HAIR LINE MAP CRACKING

GOOD REPAIR ON BOTTOM OF CAP, UPWARDS TO 25"

INSPECTED BY: CURTIS WADE

DATE: 9-29-2014

CONCRETE FOUNDATION INSPECTION
CHECKLIST
STR. # 224/56 LEG # 4

1.) GENERAL CONDITION OF THE CONCRETE FOUNDATION:

- ☐ GOOD
- ☒ SATISFACTORY
- ☐ POOR

**FND. TO BE SOUNDED TO DETERMINE VOIDS, LAMINATIONS,
SOUNDNESS, ETC.**

2.) SURFACE DEFECTS:

- ☐ SPALLING / SCALING
- ☐ POPOUTS
- ☒ CRACKS $\leq 1/16$ " WIDE
- ☐ CRACKS $\geq 1/16$ " TO $1/4$ " WIDE
- ☐ SHRINKAGE CRACKS
- ☐ EFFLORESCENCE
- ☐ EVIDENCE OF ALKALI – AGGREGATE REACTION
- ☐ EXPOSED REINFORCEMENT / CORROSION
- ☐ VISIBLE DAMAGE

3.) COMMENTS:

RUNNING RUST.

HAIR LINE MAP CRACKING

GOOD REPAIR ON BOTTOM OF CAP, UPWARDS TO 21"

INSPECTED BY: CURTIS WADE

DATE: 9-29-2014

STRUCTURE INVESTIGATION PHOTOGRAPHIC LOG

T/L No. 224 Structure No. 56



STRUCTURE INVESTIGATION PHOTOGRAPHIC LOG
T/L No. 224 Structure No. 56



FOUNDATION 1



FOUNDATION 1



STRUCTURE INVESTIGATION PHOTOGRAPHIC LOG
T/L No. 224 Structure No. 56



FOUNDATION 2



FOUNDATION 2



STRUCTURE INVESTIGATION PHOTOGRAPHIC LOG
T/L No. 224 Structure No. 56



FOUNDATION 3



FOUNDATION 3

STRUCTURE INVESTIGATION PHOTOGRAPHIC LOG
T/L No. 224 Structure No. 56



FOUNDATION 4



FOUNDATION 4



LEVEL I
FOUNDATION INSPECTION FORM

Attachment I.L.3
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TOWER LINE/STRUCTURE #: 224/57

DATE OF INSPECTION: 9-30-2014

SITE CONDITIONS

MARSH

OPEN ~~WATER~~

FRESH/~~SALT~~ WATER

TIDAL 08:40

WATER DEPTH 11' 2"

(Record Time)

FOUNDATION COMPOSITION

WOOD

STEEL

CONCRETE

STEEL PILE ~~SUPPORTED~~
CONCRETE ~~CAP~~

FOUNDATION INVENTORY

NUMBER OF FOUNDATIONS 4

NUMBER OF SUPPORT PILES PER FOUNDATION 3

PILE ENCAPSULATIONS ~~YES~~ NO TYPE FIBER GLASS JACKETS

TOWER PHOTOGRAPH

(INCLUDE IN FINAL REPORT)



OVERALL CONDITION OF FOUNDATION

GOOD

~~FAIR~~

POOR

NOTES:

PILES ARE JACKETED FROM CAP TO 1' BELOW MUDLINE

CAPS HAVE GOOD REPAIRS AT BASE, UPWARDS UP TO 24"

FOUNDATION INSPECTION FORM

FOUNDATION DESCRIPTION: 3 STEEL H PILES UNDER A CONCRETE CAP**FOUNDATION EVALUATIONS****FOUNDATION 1:**

LOSS OF SECTION/PILE		RUNNING RUST/PILE		IMPACT DAMAGE/PILE		ENCAPSULATION/PILE	
NONE	A B C D	NONE	A B C D	NONE	A B C D	MISSING	A B C D
MINOR	A B C D	MINOR	A B C D	MINOR	A B C D	CRACKED	A B C D
MODERATE	A B C D	MODERATE	A B C D	MODERATE	A B C D	OVERALL	14' 10"
SEVERE	A B C D	SEVERE	A B C D	SEVERE	A B C D	LENGTH	

COMMENTS

13' 8" CAP TO MUD LINE. 11' 2" WATER DEPTH.

PILES ARE JACKETED FROM CAP TO 1' BELOW MUDLINE

FOUNDATION 2:

LOSS OF SECTION/PILE		RUNNING RUST/PILE		IMPACT DAMAGE/PILE		ENCAPSULATION/PILE	
NONE	A B C D	NONE	A B C D	NONE	A B C D	MISSING	A B C D
MINOR	A B C D	MINOR	A B C D	MINOR	A B C D	CRACKED	A B C D
MODERATE	A B C D	MODERATE	A B C D	MODERATE	A B C D	OVERALL	14' 10"
SEVERE	A B C D	SEVERE	A B C D	SEVERE	A B C D	LENGTH	

COMMENTS

13' 8" CAP TO MUD LINE. 11' 2" WATER DEPTH.

PILES ARE JACKETED FROM CAP TO 1' BELOW MUDLINE, EXCEPT A PILE WHICH EXTENDS 6" BELOW MUDLINE

FOUNDATION 3:

LOSS OF SECTION/PILE		RUNNING RUST/PILE		IMPACT DAMAGE/PILE		ENCAPSULATION/PILE	
NONE	A B C D	NONE	A B C D	NONE	A B C D	MISSING	A B C D
MINOR	A B C D	MINOR	A B C D	MINOR	A B C D	CRACKED	A B C D
MODERATE	A B C D	MODERATE	A B C D	MODERATE	A B C D	OVERALL	14' 10"
SEVERE	A B C D	SEVERE	A B C D	SEVERE	A B C D	LENGTH	

COMMENTS

13' 8" CAP TO MUD LINE. 11' 2" WATER DEPTH.

PILES ARE JACKETED FROM CAP TO 1' BELOW MUDLINE

FOUNDATION 4:

LOSS OF SECTION/PILE		RUNNING RUST/PILE		IMPACT DAMAGE/PILE		ENCAPSULATION/PILE	
NONE	A B C D	NONE	A B C D	NONE	A B C D	MISSING	A B C D
MINOR	A B C D	MINOR	A B C D	MINOR	A B C D	CRACKED	A B C D
MODERATE	A B C D	MODERATE	A B C D	MODERATE	A B C D	OVERALL	14' 10"
SEVERE	A B C D	SEVERE	A B C D	SEVERE	A B C D	LENGTH	

COMMENTS

13' 8" CAP TO MUD LINE. 11' 2" WATER DEPTH.

PILES ARE JACKETED FROM CAP TO 1' BELOW MUDLINE

ENCAPSULATION DIMENSIONS

PILE	FOUNDATION 1-DISTANCES		FOUNDATION 2-DISTANCES		FOUNDATION 3-DISTANCES		FOUNDATION 4-DISTANCES	
	FROM CAP	**FROM MUDLINE	FROM CAP	**FROM MUDLINE	FROM CAP	**FROM MUDLINE	FROM CAP	**FROM MUDLINE
A	0"	1' BELOW	A	0"	6" BELOW	A	0"	1' BELOW
B	0"	1' BELOW	B	0"	1' BELOW	B	0"	1' BELOW
C	0"	1' BELOW	C	0"	1' BELOW	C	0"	1' BELOW
D			D			D		

STEEL H-PILE INSPECTION
RAPPAHANNOCK RIVER

DATE INSPECTED
9-30-2014

TOWER NO.
224/57

**FOUNDATION
& PILE NO.**

RECORDED MEASUREMENTS

NDT MEASUREMENT

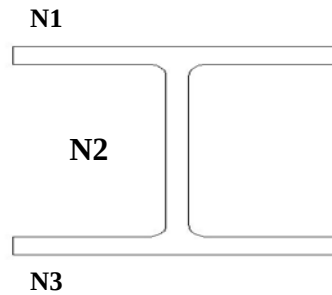
DISTANCE FROM CAP

N1 N2 N3 N1 N2 N3

1A						
1B						
1C						
1D						
2A						
2B						
2C						
2D						
3A						
3B						
3C						
3D						
4A						
4B						
4C						
4D						

COMMENTS:

PILES ARE JACKETED FROM CAP TO 1' BELOW MUDLINE. UNABLE TO TAKE NDT READINGS



CONCRETE FOUNDATION INSPECTION
CHECKLIST
STR. # 224/57 LEG # 1

1.) GENERAL CONDITION OF THE CONCRETE FOUNDATION:

- ☐ GOOD
- ☒ SATISFACTORY
- ☐ POOR

**FND. TO BE SOUNDED TO DETERMINE VOIDS, LAMINATIONS,
SOUNDNESS, ETC.**

2.) SURFACE DEFECTS:

- ☐ SPALLING / SCALING
- ☐ POPOUTS
- ☒ CRACKS $\leq 1/16$ " WIDE
- ☐ CRACKS $\geq 1/16$ " TO $1/4$ " WIDE
- ☐ SHRINKAGE CRACKS
- ☐ EFFLORESCENCE
- ☐ EVIDENCE OF ALKALI – AGGREGATE REACTION
- ☐ EXPOSED REINFORCEMENT / CORROSION
- ☐ VISIBLE DAMAGE

3.) COMMENTS:

RUNNING RUST.

HAIRLINE MAP CRACKING

GOOD REPAIR ON BOTTOM OF CAP, UPWARDS TO 15"

INSPECTED BY: CURTIS WADE

DATE: 9-30-2014

CONCRETE FOUNDATION INSPECTION
CHECKLIST
STR. # 224/57 LEG # 2

1.) GENERAL CONDITION OF THE CONCRETE FOUNDATION:

- ☐ GOOD
- ☒ SATISFACTORY
- ☐ POOR

**FND. TO BE SOUNDED TO DETERMINE VOIDS, LAMINATIONS,
SOUNDNESS, ETC.**

2.) SURFACE DEFECTS:

- ☐ SPALLING / SCALING
- ☐ POPOUTS
- ☒ CRACKS $\leq 1/16$ " WIDE
- ☐ CRACKS $\geq 1/16$ " TO $1/4$ " WIDE
- ☐ SHRINKAGE CRACKS
- ☐ EFFLORESCENCE
- ☐ EVIDENCE OF ALKALI – AGGREGATE REACTION
- ☐ EXPOSED REINFORCEMENT / CORROSION
- ☐ VISIBLE DAMAGE

3.) COMMENTS:

RUNNING RUST.

HAIR LINE MAP CRACKING

GOOD REPAIR ON BOTTOM OF CAP, UPWARDS TO 13"

INSPECTED BY: CURTIS WADE

DATE: 9-30-2014

CONCRETE FOUNDATION INSPECTION
CHECKLIST
STR. # 224/57 LEG # 3

1.) **GENERAL CONDITION OF THE CONCRETE FOUNDATION:**

- ☐ **GOOD**
- ☒ **SATISFACTORY**
- ☐ **POOR**

**FND. TO BE SOUNDED TO DETERMINE VOIDS, LAMINATIONS,
SOUNDNESS, ETC.**

2.) **SURFACE DEFECTS:**

- ☒ **SPALLING / SCALING**
- ☐ **POPOUTS**
- ☒ **CRACKS $\leq 1/16$ " WIDE**
- ☐ **CRACKS $\geq 1/16$ " TO $1/4$ " WIDE**
- ☐ **SHRINKAGE CRACKS**
- ☐ **EFFLORESCENCE**
- ☐ **EVIDENCE OF ALKALI – AGGREGATE REACTION**
- ☐ **EXPOSED REINFORCEMENT / CORROSION**
- ☐ **VISIBLE DAMAGE**

3.) **COMMENTS:**

RUNNING RUST

HAIR LINE MAP CRACKING

WEST FACE BOTTOM EDGE SPALL 3"W x 3/4"H x 1/2"D

GOOD REPAIR ON BOTTOM OF CAP, UPWARDS TO 24"

INSPECTED BY: CURTIS WADE

DATE: 9-30-2014

CONCRETE FOUNDATION INSPECTION
CHECKLIST
STR. # 224/57 LEG # 4

1.) GENERAL CONDITION OF THE CONCRETE FOUNDATION:

- ☐ GOOD
- ☒ SATISFACTORY
- ☐ POOR

**FND. TO BE SOUNDED TO DETERMINE VOIDS, LAMINATIONS,
SOUNDNESS, ETC.**

2.) SURFACE DEFECTS:

- ☐ SPALLING / SCALING
- ☐ POPOUTS
- ☒ CRACKS $\leq 1/16$ " WIDE
- ☐ CRACKS $\geq 1/16$ " TO $1/4$ " WIDE
- ☐ SHRINKAGE CRACKS
- ☐ EFFLORESCENCE
- ☐ EVIDENCE OF ALKALI – AGGREGATE REACTION
- ☐ EXPOSED REINFORCEMENT / CORROSION
- ☐ VISIBLE DAMAGE

3.) COMMENTS:

RUNNING RUST.

HAIR LINE MAP CRACKING

GOOD REPAIR ON BOTTOM OF CAP, UPWARDS TO 18"

INSPECTED BY: CURTIS WADE

DATE: 9-30-2014

STRUCTURE INVESTIGATION PHOTOGRAPHIC LOG

T/L No. 224 Structure No. 57



STRUCTURE INVESTIGATION PHOTOGRAPHIC LOG
T/L No. 224 Structure No. 57



FOUNDATION 1



FOUNDATION 1



STRUCTURE INVESTIGATION PHOTOGRAPHIC LOG
T/L No. 224 Structure No. 57



FOUNDATION 2



FOUNDATION 2



STRUCTURE INVESTIGATION PHOTOGRAPHIC LOG
T/L No. 224 Structure No. 57



FOUNDATION 3



FOUNDATION 3



STRUCTURE INVESTIGATION PHOTOGRAPHIC LOG
T/L No. 224 Structure No. 57



FOUNDATION 4



FOUNDATION 4



LEVEL I
FOUNDATION INSPECTION FORM

Attachment I.L.3
Page 63 of 75

TOWER LINE/STRUCTURE #: 224/58

DATE OF INSPECTION: 9-30-2014

SITE CONDITIONS ~~MARSH~~ OPEN WATER FRESH/~~SALT~~ WATER TIDAL 09:35
WATER DEPTH 4" (Record Time)

FOUNDATION COMPOSITION

WOOD STEEL CONCRETE ~~STEEL PILE SUPPORTED~~
~~CONCRETE CAP~~

FOUNDATION INVENTORY

NUMBER OF FOUNDATIONS 4
NUMBER OF SUPPORT PILES PER FOUNDATION 3
PILE ENCAPSULATIONS YES ~~NO~~ TYPE

TOWER PHOTOGRAPH (INCLUDE IN FINAL REPORT)



OVERALL CONDITION OF FOUNDATION GOOD FAIR ~~POOR~~

NOTES:

SEVERE CORROSION ON PILES 1 B AND 4B. 1 B KNIFE EDGING 9" LONG AND 1/2" DEEP, 16" BELOW THE CAP.

4 B KNIFE EDGING 12" LONG AND 1" DEEP, 20" BELOW THE CAP.

OTHER PILES ONLY SHOW MODERATE CORROSION.

FOUNDATION INSPECTION FORM

FOUNDATION DESCRIPTION: 3 STEEL H PILES UNDER A CONCRETE CAP

FOUNDATION EVALUATIONS

FOUNDATION 1:

LOSS OF SECTION/PILE		RUNNING RUST/PILE		IMPACT DAMAGE/PILE		ENCAPSULATION/PILE	
NONE	A B C D	NONE	A B C D	NONE	A B C D	MISSING	A B C D
MINOR	A B C D	MINOR	A B C D	MINOR	A B C D	CRACKED	A B C D
MODERATE	A B C D	MODERATE	A B C D	MODERATE	A B C D	OVERALL	
SEVERE	A B C D	SEVERE	A B C D	SEVERE	A B C D	LENGTH	

COMMENTS

19" CAP TO SAND LINE. NO WATER. ALL SAND, NO MUD

1 B KNIFE EDGING 9" LONG AND 1/2" DEEP, 16" BELOW THE CAP. NO WATER.

FOUNDATION 2:

LOSS OF SECTION/PILE		RUNNING RUST/PILE		IMPACT DAMAGE/PILE		ENCAPSULATION/PILE	
NONE	A B C D	NONE	A B C D	NONE	A B C D	MISSING	A B C D
MINOR	A B C D	MINOR	A B C D	MINOR	A B C D	CRACKED	A B C D
MODERATE	A B C D	MODERATE	A B C D	MODERATE	A B C D	OVERALL	
SEVERE	A B C D	SEVERE	A B C D	SEVERE	A B C D	LENGTH	

COMMENTS

32" CAP TO MUD LINE. NO WATER RIGHT NOW. ALL SAND, NO MUD

FOUNDATION 3:

LOSS OF SECTION/PILE		RUNNING RUST/PILE		IMPACT DAMAGE/PILE		ENCAPSULATION/PILE	
NONE	A B C D	NONE	A B C D	NONE	A B C D	MISSING	A B C D
MINOR	A B C D	MINOR	A B C D	MINOR	A B C D	CRACKED	A B C D
MODERATE	A B C D	MODERATE	A B C D	MODERATE	A B C D	OVERALL	
SEVERE	A B C D	SEVERE	A B C D	SEVERE	A B C D	LENGTH	

COMMENTS

39" CAP TO MUD LINE. 1" WATER DEPTH. ALL MUD, NO SAND

FOUNDATION 4:

LOSS OF SECTION/PILE		RUNNING RUST/PILE		IMPACT DAMAGE/PILE		ENCAPSULATION/PILE	
NONE	A B C D	NONE	A B C D	NONE	A B C D	MISSING	A B C D
MINOR	A B C D	MINOR	A B C D	MINOR	A B C D	CRACKED	A B C D
MODERATE	A B C D	MODERATE	A B C D	MODERATE	A B C D	OVERALL	
SEVERE	A B C D	SEVERE	A B C D	SEVERE	A B C D	LENGTH	

COMMENTS

37" CAP TO MUD LINE. 4" WATER DEPTH. ALL MUD, NO SAND

4 B KNIFE EDGING 12" LONG AND 1" DEEP, 20" BELOW THE CAP.

ENCAPSULATION DIMENSIONS

	FOUNDATION 1-DISTANCES		FOUNDATION 2-DISTANCES		FOUNDATION 3-DISTANCES		FOUNDATION 4-DISTANCES	
	FROM CAP	**FROM MUDLINE	FROM CAP	**FROM MUDLINE	FROM CAP	**FROM MUDLINE	FROM CAP	**FROM MUDLINE
PILE A			A		A		A	
B			B		B		B	
C			C		C		C	
D			D		D		D	

STEEL H-PILE INSPECTION
RAPPAHANNOCK RIVER

DATE INSPECTED
9-30-2014

TOWER NO. 224/58	FOUNDATION & PILE NO.	RECORDED MEASUREMENTS					
		NDT MEASUREMENT			DISTANCE FROM CAP		
		N1	N2	N3	N1	N2	N3
	1A						
	1B	0.575	0.615	0.615	2"	2"	2"
	1C						
	1D						
	2A						
	2B						
	2C	0.525	0.525	0.510	37"	37"	37"
	2D						
	3A						
	3B	0.540	0.455	0.505	41"	41"	41"
	3C						
	3D						
	4A						
	4B	0.585	0.480	0.370	43"	29"	34"
	4C						
	4D						

COMMENTS:

1 B PILE KNIFE EDGING, BEGINNING 16" BELOW THE CAP. 9" LONG AND UP TO 1/2" DEEP INTO THE FLANGE.

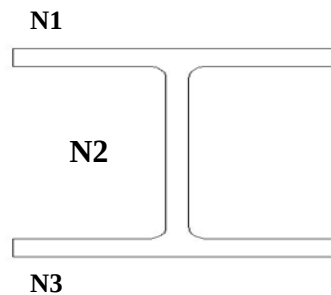
4 B PILE KNIFE EDGING, BEGINNING 20" BELOW THE CAP. 12" LONG AND UP TO 1" DEEP INTO THE FLANGE.

SUPPLEMENTAL NDT READINGS PILE 1 B 27" BELOW CAP IS 8" BELOW SAND LINE. 0.265, 0.440, 0.360

PILE 2 C 37" BELOW CAP IS 5" BELOW SAND LINE

PILE 3 B 41" BELOW CAP IS 6" BELOW MUD LINE

PILE 4 B 43" BELOW CAP IS 6" BELOW MUD LINE



CONCRETE FOUNDATION INSPECTION
CHECKLIST
STR. # 224/58 LEG # 1

1.) GENERAL CONDITION OF THE CONCRETE FOUNDATION:

- ☒ **GOOD**
- ☐ **SATISFACTORY**
- ☐ **POOR**

**FND. TO BE SOUNDED TO DETERMINE VOIDS, LAMINATIONS,
SOUNDNESS, ETC.**

2.) SURFACE DEFECTS:

- ☐ **SPALLING / SCALING**
- ☐ **POPOUTS**
- ☒ **CRACKS $\leq$ 1/16" WIDE**
- ☐ **CRACKS $\geq$ 1/16" TO 1/4" WIDE**
- ☐ **SHRINKAGE CRACKS**
- ☐ **EFFLORESCENCE**
- ☐ **EVIDENCE OF ALKALI – AGGREGATE REACTION**
- ☐ **EXPOSED REINFORCEMENT / CORROSION**
- ☐ **VISIBLE DAMAGE**

3.) COMMENTS:

RUNNING RUST.

MINOR HAIRLINE MAP CRACKING WEST AND SOUTH SIDES

INSPECTED BY: CURTIS WADE

DATE: 9-30-2014

CONCRETE FOUNDATION INSPECTION
CHECKLIST
STR. # 224/58 LEG # 2

1.) GENERAL CONDITION OF THE CONCRETE FOUNDATION:

- ☒ **GOOD**
- ☐ **SATISFACTORY**
- ☐ **POOR**

**FND. TO BE SOUNDED TO DETERMINE VOIDS, LAMINATIONS,
SOUNDNESS, ETC.**

2.) SURFACE DEFECTS:

- ☐ **SPALLING / SCALING**
- ☐ **POPOUTS**
- ☐ **CRACKS $\leq$ 1/16" WIDE**
- ☐ **CRACKS $\geq$ 1/16" TO 1/4" WIDE**
- ☐ **SHRINKAGE CRACKS**
- ☐ **EFFLORESCENCE**
- ☐ **EVIDENCE OF ALKALI – AGGREGATE REACTION**
- ☐ **EXPOSED REINFORCEMENT / CORROSION**
- ☐ **VISIBLE DAMAGE**

3.) COMMENTS:

RUNNING RUST.

INSPECTED BY: CURTIS WADE **DATE:** 9-30-2014

CONCRETE FOUNDATION INSPECTION
CHECKLIST
STR. # 224/58 LEG # 3

1.) GENERAL CONDITION OF THE CONCRETE FOUNDATION:

- ☒ **GOOD**
- ☐ **SATISFACTORY**
- ☐ **POOR**

**FND. TO BE SOUNDED TO DETERMINE VOIDS, LAMINATIONS,
SOUNDNESS, ETC.**

2.) SURFACE DEFECTS:

- ☐ **SPALLING / SCALING**
- ☐ **POPOUTS**
- ☐ **CRACKS $\leq$ 1/16" WIDE**
- ☐ **CRACKS $\geq$ 1/16" TO 1/4" WIDE**
- ☐ **SHRINKAGE CRACKS**
- ☐ **EFFLORESCENCE**
- ☐ **EVIDENCE OF ALKALI – AGGREGATE REACTION**
- ☐ **EXPOSED REINFORCEMENT / CORROSION**
- ☐ **VISIBLE DAMAGE**

3.) COMMENTS:

RUNNING RUST

INSPECTED BY: CURTIS WADE **DATE:** 9-30-2014

CONCRETE FOUNDATION INSPECTION
CHECKLIST
STR. # 224/58 LEG # 4

1.) GENERAL CONDITION OF THE CONCRETE FOUNDATION:

- ☒ **GOOD**
- ☐ **SATISFACTORY**
- ☐ **POOR**

**FND. TO BE SOUNDED TO DETERMINE VOIDS, LAMINATIONS,
SOUNDNESS, ETC.**

2.) SURFACE DEFECTS:

- ☐ **SPALLING / SCALING**
- ☐ **POPOUTS**
- ☐ **CRACKS $\leq$ 1/16" WIDE**
- ☐ **CRACKS $\geq$ 1/16" TO 1/4" WIDE**
- ☐ **SHRINKAGE CRACKS**
- ☐ **EFFLORESCENCE**
- ☐ **EVIDENCE OF ALKALI – AGGREGATE REACTION**
- ☐ **EXPOSED REINFORCEMENT / CORROSION**
- ☐ **VISIBLE DAMAGE**

3.) COMMENTS:

RUNNING RUST.

INSPECTED BY: CURTIS WADE **DATE:** 9-30-2014

STRUCTURE INVESTIGATION PHOTOGRAPHIC LOG

T/L No. 224 Structure No. 58



STRUCTURE INVESTIGATION PHOTOGRAPHIC LOG
T/L No. 224 Structure No. 58



FOUNDATION 1



FOUNDATION 1



STRUCTURE INVESTIGATION PHOTOGRAPHIC LOG
T/L No. 224 Structure No. 58



FOUNDATION 2



FOUNDATION 2

STRUCTURE INVESTIGATION PHOTOGRAPHIC LOG
T/L No. 224 Structure No. 58



FOUNDATION 3



FOUNDATION 3



STRUCTURE INVESTIGATION PHOTOGRAPHIC LOG
T/L No. 224 Structure No. 58



FOUNDATION 4



FOUNDATION 4



STRUCTURE INVESTIGATION PHOTOGRAPHIC LOG

T/L No. 224 Structure No. 58



FOUNDATION 4-PILE SECTION LOSS



FOUNDATION 4-PILE SECTION LOSS

I. NECESSITY FOR THE PROPOSED PROJECT

- M. In addition to the other information required by these guidelines, applications for approval to construct facilities and transmission lines interconnecting a Non-Utility Generator (“NUG”) and a utility shall include the following information:**
- 1. The full name of the NUG as it appears in its contract with the utility and the dates of initial contract and any amendments;**
 - 2. A description of the arrangements for financing the facilities, including information on the allocation of costs between the utility and the NUG;**
 - 3. a. For Qualifying Facilities (“QFs”) certificated by Federal Energy Regulatory Commission (“FERC”) order, provide the QF or docket number, the dates of all certification or recertification orders, and the citation to FERC Reports, if available;**
b. For self-certificated QFs, provide a copy of the notice filed with FERC;
 - 4. Provide the project number and project name used by FERC in licensing hydroelectric projects; also provide the dates of all orders and citations to FERC Reports, if available; and**
 - 5. If the name provided in 1 above differs from the name provided in 3 above, give a full explanation.**

Response: Not applicable.

I. NECESSITY FOR THE PROPOSED PROJECT

- N. Describe the proposed and existing generating sources, distribution circuits or load centers planned to be served by all new substations, switching stations and other ground facilities associated with the proposed project.**

Response: Not applicable.

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way (“ROW”)

1. Provide the length of the proposed corridor and viable alternatives.

Response: The proposed route for the Project runs along an existing approximately 41.3-mile corridor consisting of primarily 120 foot wide transmission right-of-way easement and Company-owned property within New Kent, King William, King and Queen, Essex, and Richmond Counties. Within that existing 41.3-mile transmission corridor, the portion of Line #224 being rebuilt as part of the Project extends a total of 38.3 miles, and the new Line #2208 being installed as part of the Project extends a total of 40.5 miles.

No alternative routes are proposed for the Project. See Section II.A.9 for an explanation of the Company’s route selection process and consideration of alternatives for the Project.

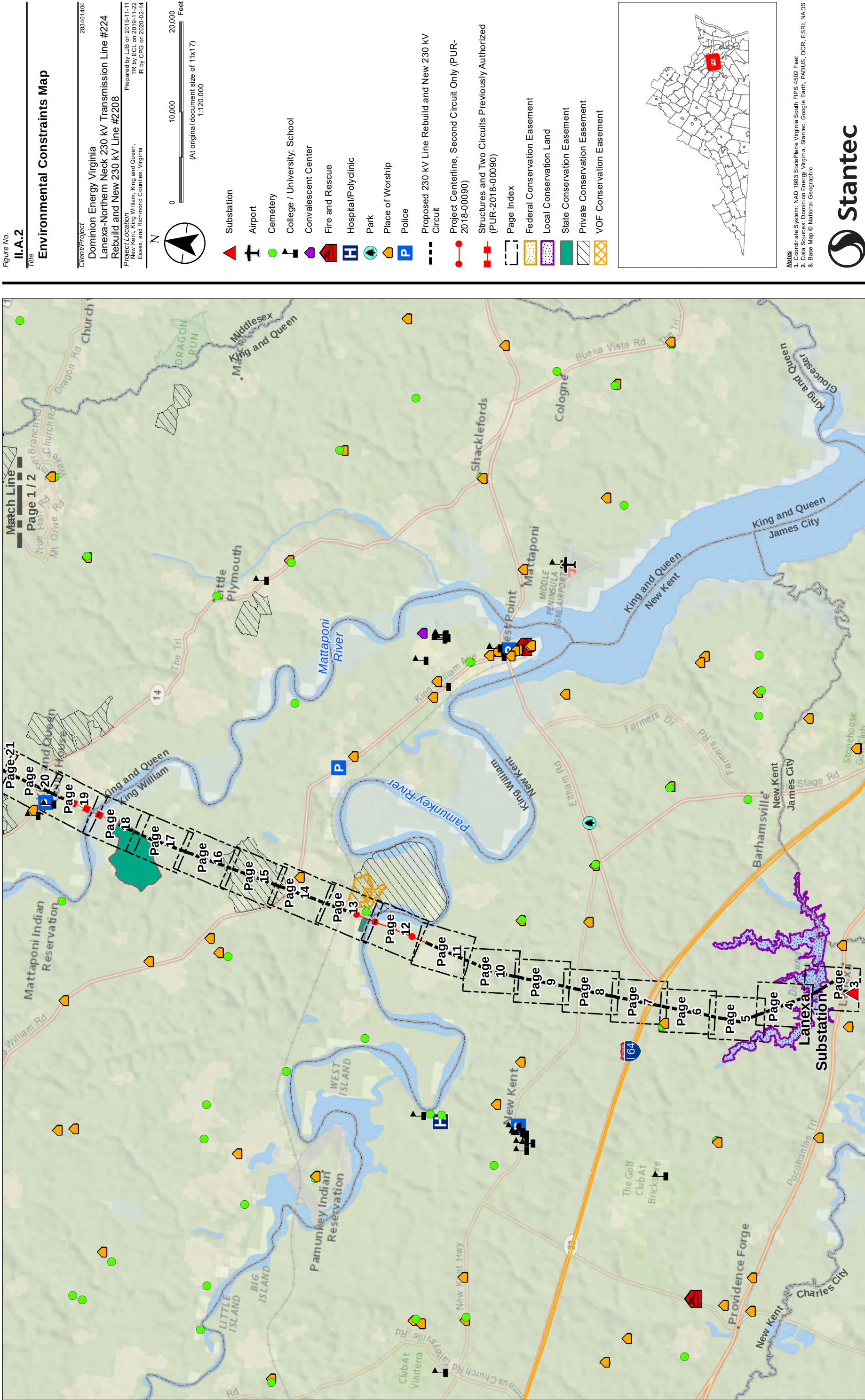
II. DESCRIPTION OF THE PROPOSED PROJECT

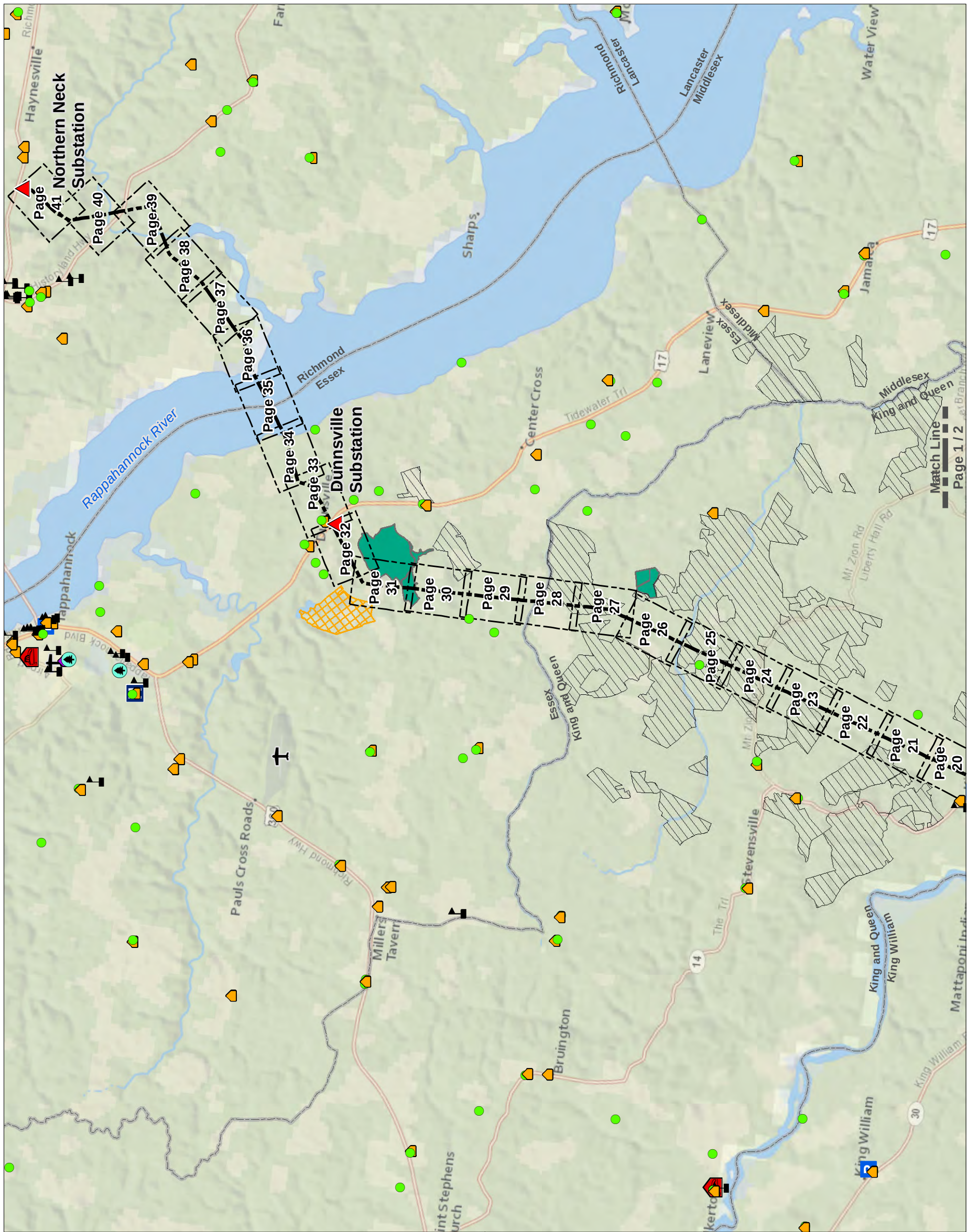
A. Right-of-way (“ROW”)

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

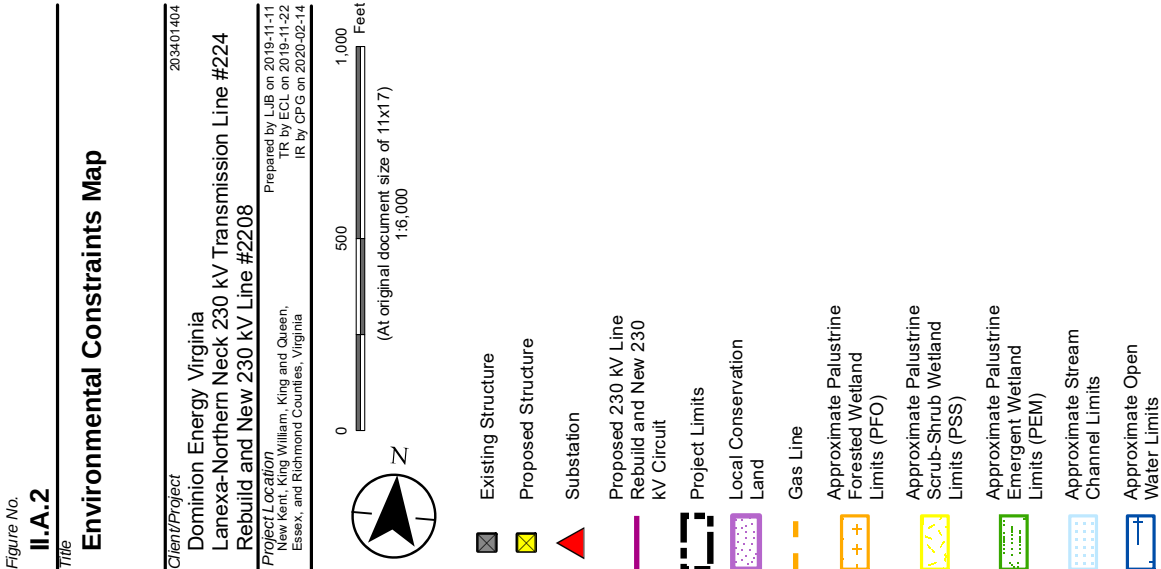
Response: See Attachment II.A.2. No portion of the right-of-way is proposed to be quitclaimed or relinquished.

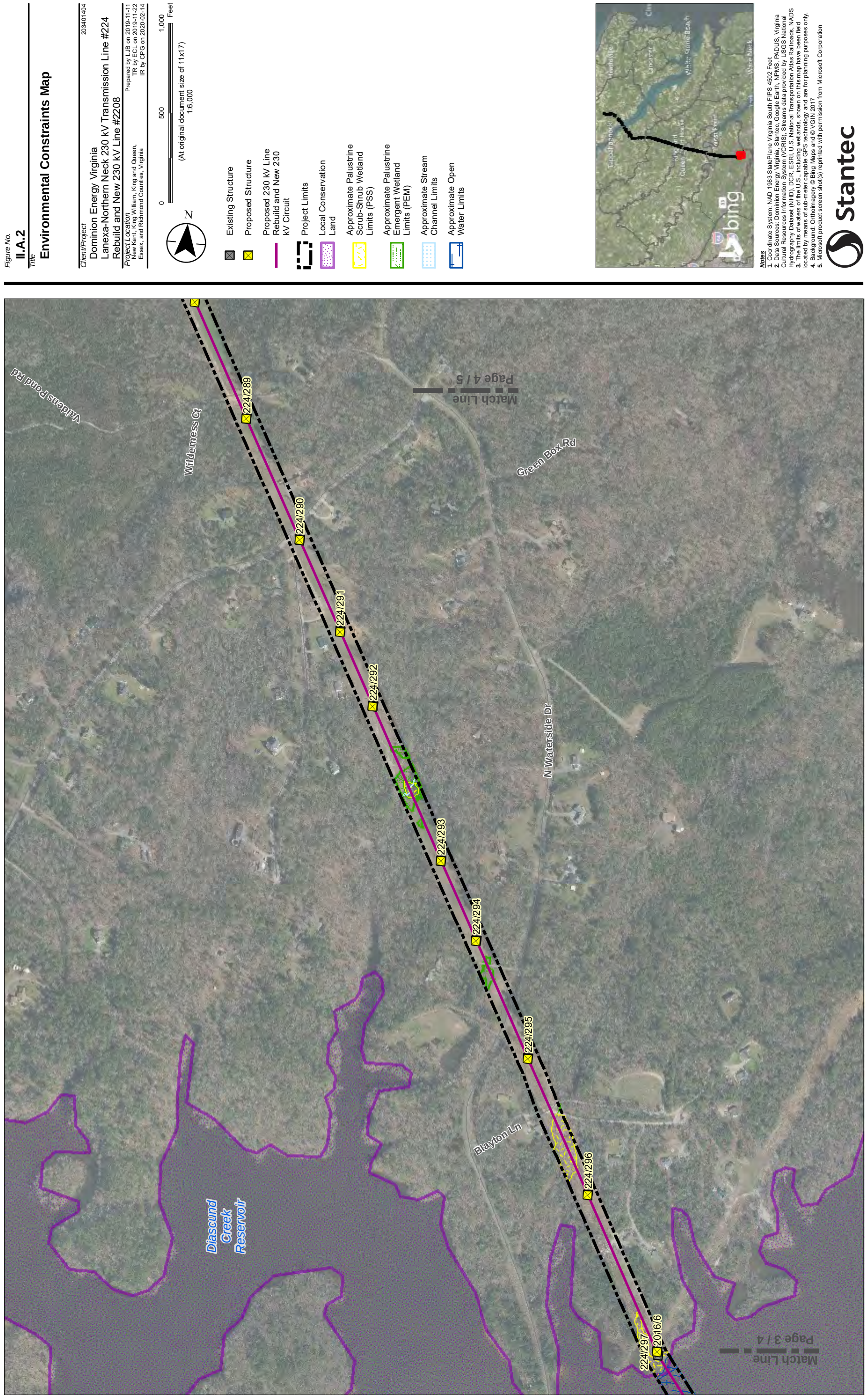
The Company will make the digital Geographic Information Systems (“GIS”) shape file available to interested persons upon request to counsel for the Company as listed in the Project Application.





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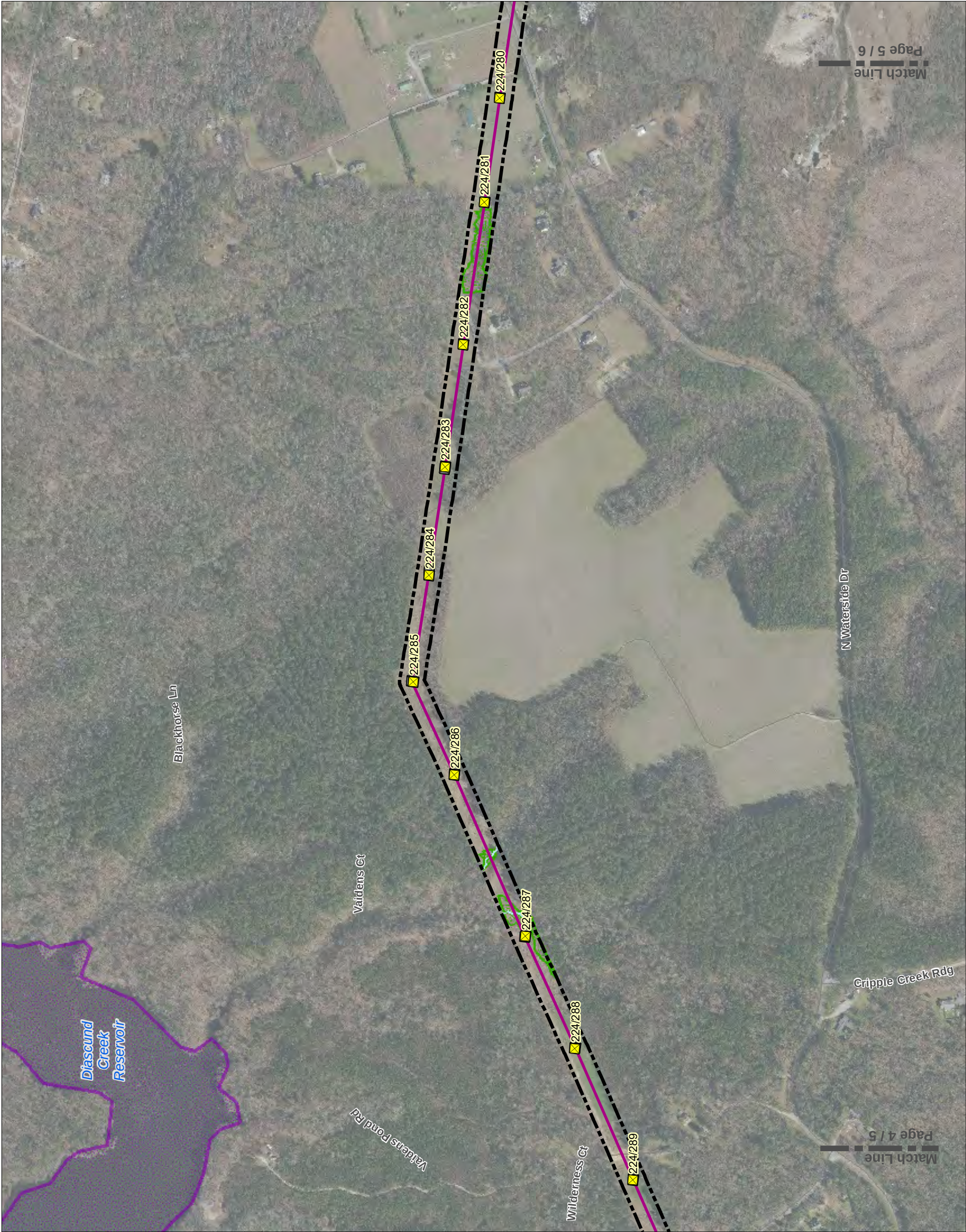


Figure No.
II.A.2

Client/Project
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208

Project Location
New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia

203401404
Prepared by LJB on 2019-11-11
TR by ECL on 2019-11-22
IR by CFG on 2020-02-14

Environmental Constraints Map

Existing Structure

Proposed Structure

Proposed 230 kV Line
Rebuild and New 230
kV Circuit

Project Limits

Local Conservation
Land

Approximate Palustrine
Scrub-Shrub Wetland
Limits (PSS)

Approximate Palustrine
Emergent Wetland
Limits (PEM)

Approximate Stream
Channel Limits

0

500

1,000

Feet

N

(At original document size of 11x17)

1:6,000

NOTES

1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
2. Data Sources: Dominion Energy Virginia, Stantec, Google Earth, NPMS, PADUS, Virginia Cultural Resources Information System (VCRIS), Streams data provided by USGS National Hydrography Dataset (NHD), DCR, ESR, U.S. National Transportation Atlas Railroad, NADS
3. The limits of wetlands of the U.S., including wetlands, shown on this map have been field located by means of sub-meter GPS technology and are for planning purposes only.
4. Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation
5. Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation

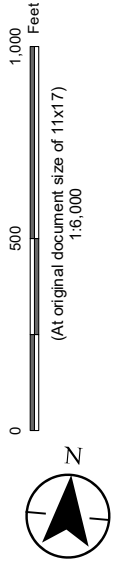
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Page 5 of 41

Figure No.
II.A.2
Title

Environmental Constraints Map

Client/Project
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208
Project Location
New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia
Prepared by LJB on 2019-11-11
TR by ECL on 2019-11-22
IR by CFG on 2020-02-14



- Existing Structure
- Proposed Structure
- Cemetery
- Place of Worship
- Proposed 230 kV Line
Rebuild and New 230
kV Circuit
- Project Limits
- Approximate Palustrine
Forested Wetland
Limits (PFO)
- Approximate Palustrine
Scrub-Shrub Wetland
Limits (PSS)
- Approximate Palustrine
Emergent Wetland
Limits (PEM)
- Approximate Stream
Channel Limits
- Approximate Open
Water Limits



Notes
1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
2. Data Sources: Dominion Energy Virginia, Stantec, Google Earth, NPWS, PADUS, Virginia
Cultural Resources Information System (VCRIS), Streams data provided by USGS National
Hydrography Dataset (NHD), DCR, ESI, U.S. National Transportation Atlas Railroad, NADS
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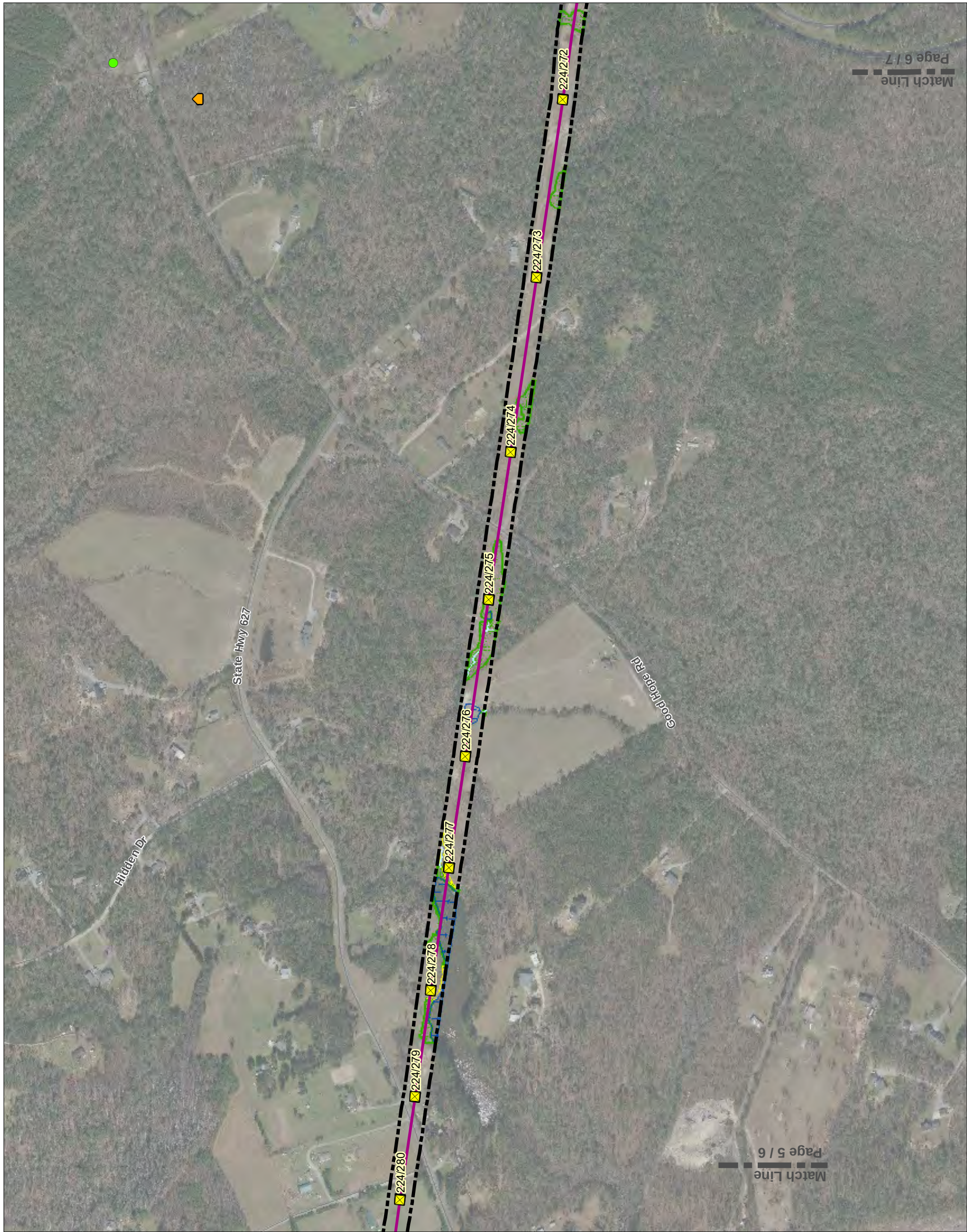
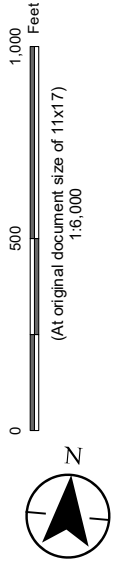


Figure No.
II.A.2

Environmental Constraints Map

Client/Project
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208
203401404

Project Location
New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia
Prepared by LJB on 2019-11-11
TR by ECL on 2019-11-22
IR by CFG on 2020-02-14

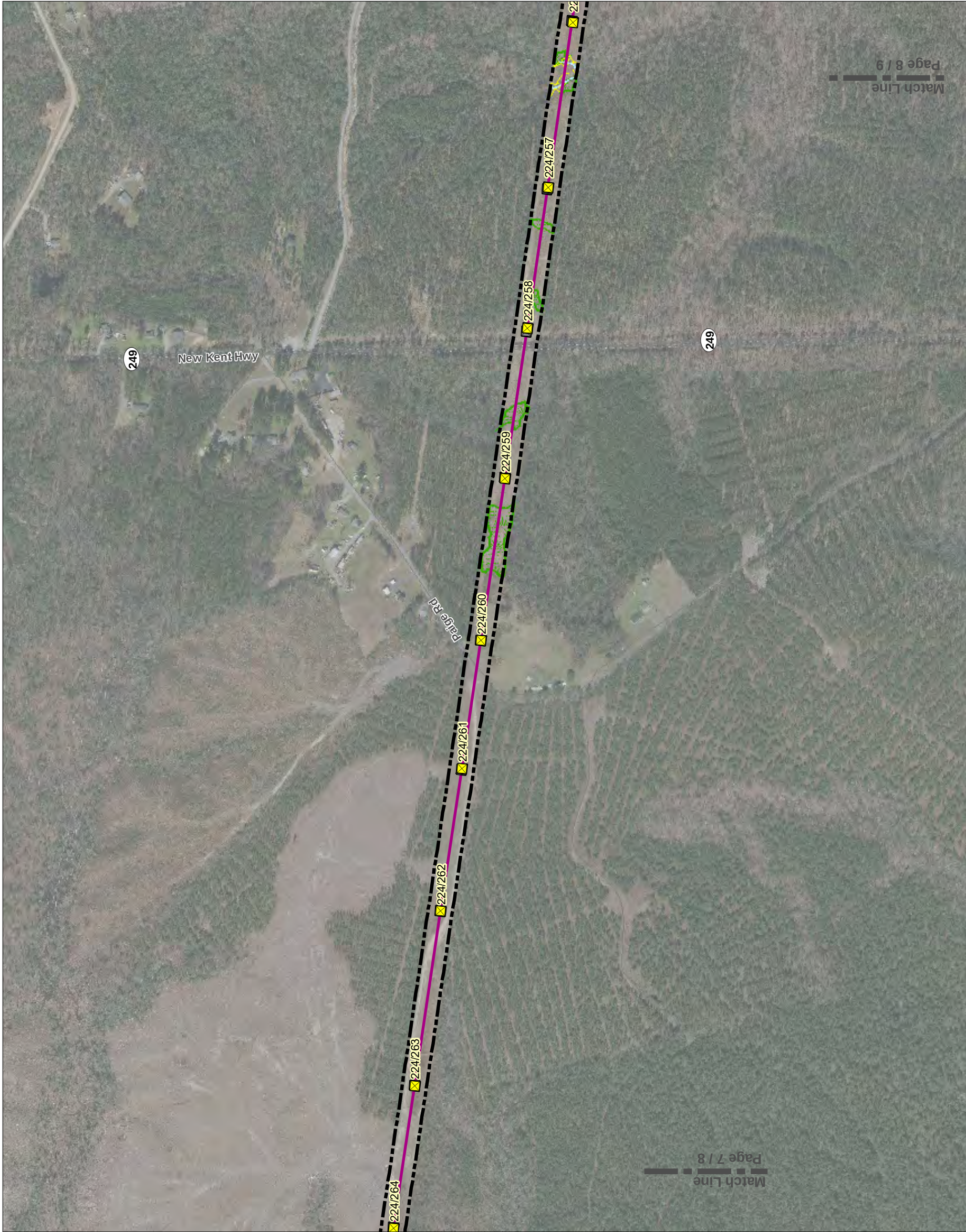


- Existing Structure
- Proposed Structure
- Proposed 230 kV Line Rebuild and New 230 kV Circuit
- Project Limits
- Approximate Palustrine Scrub-Shrub Wetland Limits (PSS)
- Approximate Palustrine Emergent Wetland Limits (PEM)
- Approximate Stream Channel Limits



NOTES

1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
2. Data Sources: Dominion Energy Virginia, Stantec, Google Earth, NPMS, PADUS, Virginia Cultural Resources Information System (VCRIS), Streams data provided by USGS National Hydrography Dataset (NHD), DCR, ESR, U.S. National Transportation Atlas Railroad, NADS
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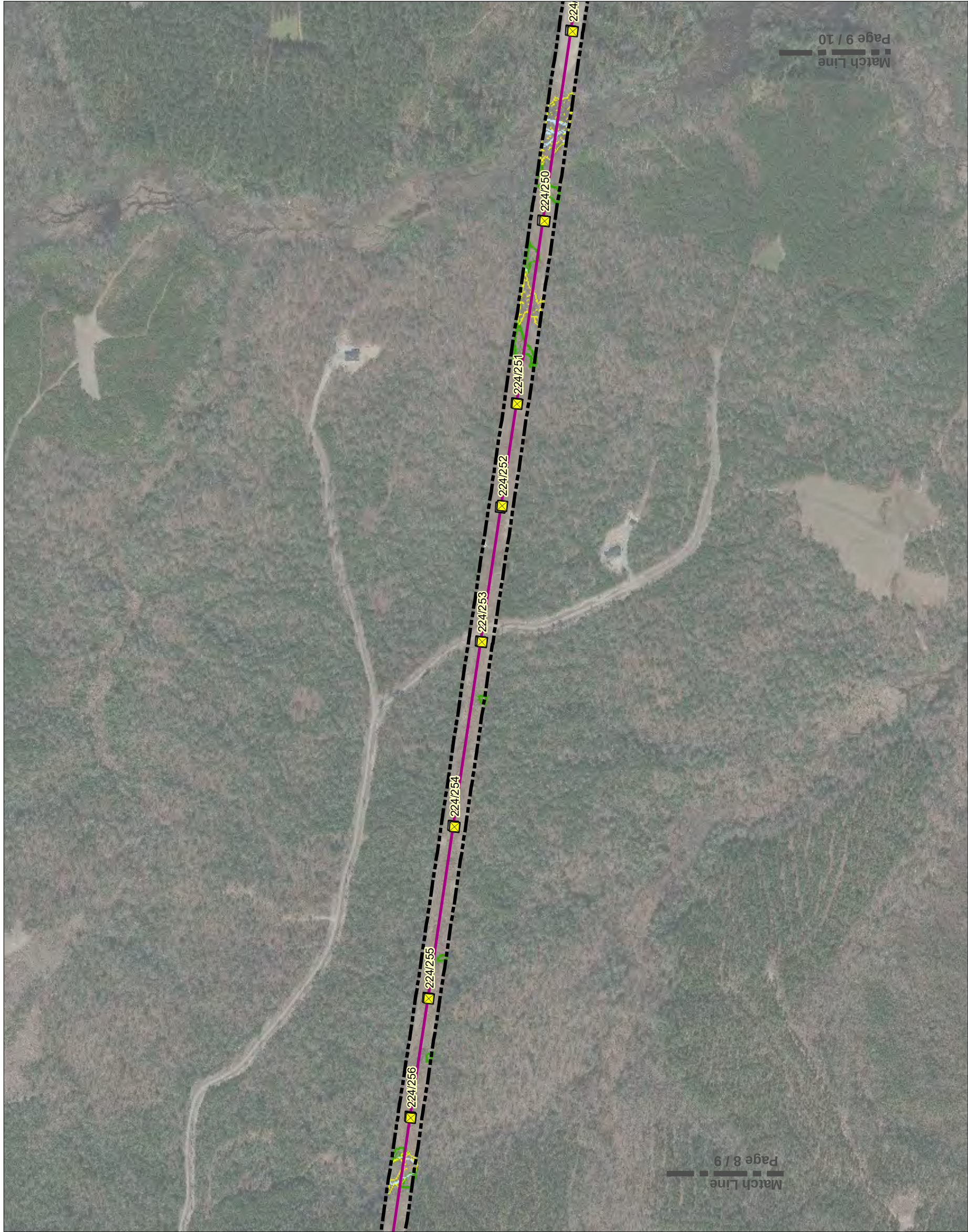
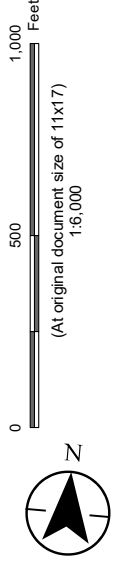


Figure No.
II.A.2
Title
Environmental Constraints Map

Client/Project
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208
Project Location
New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia
Prepared by LJB on 2019-11-11
TR by ECL on 2019-11-22
IR by CFG on 2020-02-14



- Existing Structure
- Proposed Structure
- Proposed 230 kV Line
Rebuild and New 230
kV Circuit
- Project Limits
- Approximate Palustrine
Scrub-Shrub Wetland
Limits (PSS)
- Approximate Palustrine
Emergent Wetland
Limits (PEM)
- Approximate Stream
Channel Limits



Notes
1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
2. Data Sources: Dominion Energy Virginia, Stantec, Google Earth, NPMS, PADUS, Virginia
Cultural Resources Information System (VCRIS), Streams data provided by USGS National
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4. The limits of wetlands of the U.S. are for planning purposes only.
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Figure No.

II.A.2

Title

Environmental Constraints Map

Client/Project203401404

Dominion Energy Virginia

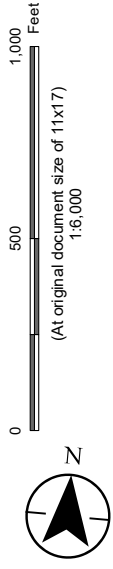
Lanexa-Northern Neck 230 kV Transmission Line #224

Rebuild and New 230 kV Line #2208

Project Location

New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia

Prepared by LIB on 2019-11-11
TR by ECL on 2019-11-22
IR by CFG on 2020-02-14

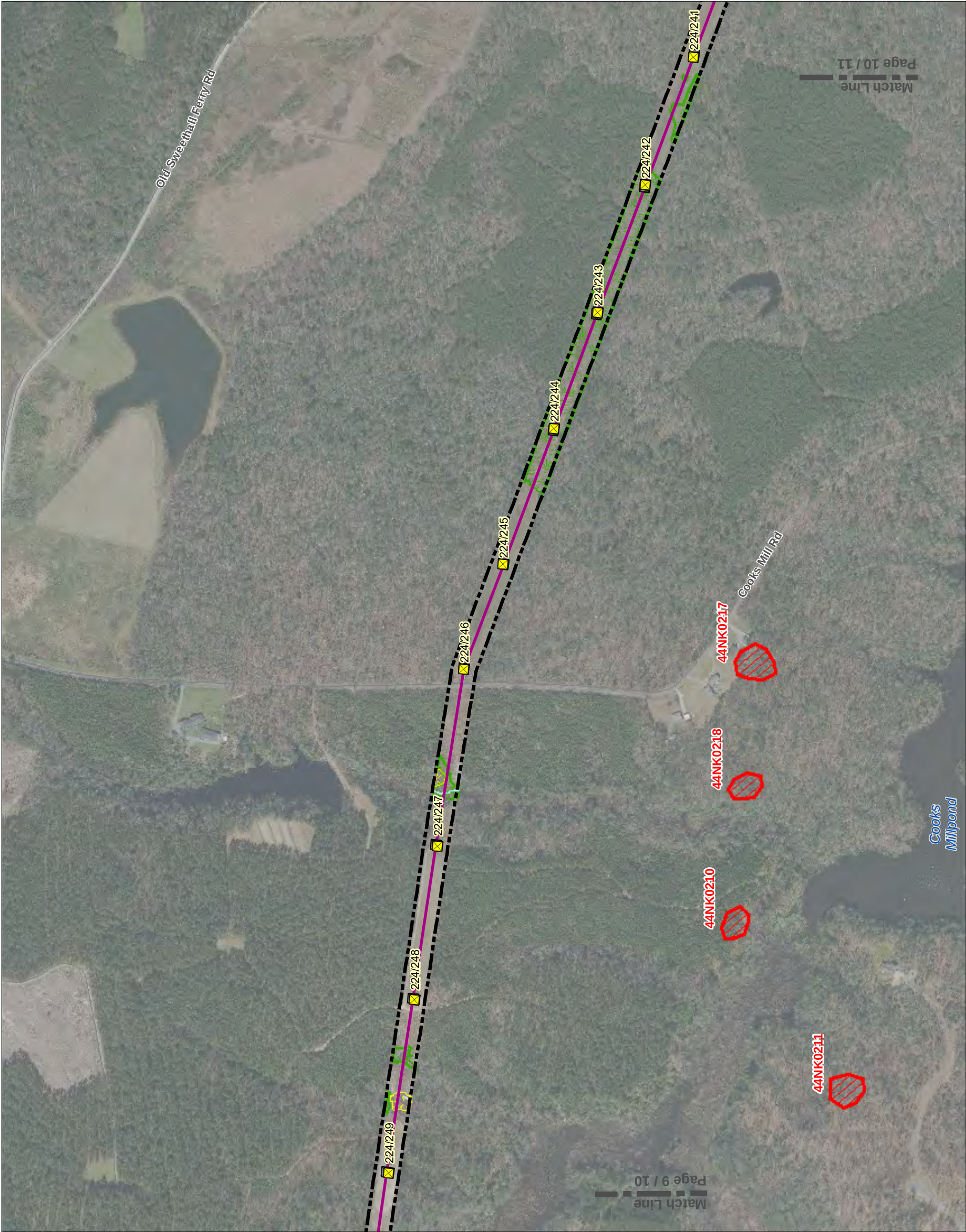


- Existing Structure
- Proposed Structure
- Proposed 230 kV Line Rebuild and New 230 kV Circuit
- Project Limits
- Archaeological Resources
- Approximate Palustrine Scrub-Shrub Wetland Limits (PSS)
- Approximate Palustrine Emergent Wetland Limits (PEM)
- Approximate Stream Channel Limits



Notes

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- Data Sources: Dominion Energy Virginia, Stantec, Google Earth, NPMS, PADUS, Virginia Cultural Resources Information System (VCRIS), Streams data provided by USGS National Hydrography Dataset (NHD), DCR, ESI, U.S. National Transportation Atlas Railroad, NAOS
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Page 10 / 11

Cooks Millpond

Cooks Mill Rd

Old Sweet Hall Ferry Rd

Page 9 / 10

44NK0211

44NK0210

44NK0218

44NK0217

224/249

224/248

224/247

224/246

224/245

224/244

224/243

224/242

224/241

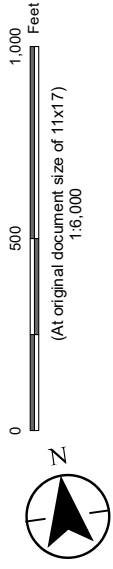
Figure No.

II.A.2

Title

Environmental Constraints Map

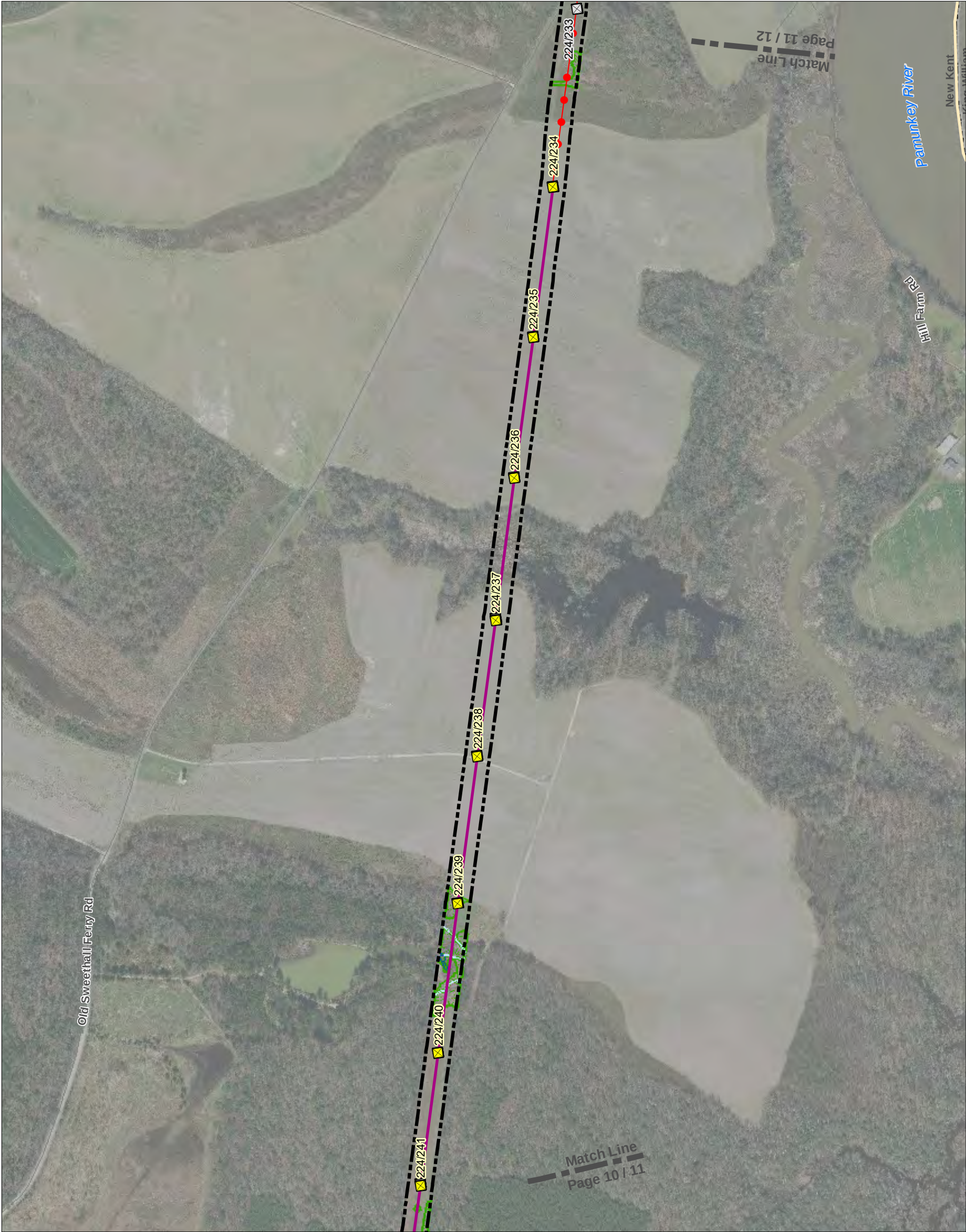
Client/Project
203401404
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208
Project Location
New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia
Prepared by LJB on 2019-11-11
TR by ECL on 2019-11-22
IR by CFG on 2020-02-14



- Existing Structure
- Proposed Structure
- Structures, Second Circuit Only
- Proposed 230 kV Line
- Rebuild and New 230 kV Circuit
- Project Centerline, Second Circuit Only (PUR-2018-00090)
- John Smith
- Chesapeake National Historic Trail
- Project Limits
- Approximate Palustrine Emergent Wetland Limits (PEM)
- Approximate Stream Channel Limits
- Approximate Open Water Limits



NOTES
1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
2. Data Sources: Dominion Energy Virginia, Stantec, Google Earth, NPMS, PADUS, Virginia Cultural Resources Information System (VCRIS), Streams data provided by USGS National Hydrography Dataset (NHD), DCR, ESR, U.S. National Transportation Atlas Railroad, NADS
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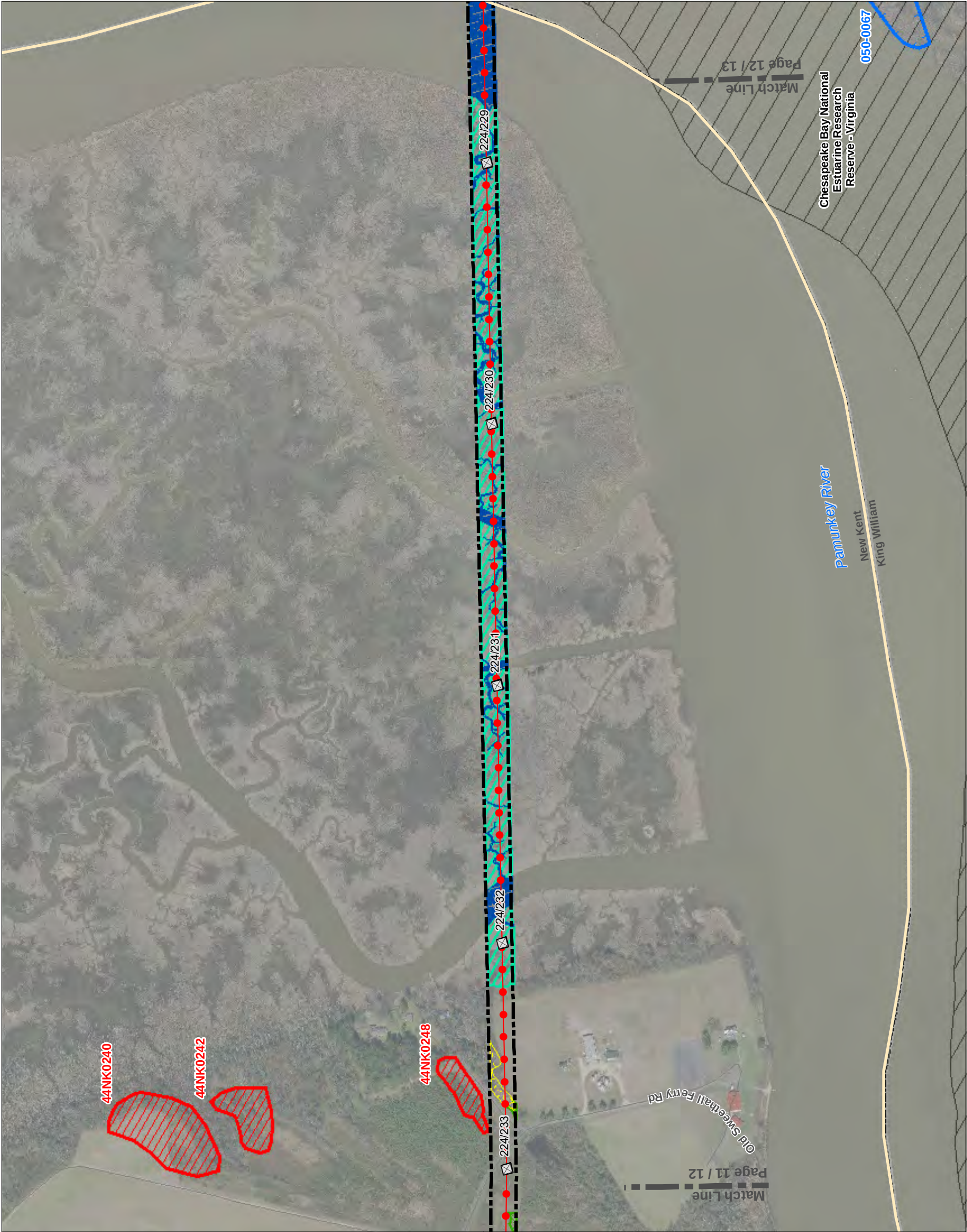


Figure No.
II.A.2

Client/Project
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208

Project Location
New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia

203401404

Prepared by LJB on 2019-11-11
TR by ECL on 2019-11-22
IR by CFG on 2020-02-14

0 500 1,000 Feet

(At original document size of 11x17)

North Arrow

0 500 1,000 Feet

Structures, Second Circuit Only

Proposed 230 kV Line Rebuild and New 230 kV Circuit

Project Centerline, Second Circuit Only (PUR-2018-00090)

John Smith

Chesapeake National Historic Trail

Project Limits

Archaeological Resources

Architectural Resource

Private Conservation Easement

Approximate Estuarine Interstitial Emergent Wetland Limits (E2EM)

Approximate Palustrine Scrub-Shrub Wetland Limits (PSS)

Approximate Palustrine Emergent Wetland Limits (PEM)

Approximate Estuarine Subtidal Unconsolidated Bottom Limits (E1UB)

Notes

1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet

2. Data Sources: Dominion Energy Virginia, Stantec, Google Earth, NPMIS, PADUS, Virginia Cultural Resources Information System (VCRIS), Streams data provided by USGS National Hydrography Dataset (NHD), DCR, ESI, U.S. National Transportation Atlas Railroad, NAOS

3. The limits of the U.S., including wetlands, shown on this map have been field located by means of sub-meter accuracy GPS technology and are for planning purposes only.

4. Microsoft product screen shot(s) are for planning purposes only.

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Stantec

Match Line

Page 11 / 12

Match Line

Page 12 / 13

Notes

1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet

2. Data Sources: Dominion Energy Virginia, Stantec, Google Earth, NPMIS, PADUS, Virginia Cultural Resources Information System (VCRIS), Streams data provided by USGS National Hydrography Dataset (NHD), DCR, ESI, U.S. National Transportation Atlas Railroad, NAOS

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Stantec

Page 12 of 41

Attachment II.A.2
Page 12 of 41





Figure No.
II.A.2

Title
Environmental Constraints Map

Client/Project
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208

203401404

Project Location
New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia

Prepared by LJB on 2019-11-11
TR by ECL on 2019-11-22
IR by CFG on 2020-02-14

Existing Structure

Proposed Structure

Place of Worship

Proposed 230 kV Line
Rebuild and New 230
kV Circuit

Project Limits

Private Conservation
Easement

Approximate Palustrine
Forested Wetland
Limits (PFO)

Approximate Palustrine
Scrub-Shrub Wetland
Limits (PSS)

Approximate Palustrine
Emergent Wetland
Limits (PEM)

Approximate Stream
Channel Limits

0

500

1,000

Feet

N

(At original document size of 11x17)
1:6,000

Existing Structure

Proposed Structure

Place of Worship

Proposed 230 kV Line
Rebuild and New 230
kV Circuit

Project Limits

Private Conservation
Easement

Approximate Palustrine
Forested Wetland
Limits (PFO)

Approximate Palustrine
Scrub-Shrub Wetland
Limits (PSS)

Approximate Palustrine
Emergent Wetland
Limits (PEM)

Approximate Stream
Channel Limits

NOTES

1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
2. Data Sources: Dominion Energy Virginia, Stantec, Google Earth, NPMS, PADUS, Virginia Cultural Resources Information System (VCRIS), Streams data provided by USGS National Hydrography Dataset (NHD), DCR, ESR, U.S. National Transportation Atlas Railroad, NAOS
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Page 14 of 41

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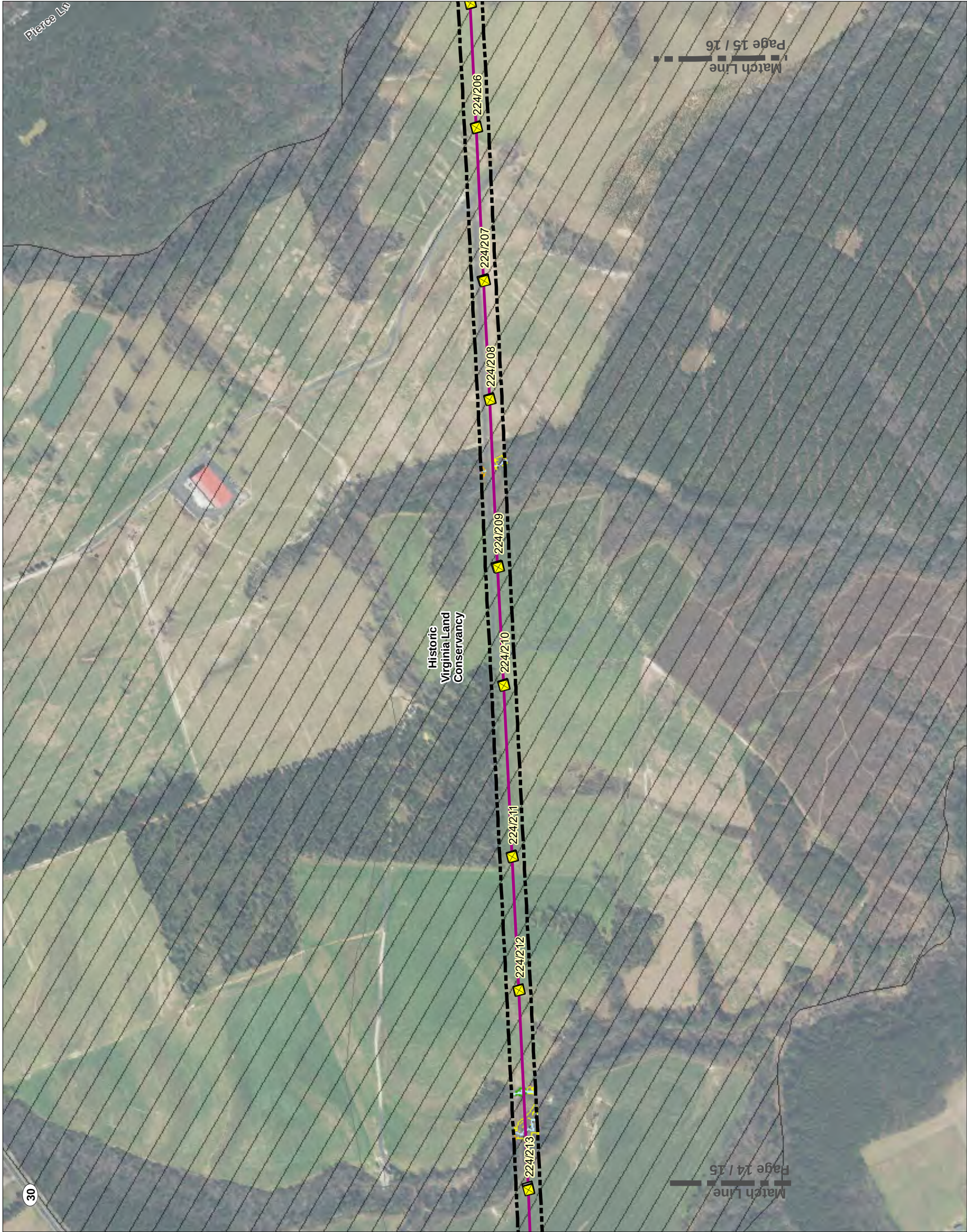
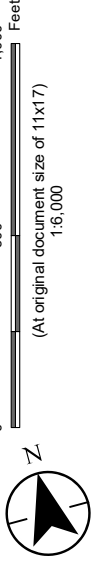


Figure No. II.A.2
Title Environmental Constraints Map

Client/Project 203401404
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208
Project Location
New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia
Prepared by LJB on 2019-11-11
TR by ECL on 2019-11-22
IR by CFG on 2020-02-14



- Existing Structure
- Proposed Structure
- Proposed 230 kV Line
Rebuild and New 230
kV Circuit
- Project Limits
- Private Conservation
Easement
- Approximate Palustrine
Forested Wetland
Limits (PFO)
- Approximate Palustrine
Scrub-Shrub Wetland
Limits (PSS)
- Approximate Palustrine
Emergent Wetland
Limits (PEM)
- Approximate Stream
Channel Limits



NOTES
1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
2. Data Sources: Dominion Energy Virginia, Stantec, Google Earth, NPMS, PADUS, Virginia
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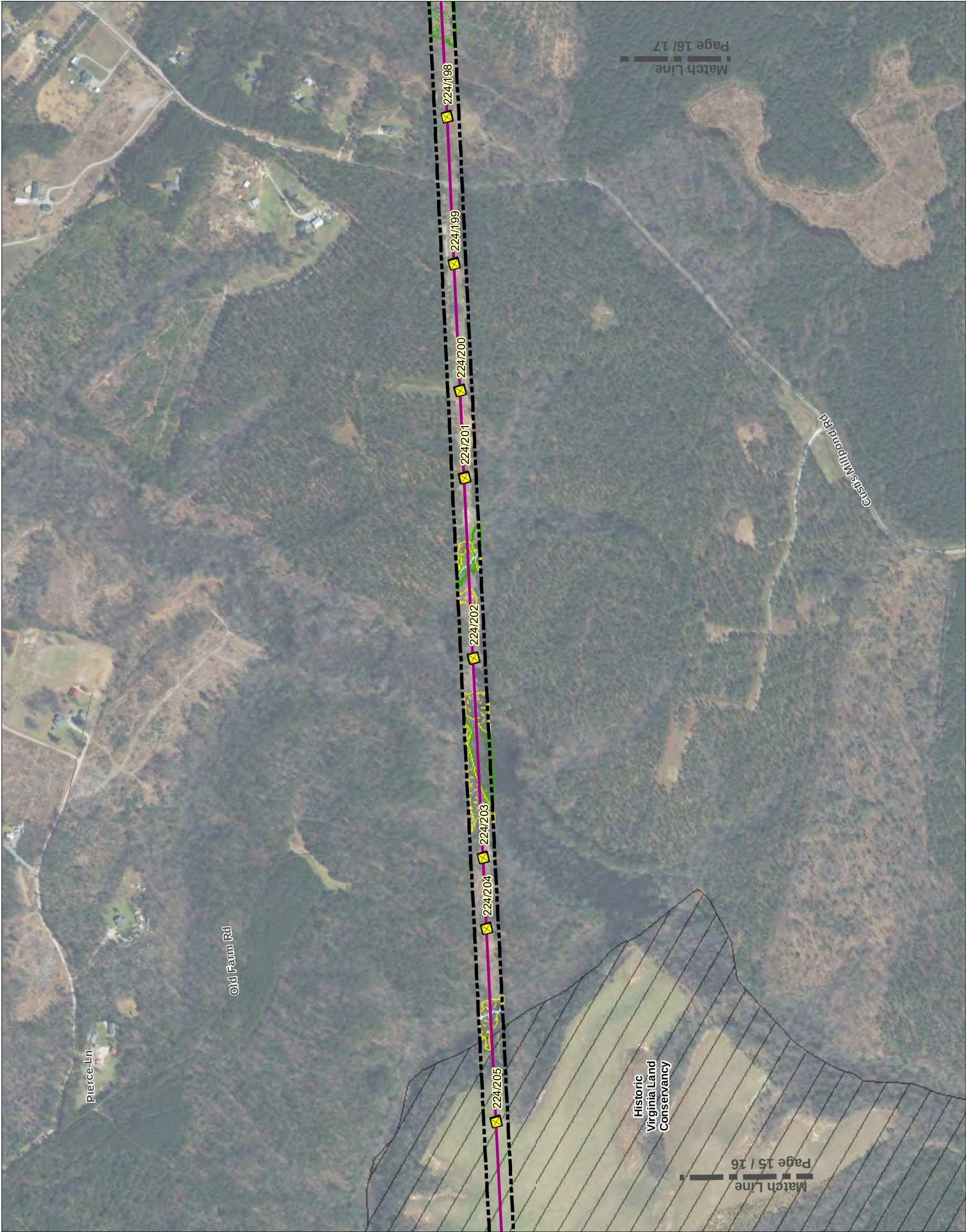
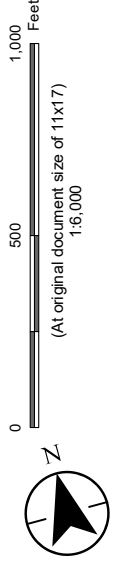


Figure No. II.A.2
Title Environmental Constraints Map

Client/Project 203401404
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208
Project Location
New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia
Prepared by LJB on 2019-11-11
TR by ECL on 2019-11-22
IR by CFG on 2020-02-14



- Existing Structure
- Proposed Structure
- Proposed 230 kV Line
Rebuild and New 230
kV Circuit
- Project Limits
- Private Conservation
Easement
- Approximate Palustrine
Scrub-Shrub Wetland
Limits (PSS)
- Approximate Palustrine
Emergent Wetland
Limits (PEM)
- Approximate Stream
Channel Limits



Notes
1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
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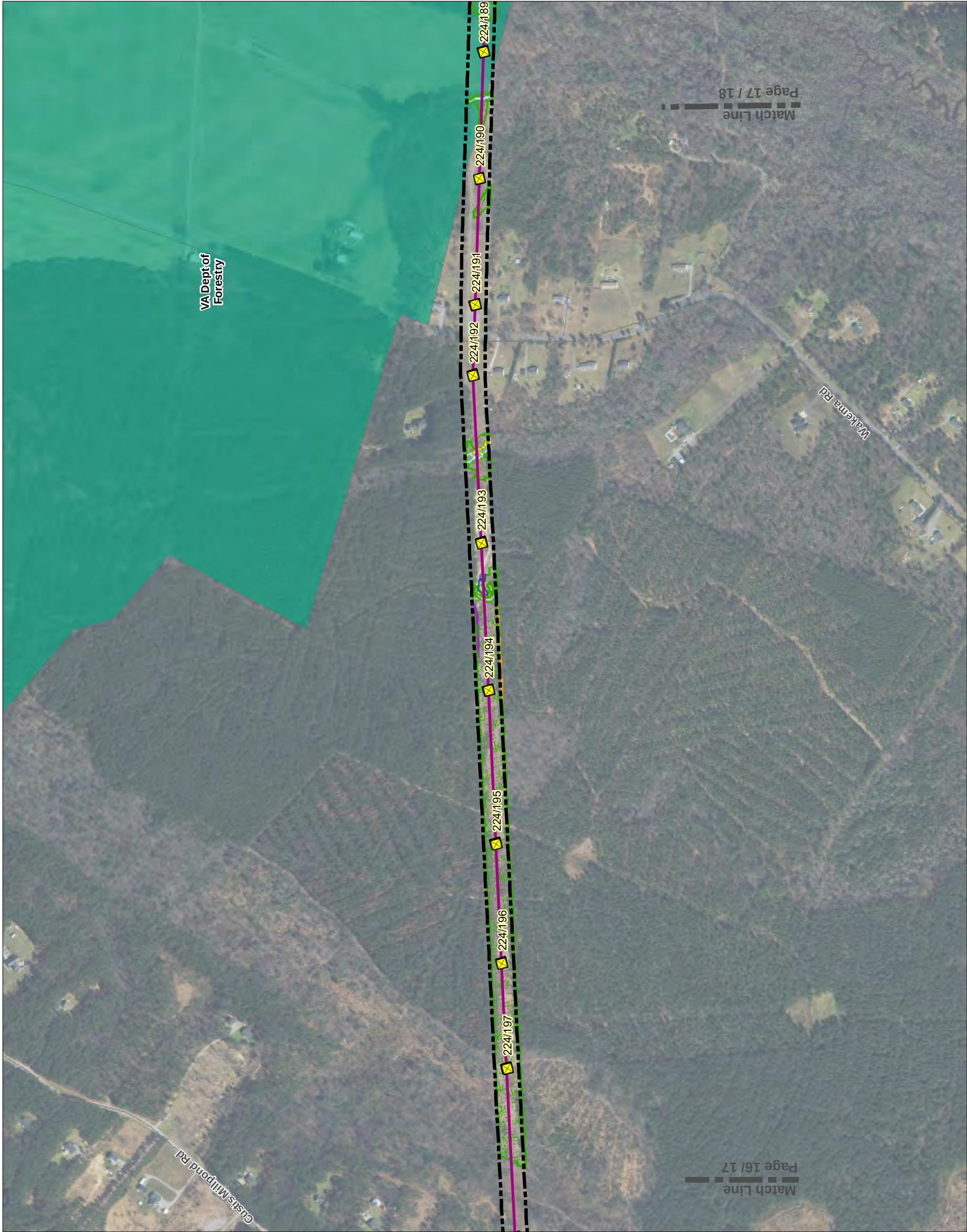
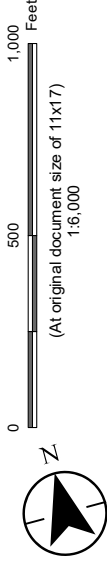


Figure No.
II.A.2
Title
Environmental Constraints Map

Client/Project
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208
Project Location
New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia
Prepared by LJB on 2019-11-11
TR by ECL on 2019-11-22
IR by CFG on 2020-02-14



- Existing Structure
- Proposed Structure
- Proposed 230 kV Line
Rebuild and New 230
kV Circuit
- Project Limits
- State Conservation
Easement
- Approximate Palustrine
Forested Wetland
Limits (PFO)
- Approximate Palustrine
Scrub-Shrub Wetland
Limits (PSS)
- Approximate Palustrine
Emergent Wetland
Limits (PEM)
- Approximate Stream
Channel Limits
- Approximate Open
Water Limits
- Approximate
Jurisdictional Ditch
Limits (JD)



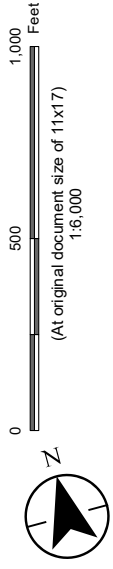
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2. Data Sources: Dominion Energy Virginia, Stantec, Google Earth, NPMS, PADUS, Virginia
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Figure No.
II.A.2

Environmental Constraints Map

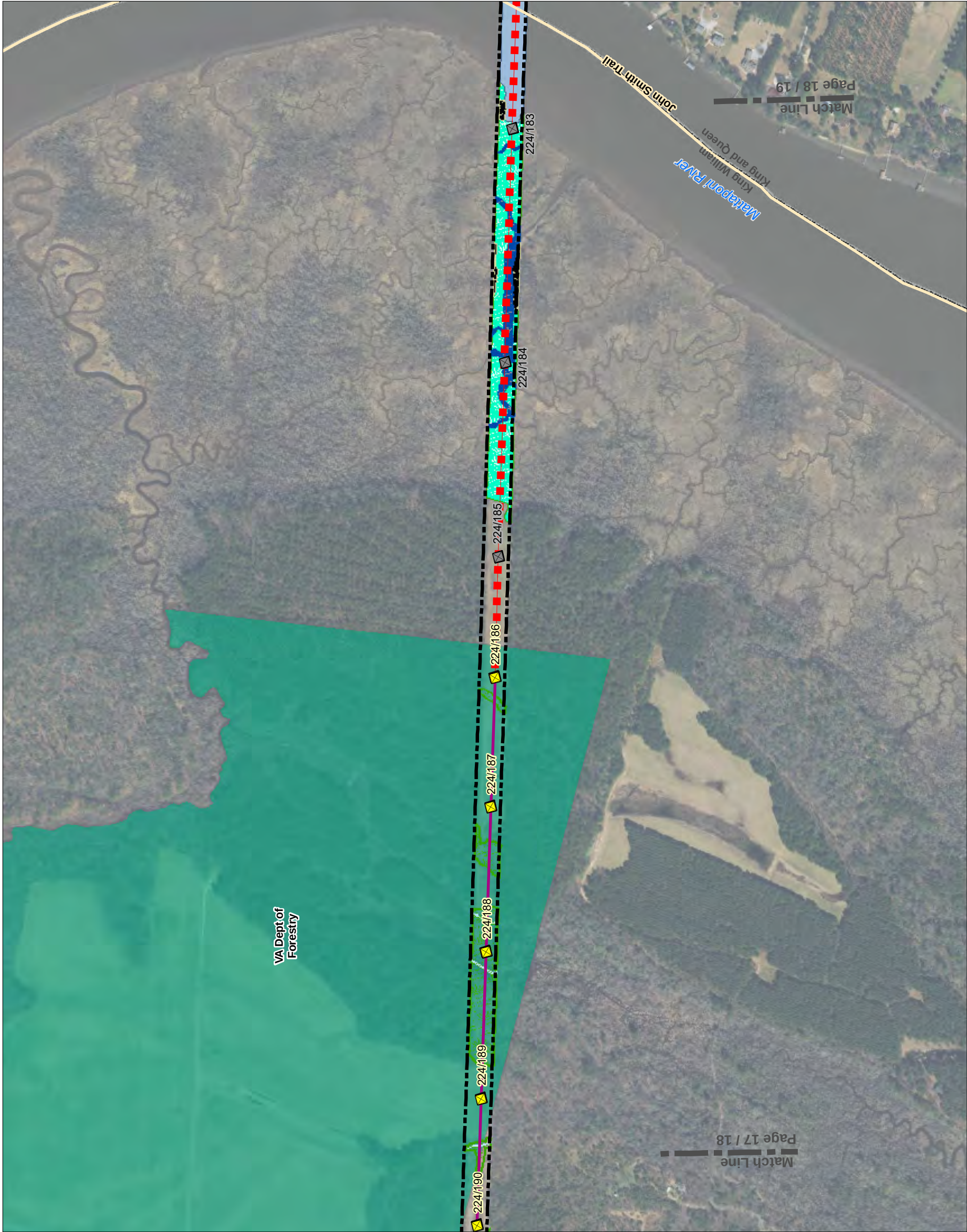
Client/Project
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208
Project Location
New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia
Prepared by LJB on 2019-11-11
TR by ECL on 2019-11-22
IR by CFG on 2020-02-14

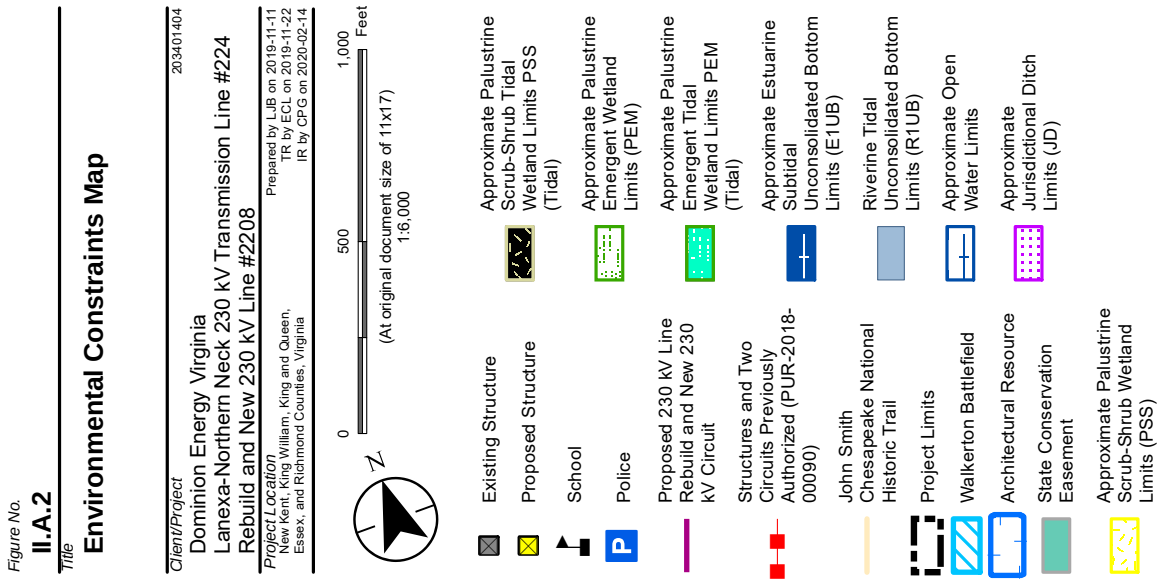


- Existing Structure
- Proposed Structure
- Proposed 230 kV Line Rebuild and New 230 kV Circuit
- Structures and Two Circuits Previously Authorized (PUR-2018-00090)
- John Smith
- Chesapeake National Historic Trail
- Project Limits
- State Conservation Easement
- Approximate Palustrine Scrub-Shrub Tidal Wetland Limits PSS (Tidal)
- Approximate Palustrine Emergent Wetland Limits (PEM)
- Approximate Palustrine Emergent Tidal Wetland Limits PEM (Tidal)
- Approximate Estuarine Subtidal Unconsolidated Bottom Limits (E1UB)
- Riverine Tidal Unconsolidated Bottom Limits (R1UB)
- Approximate Stream Channel Limits



Notes
1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
2. Data Sources: Dominion Energy Virginia, Stantec, Google Earth, NPMS, PADUS, Virginia Cultural Resources Information System (VCRIS), Streams data provided by USGS National Hydrography Dataset (NHD), DCR, ESI, U.S. National Transportation Atlas Railroad, NADS
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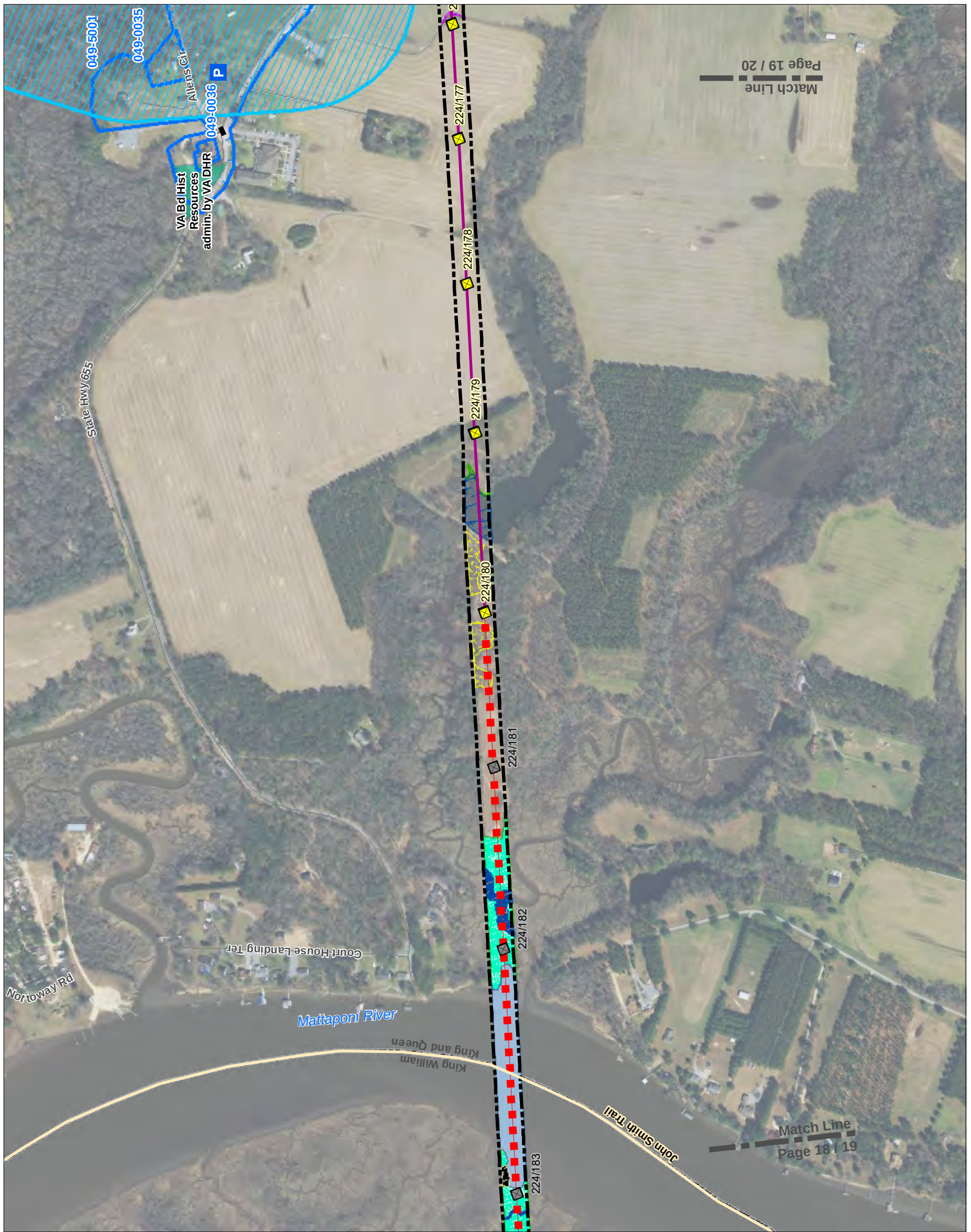


Notes

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2. Data Sources: Dominion Energy Virginia, Stantec, Google Earth, NPMAS, PADUS, Virginia Cultural Resources Information System (VCRIS), Streams data provided by USGS National Water Research Institute, Potomac River Environmental Monitoring System (PREAMS)
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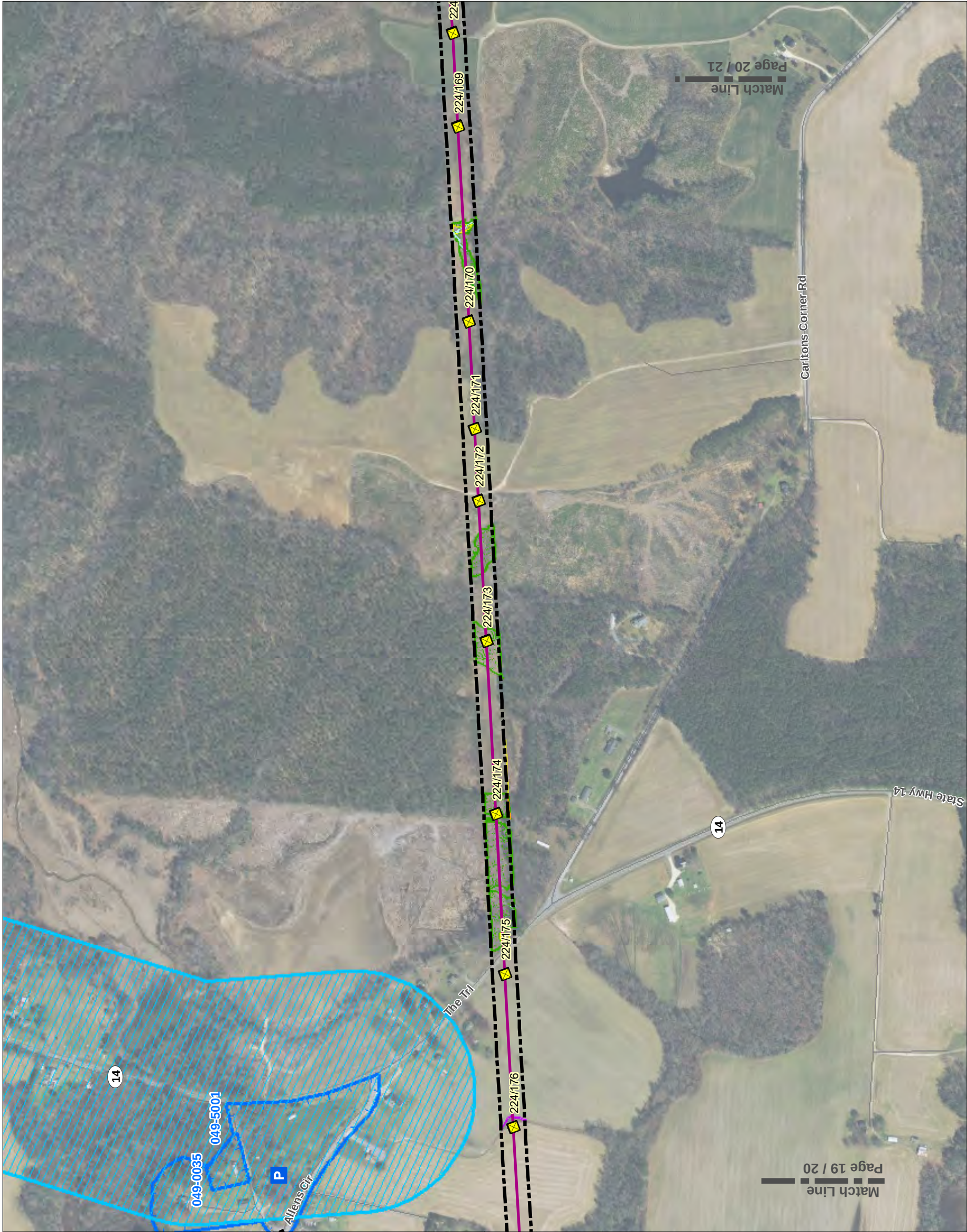
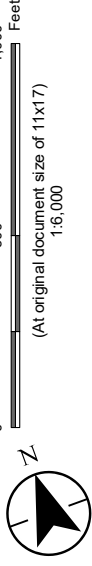


Figure No. II.A.2
Title Environmental Constraints Map

Client/Project 203401404
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208
Project Location
New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia
Prepared by LJB on 2019-11-11
TR by ECL on 2019-11-22
IR by CFG on 2020-02-14



- Existing Structure
- Proposed Structure
- School
- Police
- Proposed 230 kV Line
Rebuild and New 230
kV Circuit
- Project Limits
- Walkerton Battlefield
- Architectural Resource
- Approximate Palustrine
Forested Wetland
Limits (PFO)
- Approximate Palustrine
Scrub-Shrub Wetland
Limits (PSS)
- Approximate Palustrine
Emergent Wetland
Limits (PEM)
- Approximate Stream
Channel Limits
- Approximate
Jurisdictional Ditch
Limits (JD)



Notes
1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
2. Data Sources: Dominion Energy Virginia, Stantec, Google Earth, NPMIS, PADUS, Virginia
Cultural Resources Information System (VCRIS), Streams data provided by USGS National
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Figure No.
II.A.2

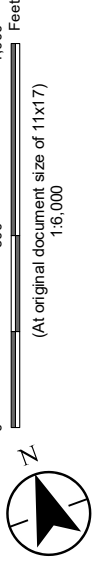
Title
Environmental Constraints Map

Client/Project
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208

203401404

Project Location
New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia

Prepared by LJB on 2019-11-11
TR by ECL on 2019-11-22
IR by CFG on 2020-02-14



- Existing Structure
- Proposed Structure
- Proposed 230 kV Line Rebuild and New 230 kV Circuit
- Project Limits
- Private Conservation Easement
- Approximate Palustrine Scrub-Shrub Wetland Limits (PSS)
- Approximate Palustrine Emergent Wetland Limits (PEM)
- Approximate Stream Channel Limits



NOTES

1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
2. Data Sources: Dominion Energy Virginia, Stantec, Google Earth, NPMS, PADUS, Virginia Cultural Resources Information System (VCRIS), Streams data provided by USGS National Hydrography Dataset (NHD), DCR, ESI, U.S. National Transportation Atlas Railroad, NAOS
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Figure No.
II.A.2

Title
Environmental Constraints Map

Client/Project
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208

203401404

Project Location
New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia

Prepared by LJB on 2019-11-11
TR by ECL on 2019-11-22
IR by CFG on 2020-02-14

Existing Structure

Proposed Structure

Proposed 230 kV Line
Rebuild and New 230
kV Circuit

Project Limits

Private Conservation
Easement

Approximate Palustrine
Scrub-Shrub Wetland
Limits (PSS)

Approximate Palustrine
Emergent Wetland
Limits (PEM)

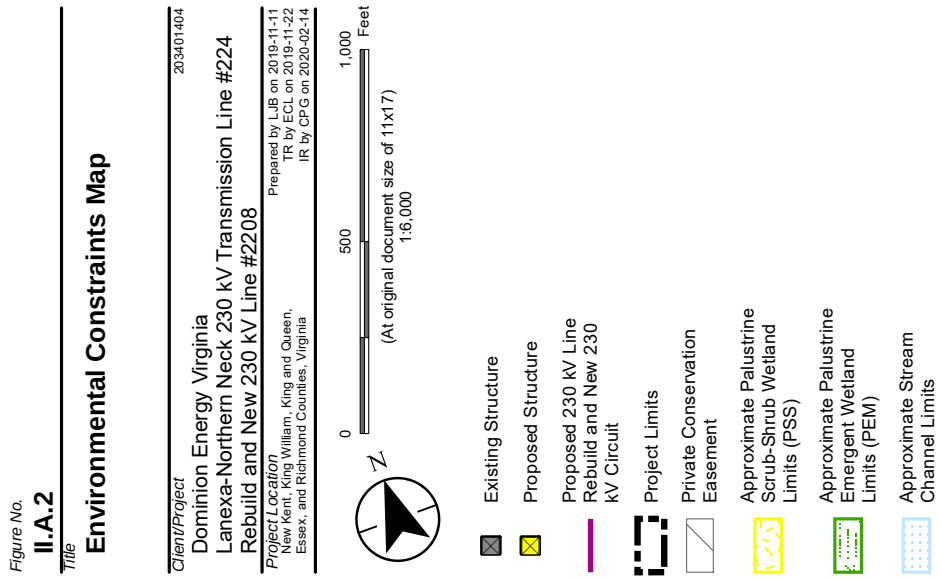
Approximate Stream
Channel Limits



NOTES

1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
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Notes

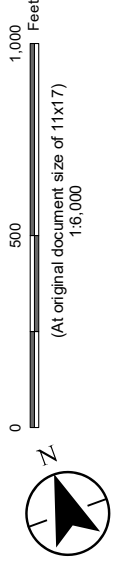
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Figure No.
II.A.2

Environmental Constraints Map

Client/Project
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208
Project Location
New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia
Prepared by LJB on 2019-11-11
TR by ECL on 2019-11-22
IR by CFG on 2020-02-14



- Existing Structure
- Proposed Structure
- Proposed 230 kV Line
Rebuild and New 230
kV Circuit
- Project Limits
- Private Conservation
Easement
- Approximate Palustrine
Scrub-Shrub Wetland
Limits (PSS)
- Approximate Palustrine
Emergent Wetland
Limits (PEM)
- Approximate Stream
Channel Limits



NOTES
1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
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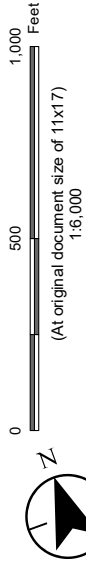
Figure No.

II.A.2

Title

Environmental Constraints Map

Client/Project
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208
Project Location
New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia
Prepared by LIB on 2019-11-11
TR by ECL on 2019-11-22
IR by CFG on 2020-02-14



- Existing Structure
- Proposed Structure
- Cemetery
- Proposed 230 kV Line
Rebuild and New 230
kV Circuit
- Project Limits
- Private Conservation
Easement
- Approximate Palustrine
Scrub-Shrub Wetland
Limits (PSS)
- Approximate Palustrine
Emergent Wetland
Limits (PEM)
- Approximate Stream
Channel Limits

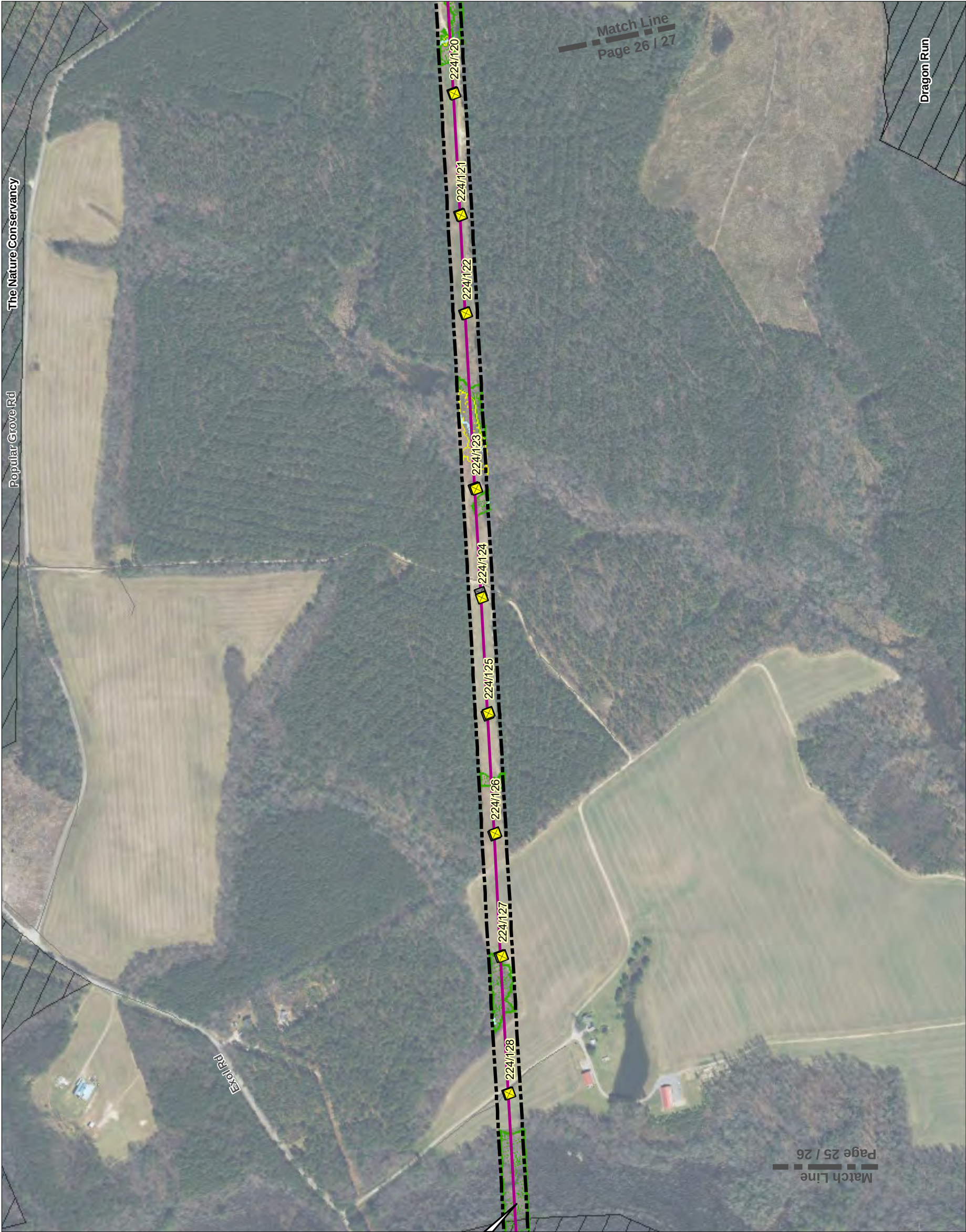


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Match Line
Page 25 / 26

Match Line
Page 24 / 25



The Nature Conservancy

Popular Grove Rd

Exot Rd

Dragon Run

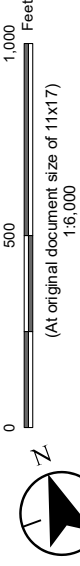
Match Line
Page 26 / 27

Match Line
Page 25 / 26

Figure No.
II.A.2
Title

Environmental Constraints Map

Client/Project
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208
Project Location
New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia
Prepared by LJB on 2019-11-11
TR by ECL on 2019-11-22
IR by CFG on 2020-02-14



- Existing Structure
- Proposed Structure
- Proposed 230 kV Line
Rebuild and New 230
kV Circuit
- Project Limits
- Private Conservation
Easement
- Private Conservation
Easement
- Approximate Palustrine
Scrub-Shrub Wetland
Limits (PSS)
- Approximate Palustrine
Emergent Wetland
Limits (PEM)
- Approximate Stream
Channel Limits



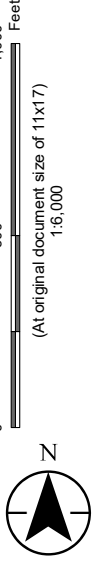
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Figure No. II.A.2
Title Environmental Constraints Map

Client/Project 203401404
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208
Project Location
New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia
Prepared by LJB on 2019-11-11
TR by ECL on 2019-11-22
IR by CFG on 2020-02-14



- Existing Structure
- Proposed Structure
- Proposed 230 kV Line Rebuild and New 230 kV Circuit
- Project Limits
- Private Conservation Easement
- State Conservation Easement
- Private Conservation Easement
- Approximate Palustrine Scrub-Shrub Wetland Limits (PSS)
- Approximate Palustrine Emergent Wetland Limits (PEM)
- Approximate Stream Channel Limits



Notes
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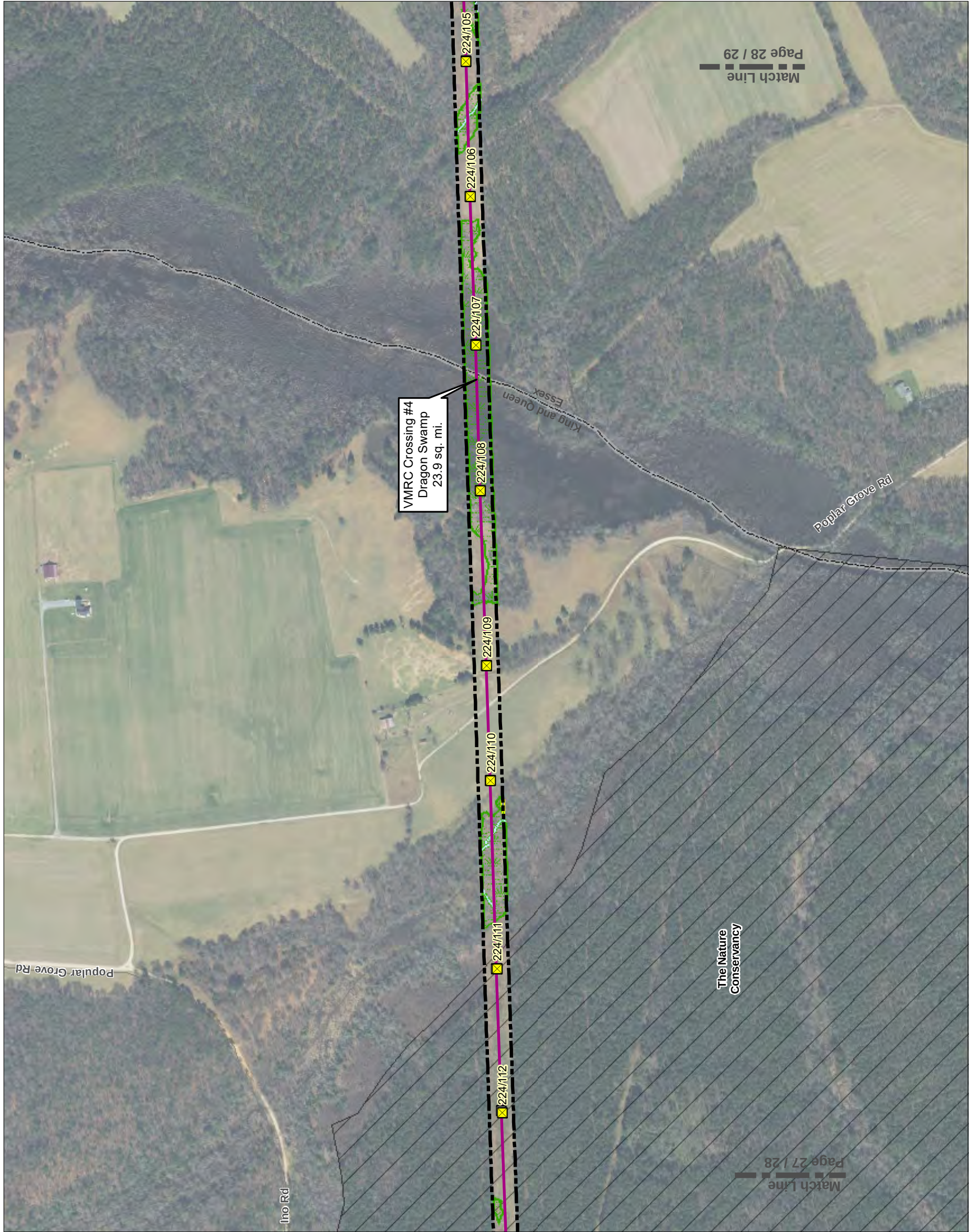


Figure No.
II.A.2

Title
Environmental Constraints Map

Client/Project
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208

203401404

Project Location
New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia

Prepared by LJB on 2019-11-11
TR by ECL on 2019-11-22
IR by CFG on 2020-02-14

Existing Structure

Proposed Structure

Proposed 230 kV Line
Rebuild and New 230
kV Circuit

Project Limits

Private Conservation
Easement

Approximate Palustrine
Scrub-Shrub Wetland
Limits (PSS)

Approximate Palustrine
Emergent Wetland
Limits (PEM)

Approximate Stream
Channel Limits

0

500

1,000

Feet
(At original document size of 11x17)

16,000

NOTES

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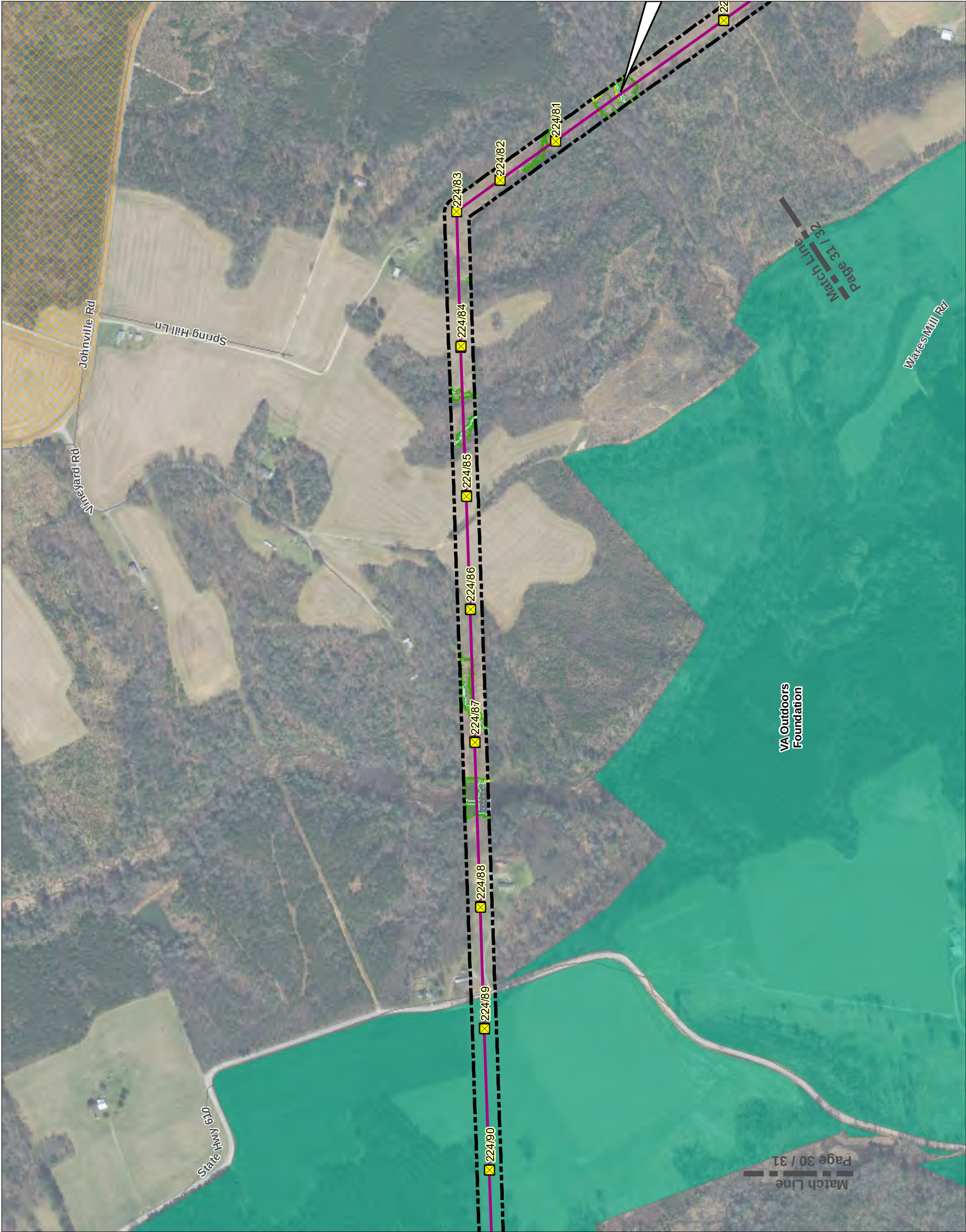


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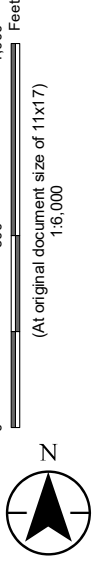
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Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208

203401404

Project Location
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Prepared by: LIB on 2019-11-11
TR by ECL on 2019-11-22
IR by CFG on 2020-02-14



- Existing Structure
- Proposed Structure
- Proposed 230 kV Line Rebuild and New 230 kV Circuit
- Project Limits
- State Conservation Easement
- VOF Conservation Easement
- Approximate Palustrine Scrub-Shrub Wetland Limits (PSS)
- Approximate Palustrine Emergent Wetland Limits (PEM)
- Approximate Stream Channel Limits



Notes

1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
2. Data Sources: Dominion Energy Virginia, Stantec, Google Earth, NPMS, PADUS, Virginia Cultural Resources Information System (VCRIS), Streams data provided by USGS National Hydrography Dataset (NHD), DCR, ESR, U.S. National Transportation Atlas Railroad, NADS
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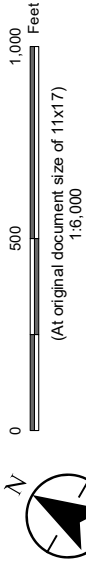
Figure No.

II.A.2

Title

Environmental Constraints Map

Client/Project
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208
Project Location
New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia
Prepared by LJB on 2019-11-11
TR by ECL on 2019-11-22
IR by CFG on 2020-02-14



- Existing Structure
- Proposed Structure
- Substation
- Proposed 230 kV Line
Rebuild and New 230
kV Circuit
- Project Limits
- State Conservation
Easement
- Approximate Palustrine
Forested Wetland
Limits (PFO)
- Approximate Palustrine
Scrub-Shrub Wetland
Limits (PSS)
- Approximate Palustrine
Emergent Wetland
Limits (PEM)
- Approximate Stream
Channel Limits



NOTES
1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
2. Data Sources: Dominion Energy Virginia, Stantec, Google Earth, NPMS, PADUS, Virginia
Cultural Resources Information System (VCRIS), Streams data provided by USGS National
Hydrography Dataset (NHD), DCR, ESRI, U.S. National Transportation Atlas Railroad, NADS
3. The limits of wetlands of the U.S., including wetlands, shown on this map have been field
checked by means of sub-meter GPS technology and are for planning purposes only.
4. Wetland data is derived from the Virginia Department of Game and Inland Fisheries (VDGIF) and is for planning purposes only.
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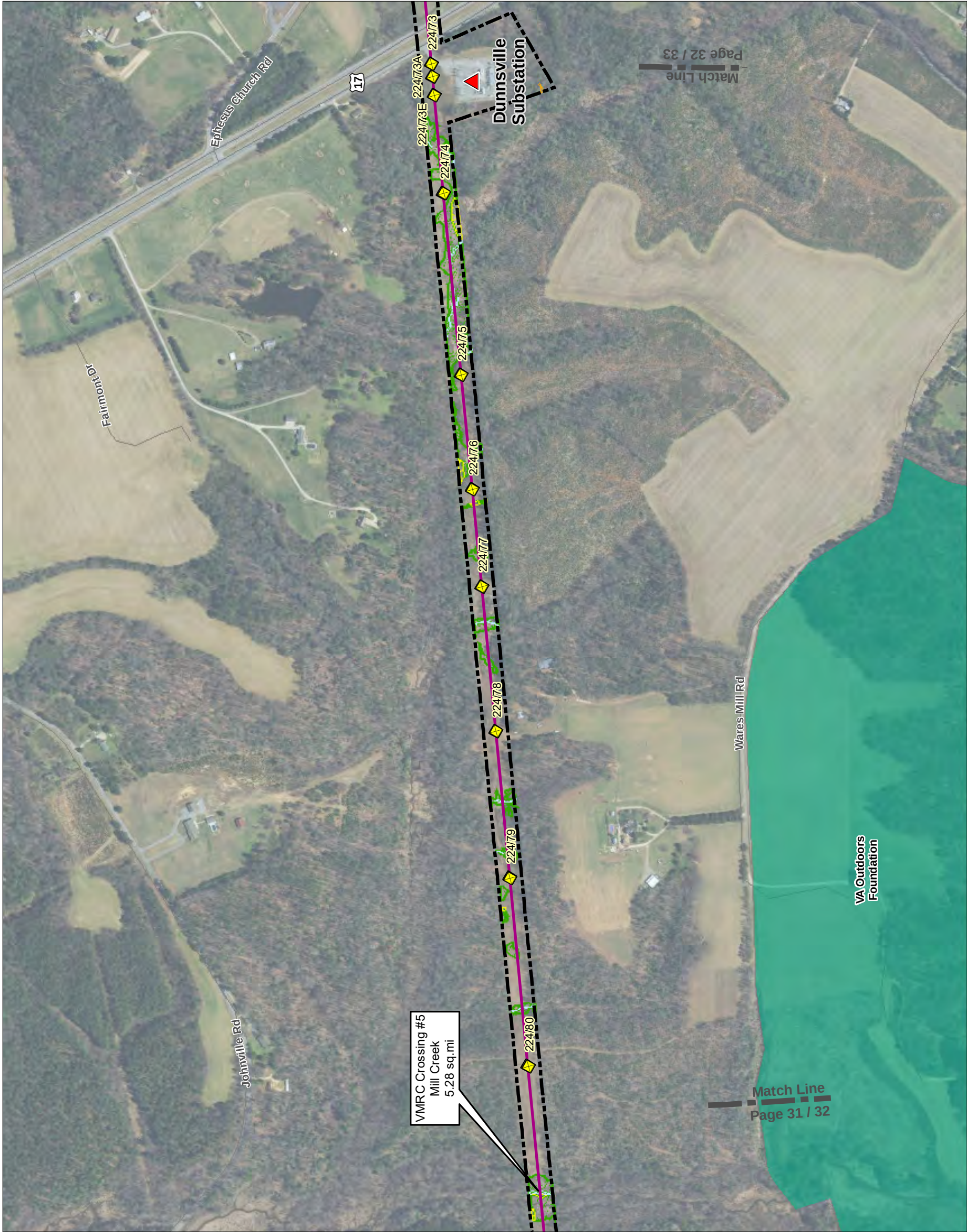


Figure No.

II.A.2

Title

Environmental Constraints Map

Client/Project203401404

Dominion Energy Virginia

Lanexa-Northern Neck 230 kV Transmission Line #224

Rebuild and New 230 kV Line #2208

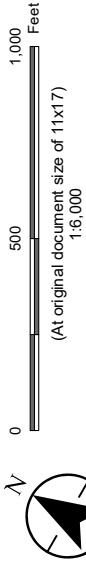
Project Location

New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia

Prepared by LJB on 2019-11-11

TR by ECL on 2019-11-22

IR by CFG on 2020-02-14

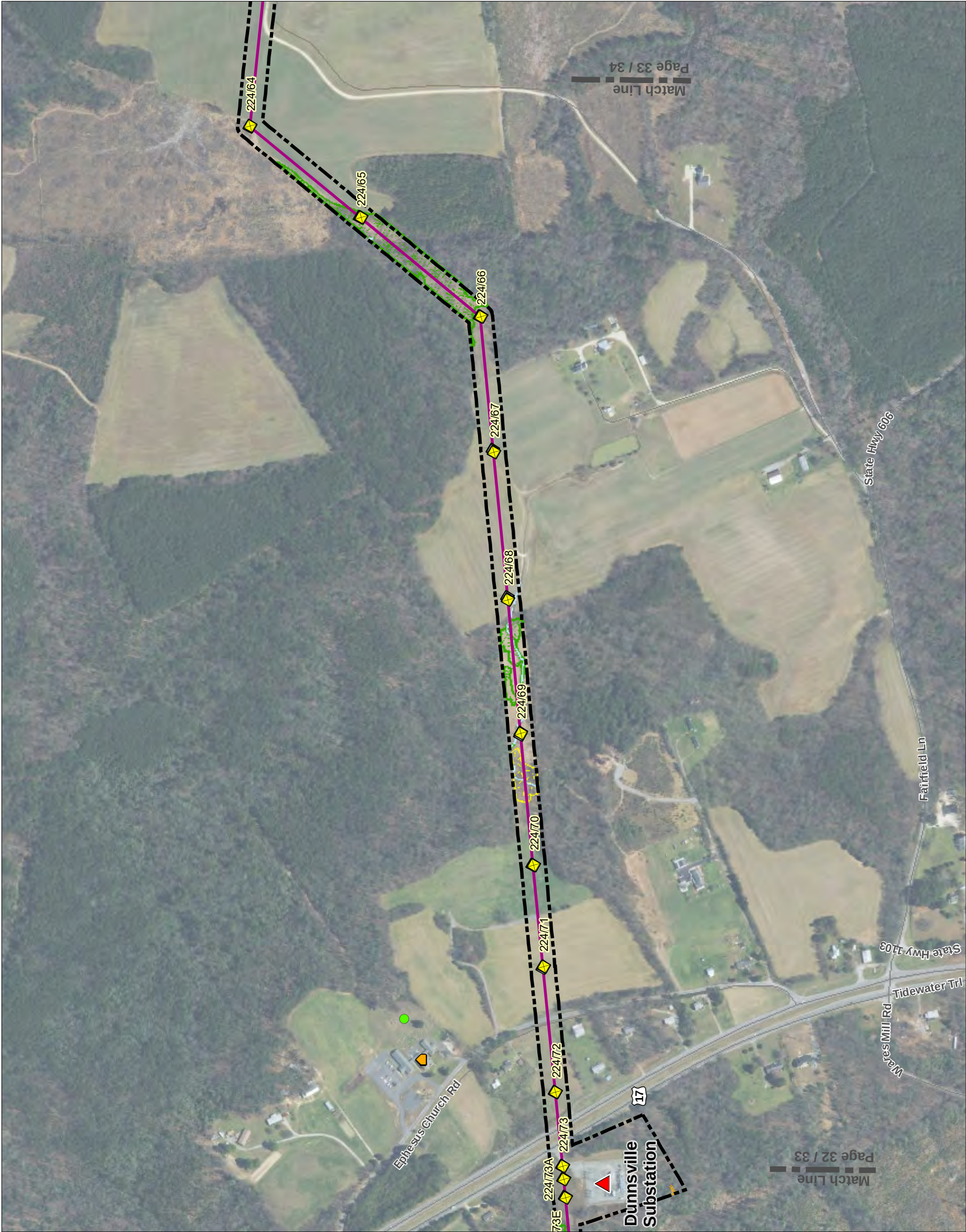


- Existing Structure
- Proposed Structure
- Substation
- Cemetery
- Place of Worship
- Proposed 230 kV Line
Rebuild and New 230
kV Circuit
- Project Limits
- Approximate Palustrine
Forested Wetland
Limits (PFO)
- Approximate Palustrine
Scrub-Shrub Wetland
Limits (PSS)
- Approximate Palustrine
Emergent Wetland
Limits (PEM)
- Approximate Stream
Channel Limits



Notes

1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
2. Data Sources: Dominion Energy Virginia, Stantec, Google Earth, NPMS, PADUS, Virginia Cultural Resources Information System (VCRIS), Streams data provided by USGS National Hydrography Dataset (NHD), DCR, ESR, U.S. National Transportation Atlas Railroad, NAOS
3. The limits of the U.S., including wetlands, shown on this map have been field located by means of sub-meter accuracy GPS technology and are for planning purposes only.
4. Microsoft product screen shot(s) printed with permission from Microsoft Corporation
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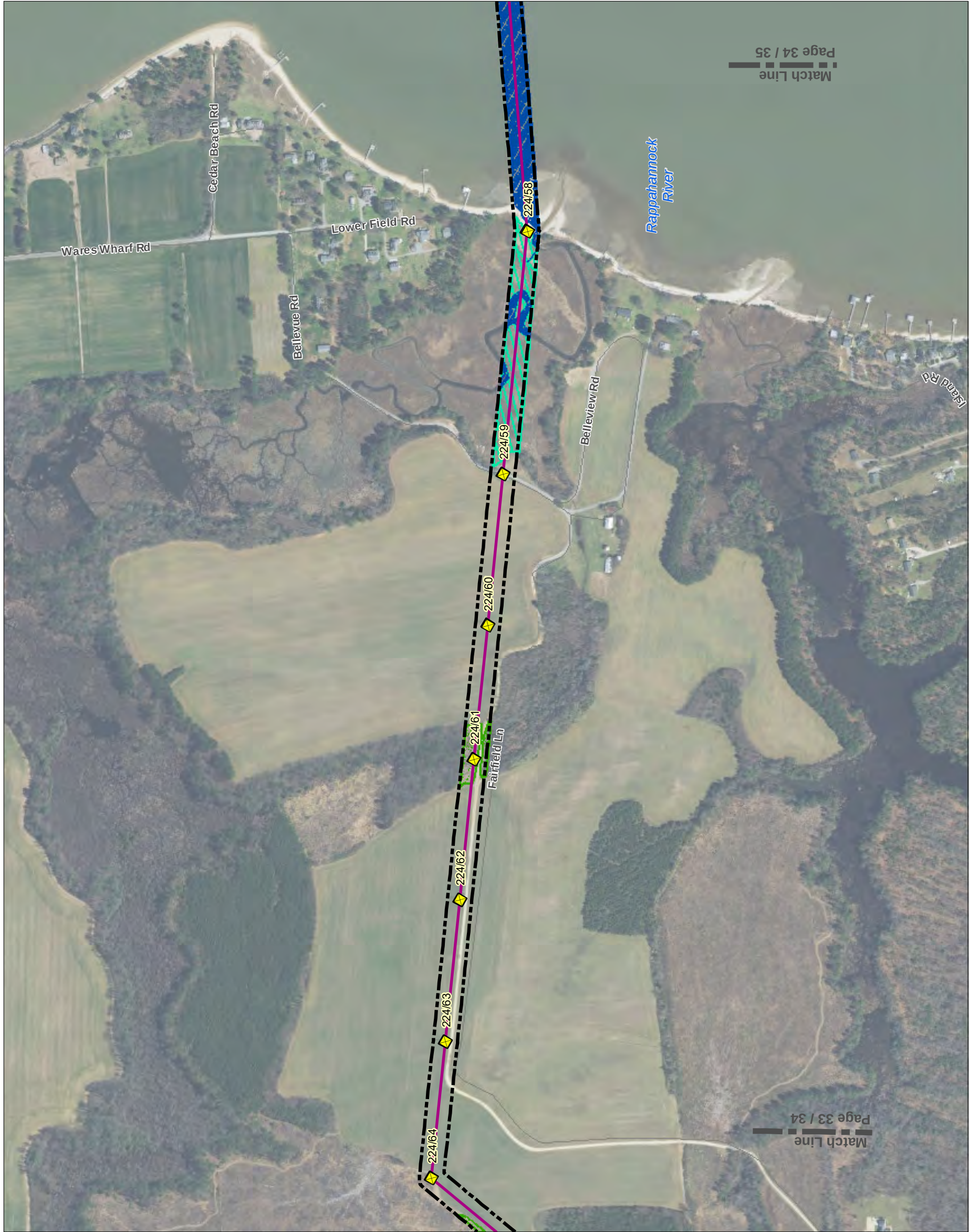
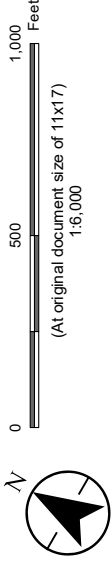


Figure No. II.A.2
Title Environmental Constraints Map

Client/Project 203401404
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208
Project Location
New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia
Prepared by LJB on 2019-11-11
TR by ECL on 2019-11-22
IR by CFG on 2020-02-14



- Existing Structure
- Proposed Structure
- Proposed 230 kV Line
Rebuild and New 230
kV Circuit
- Project Limits
- Approximate Estuarine
Intertidal Emergent
Wetland Limits (E2EM)
- Approximate Palustrine
Emergent Wetland
Limits (PEM)
- Approximate Estuarine
Subtidal
Unconsolidated Bottom
Limits (E1UB)



Notes
1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
2. Data Sources: Dominion Energy Virginia, Stantec, Google Earth, NPMS, PADUS, Virginia
Cultural Resources Information System (VCRIS), Streams data provided by USGS National
Hydrography Dataset (NHD), DCR, ESRI, U.S. National Transportation Atlas Railroad, NADS
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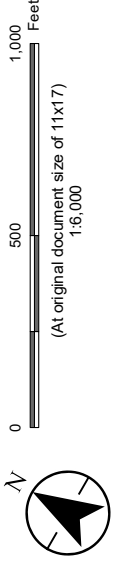


Figure No.
II.A.2

Title
Environmental Constraints Map

Client/Project
203401404
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208

Prepared by LIB on 2019-11-11
TR by ECL on 2019-11-22
IR by CFG on 2020-02-14
Project Location
New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia



- Existing Structure
- Proposed Structure
- Proposed 230 kV Line
Rebuild and New 230 kV Circuit
- John Smith
Chesapeake National
Historic Trail
- Project Limits
- Approximate Estuarine
Intertidal Emergent
Wetland Limits (E2EM)
- Approximate Estuarine
Subtidal
Unconsolidated Bottom
Limits (E1UB)



NOTES

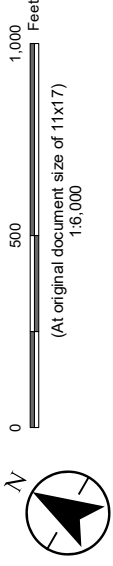
1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
2. Data Sources: Dominion Energy Virginia, Stantec, Google Earth, NPMS, PADUS, Virginia Cultural Resources Information System (VCRIS), Streams data provided by USGS National Hydrography Dataset (NHD), DCR, ESRI, U.S. National Transportation Atlas Railroad, NADS
3. The limits of the U.S., including wetlands, shown on this map have been field located by means of sub-meter GPS technology and are for planning purposes only.
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Figure No.
II.A.2
Title
Environmental Constraints Map

Client/Project
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208
Project Location
New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia
Prepared by LJB on 2019-11-11
TR by ECL on 2019-11-22
IR by CFG on 2020-02-14



- Existing Structure
- Proposed Structure
- Proposed 230 kV Line
Rebuild and New 230
kV Circuit
- Project Limits
- Approximate Estuarine
Intertidal Emergent
Wetland Limits (E2EM)
- Approximate Estuarine
Intertidal Scrub-Shrub
Wetland Limits (E2SS)
- Approximate Palustrine
Scrub-Shrub Wetland
Limits (PSS)
- Approximate Palustrine
Emergent Wetland
Limits (PEM)
- Approximate Estuarine
Subtidal
Unconsolidated Bottom
Limits (E1UB)



NOTES
1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
2. Data Sources: Dominion Energy Virginia, Stantec, Google Earth, NPMS, PADUS, Virginia
Cultural Resources Information System (VCRIS), Streams data provided by USGS National
Hydrography Dataset (NHD), DCR, ESI, U.S. National Transportation Atlas Railroad, NADS
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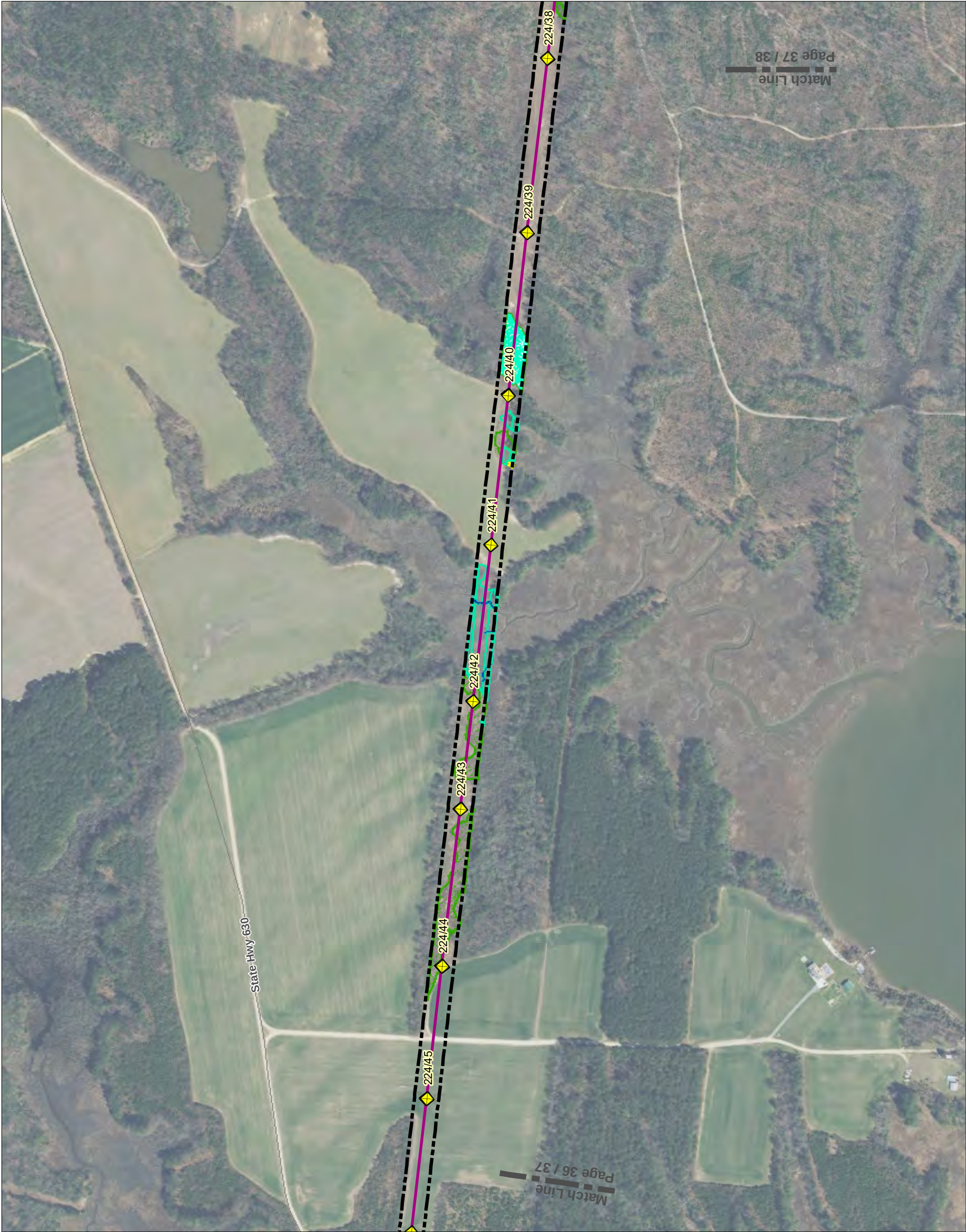


Figure No.
II.A.2

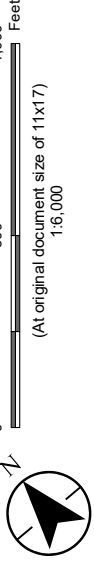
Title
Environmental Constraints Map

Client/Project
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208

203401404

Project Location
New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia

Prepared by LJB on 2019-11-11
TR by ECL on 2019-11-22
IR by CFG on 2020-02-14



- Existing Structure
- Proposed Structure
- Proposed 230 kV Line Rebuild and New 230 kV Circuit
- Project Limits
- Approximate Estuarine Inter tidal Emergent Wetland Limits (E2EM)
- Approximate Estuarine Inter tidal Scrub-Shrub Wetland Limits (E2SS)
- Approximate Palustrine Emergent Wetland Limits (PEM)
- Approximate Palustrine Emergent Tidal Wetland Limits PEM (Tidal)
- Approximate Estuarine Subtidal Unconsolidated Bottom Limits (E1UB)



NOTES

1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
2. Data Sources: Dominion Energy Virginia, Stantec, Google Earth, NPMS, PADUS, Virginia Cultural Resources Information System (VCRIS), Streams data provided by USGS National Hydrography Dataset (NHD), DCR, ESI, U.S. National Transportation Atlas Railroad, NADS
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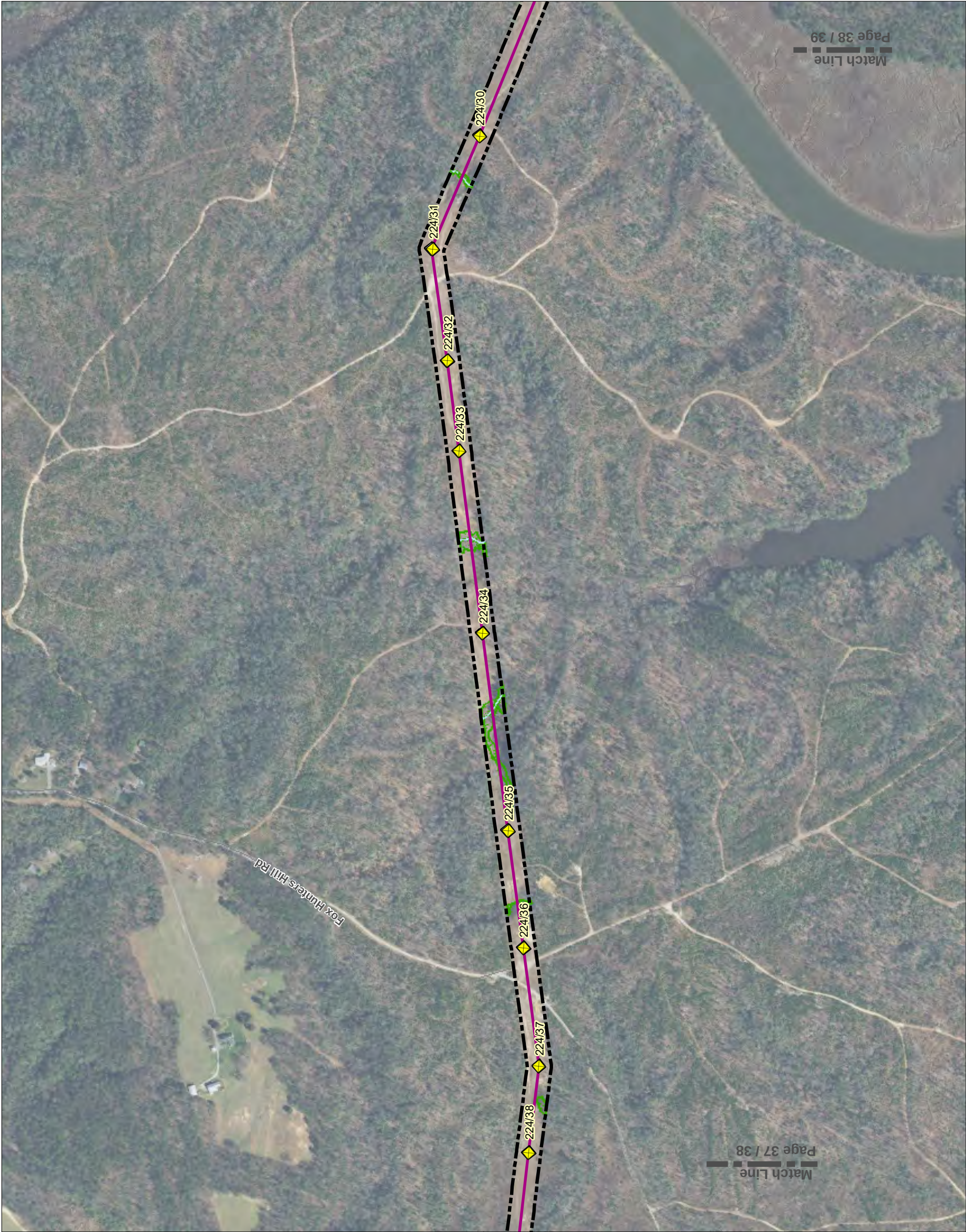
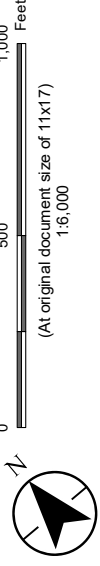


Figure No.
II.A.2

Title
Environmental Constraints Map

Client/Project
203401404
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208

Prepared by LJB on 2019-11-11
TR by ECL on 2019-11-22
IR by CFG on 2020-02-14
Project Location
New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia



- Existing Structure
- Proposed Structure
- Proposed 230 kV Line
Rebuild and New 230
kV Circuit
- Project Limits
- Approximate Palustrine
Emergent Wetland
Limits (PEM)
- Approximate Stream
Channel Limits



NOTES

1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
2. Data Sources: Dominion Energy Virginia, Stantec, Google Earth, NPMS, PADUS, Virginia Cultural Resources Information System (VCRIS), Streams data provided by USGS National Hydrography Dataset (NHD), DCR, ESR, U.S. National Transportation Atlas Railroad, NADS
3. The limits of wetlands of the U.S., including wetlands, shown on this map have been field located by means of sub-meter GPS technology and are for planning purposes only.
4. This map was prepared using Microsoft MapPoint 2012.
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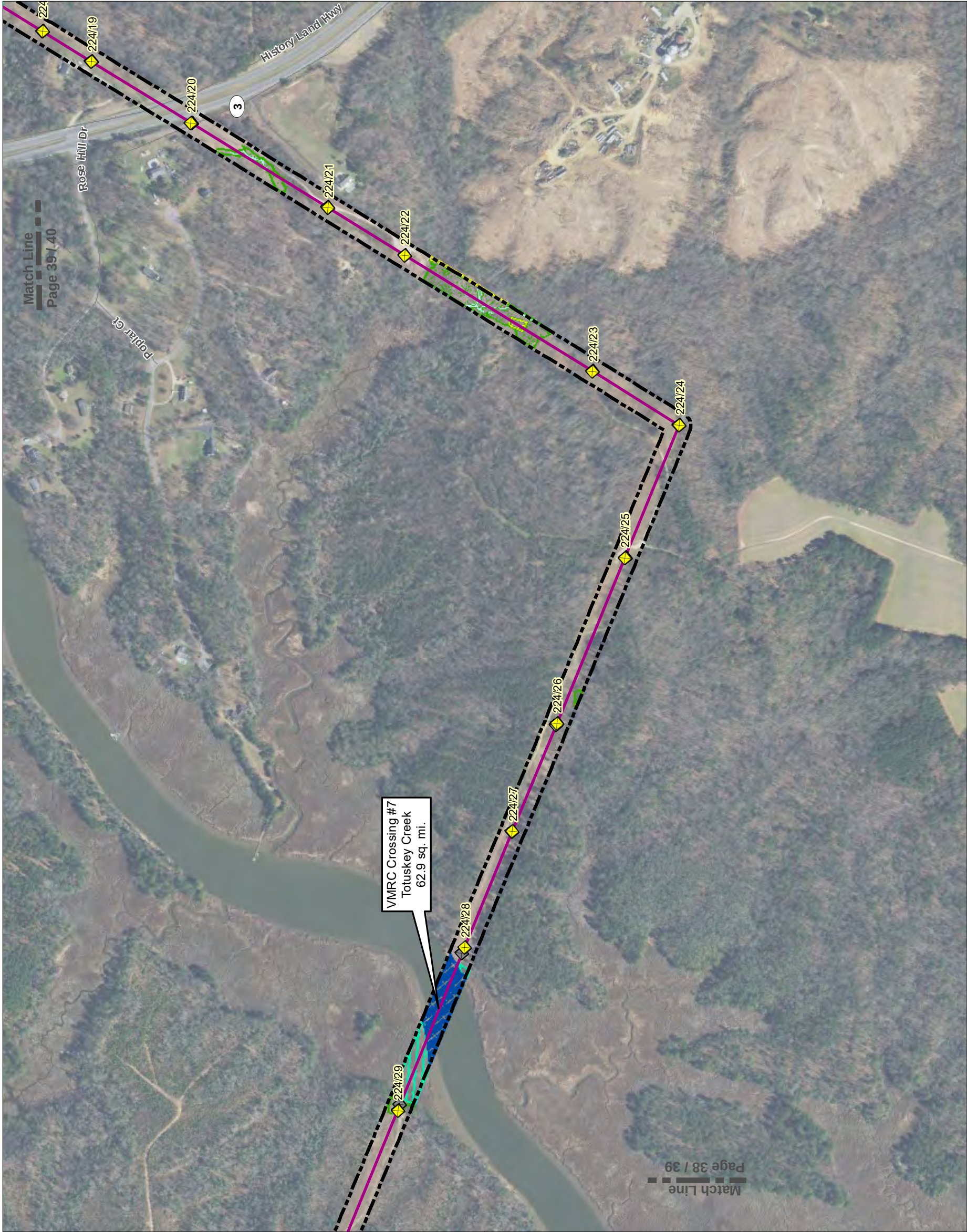
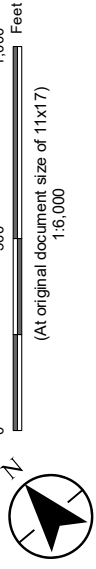


Figure No. II.A.2
Title Environmental Constraints Map

Client/Project 203401404
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208

Project Location
New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia

Prepared by LJB on 2019-11-11
TR by ECL on 2019-11-22
IR by CFG on 2020-02-14



- Existing Structure
- Proposed Structure
- Proposed 230 kV Line Rebuild and New 230 kV Circuit
- Project Limits
- Approximate Estuarine Interstitial Emergent Wetland Limits (E2EM)
- Approximate Palustrine Forested Wetland Limits (PFO)
- Approximate Palustrine Scrub-Shrub Wetland Limits (PSS)
- Approximate Palustrine Emergent Wetland Limits (PEM)
- Approximate Estuarine Subtidal Unconsolidated Bottom Limits (E1UB)
- Approximate Stream Channel Limits



Notes

- Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
- Data Sources: Dominion Energy Virginia, Stantec, Google Earth, NPMS, PADUS, Virginia Cultural Resources Information System (VCRIS), Streams data provided by USGS National Hydrography Dataset (NHD), DCR, ESR, U.S. National Transportation Atlas Railroad, NADS
- The limits overlaid on the map are for planning purposes only.
- Revised by means of submittal (GPS technology) and are for planning purposes only.
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Figure No.
II.A.2

Client/Project
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208

Project Location
New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia

203401404
Prepared by LJB on 2019-11-11
TR by ECL on 2019-11-22
IR by CFG on 2020-02-14



- Existing Structure
- Proposed Structure
- Proposed 230 kV Line Rebuild and New 230 kV Circuit
- Project Limits
- Approximate Estuarine Inter tidal Emergent Wetland Limits (E2EM)
- Approximate Palustrine Forested Wetland Limits (PFO)
- Approximate Palustrine Scrub-Shrub Wetland Limits (PSS)
- Approximate Palustrine Emergent Wetland Limits (PEM)
- Approximate Estuarine Subtidal Unconsolidated Bottom Limits (E1UB)
- Approximate Stream Channel Limits



Notes

- Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
- Data Sources: Dominion Energy Virginia, Stantec, Google Earth, NPMS, PADUS, Virginia Cultural Resources Information System (VCRIS), Streams data provided by USGS National Hydrography Dataset (NHD), DCR, ESR, U.S. National Transportation Atlas Railroad, NADS
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- Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation



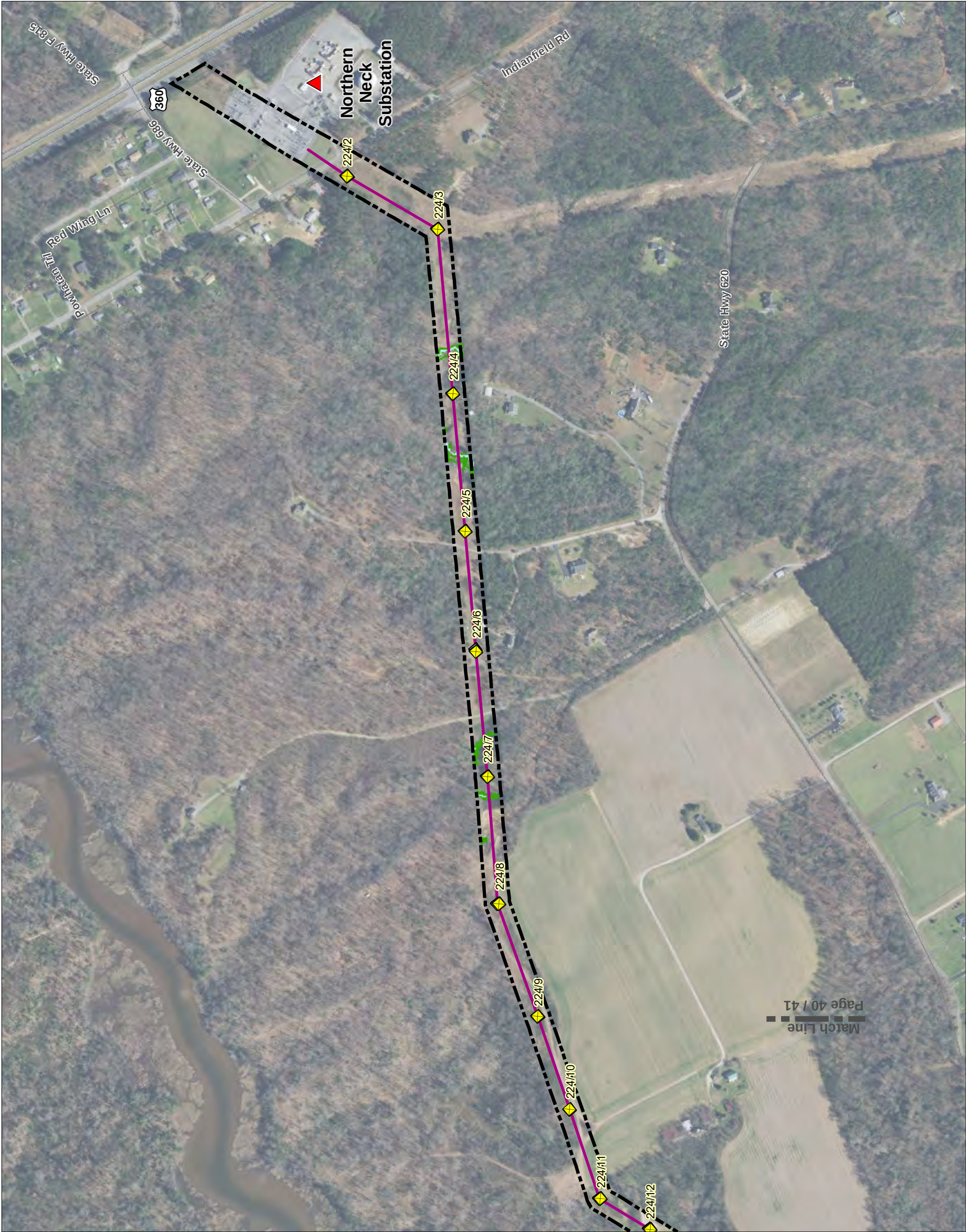


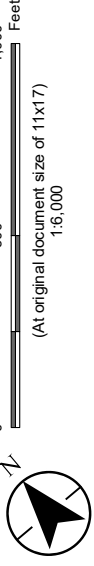
Figure No.
II.A.2

Client/Project
Environmental Constraints Map

203401404

Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208

Prepared by LJB on 2019-11-11
TR by ECL on 2019-11-22
New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia
IR by CFG on 2020-02-14



- Existing Structure
- Proposed Structure
- Substation
- Proposed 230 kV Line
Rebuild and New 230
kV Circuit
- Project Limits
- Approximate Palustrine
Emergent Wetland
Limits (PEM)
- Approximate Stream
Channel Limits



NOTES

1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
2. Data Sources: Dominion Energy Virginia, Stantec, Google Earth, NPMS, PADUS, Virginia Cultural Resources Information System (VCRIS), Streams data provided by USGS National Hydrography Dataset (NHD), DCR, ESR, U.S. National Transportation Atlas Railroad, NADS
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II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way (“ROW”)

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

Response: See Attachment I.G.1.

II. DESCRIPTION OF THE PROPOSED PROJECT

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

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

Response: Not applicable.

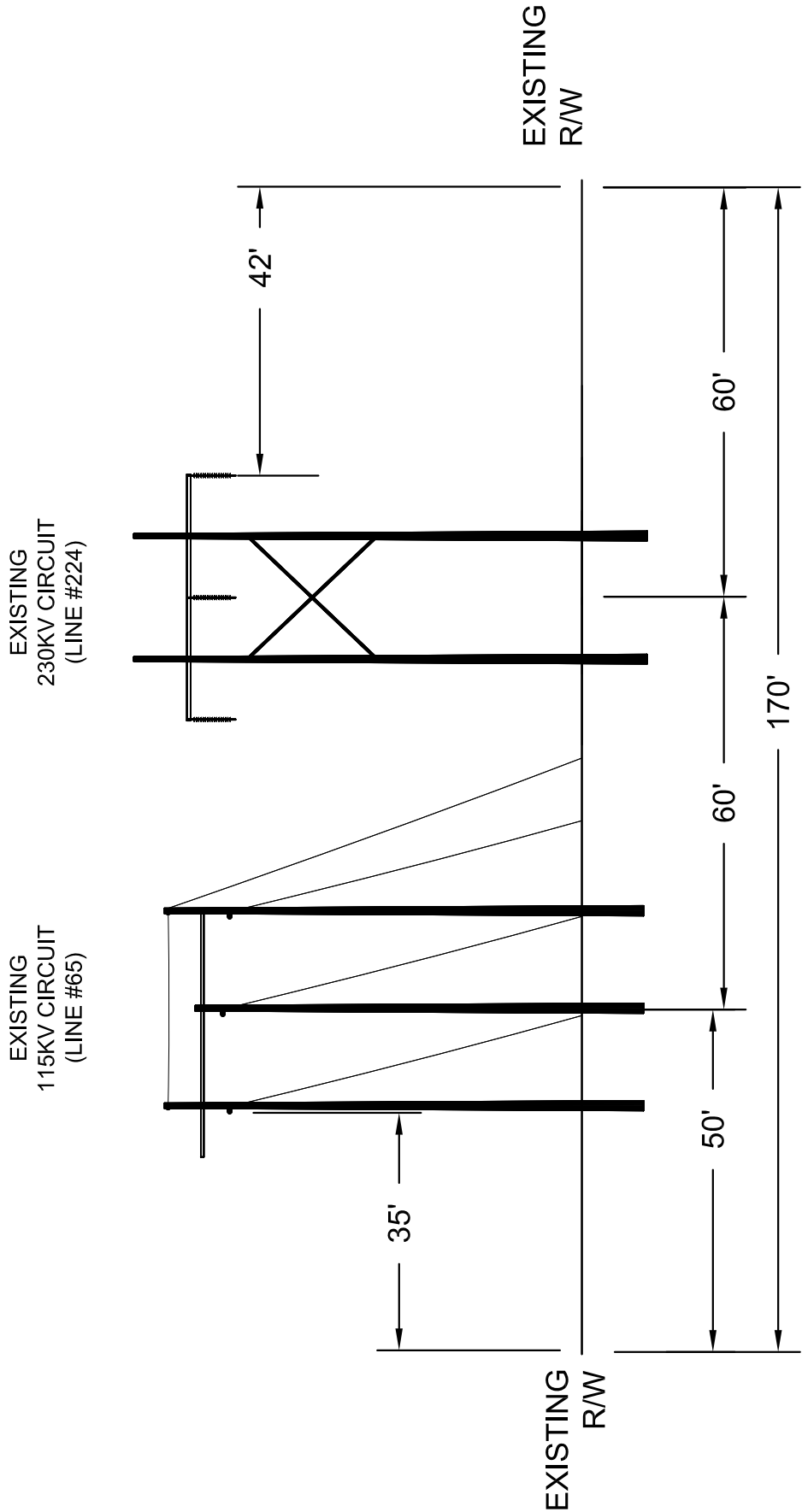
II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way (“ROW”)

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

Response: See Attachments II.A.5.a through II.A.5.j.

NORTHERN NECK - STRUCTURE 224/3
EXISTING CONFIGURATION



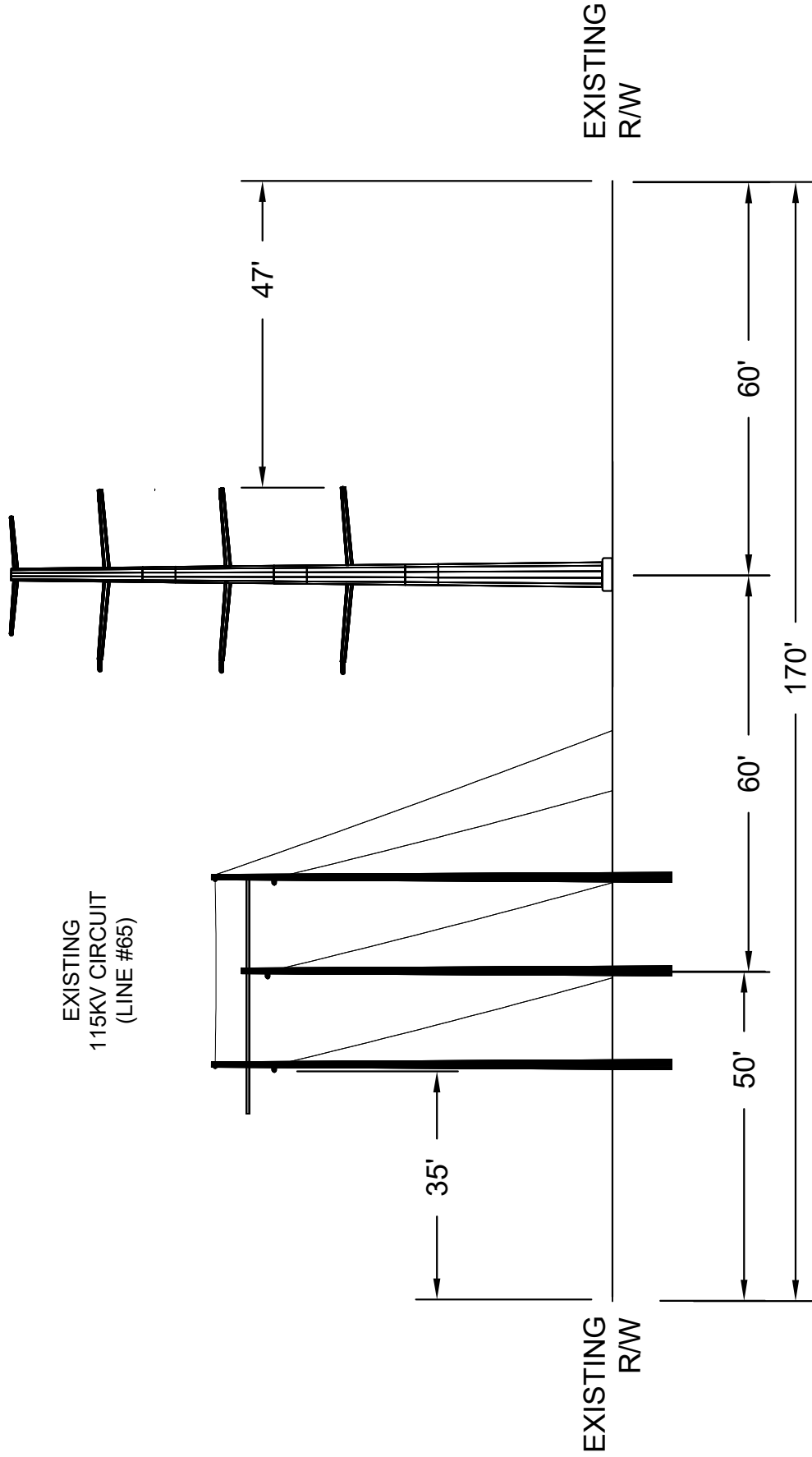
TYPICAL RIGHT OF WAY LOOKING TOWARD LANEXA SUBSTATION.

NOTES:

1. Existing structure shown with approximate average height of 65' (line 224) and does not include foundation reveal.
2. Approximate average height is measured from the groundline at structure centerline.

NORTHERN NECK - STRUCTURE 224/3 PROPOSED CONFIGURATION

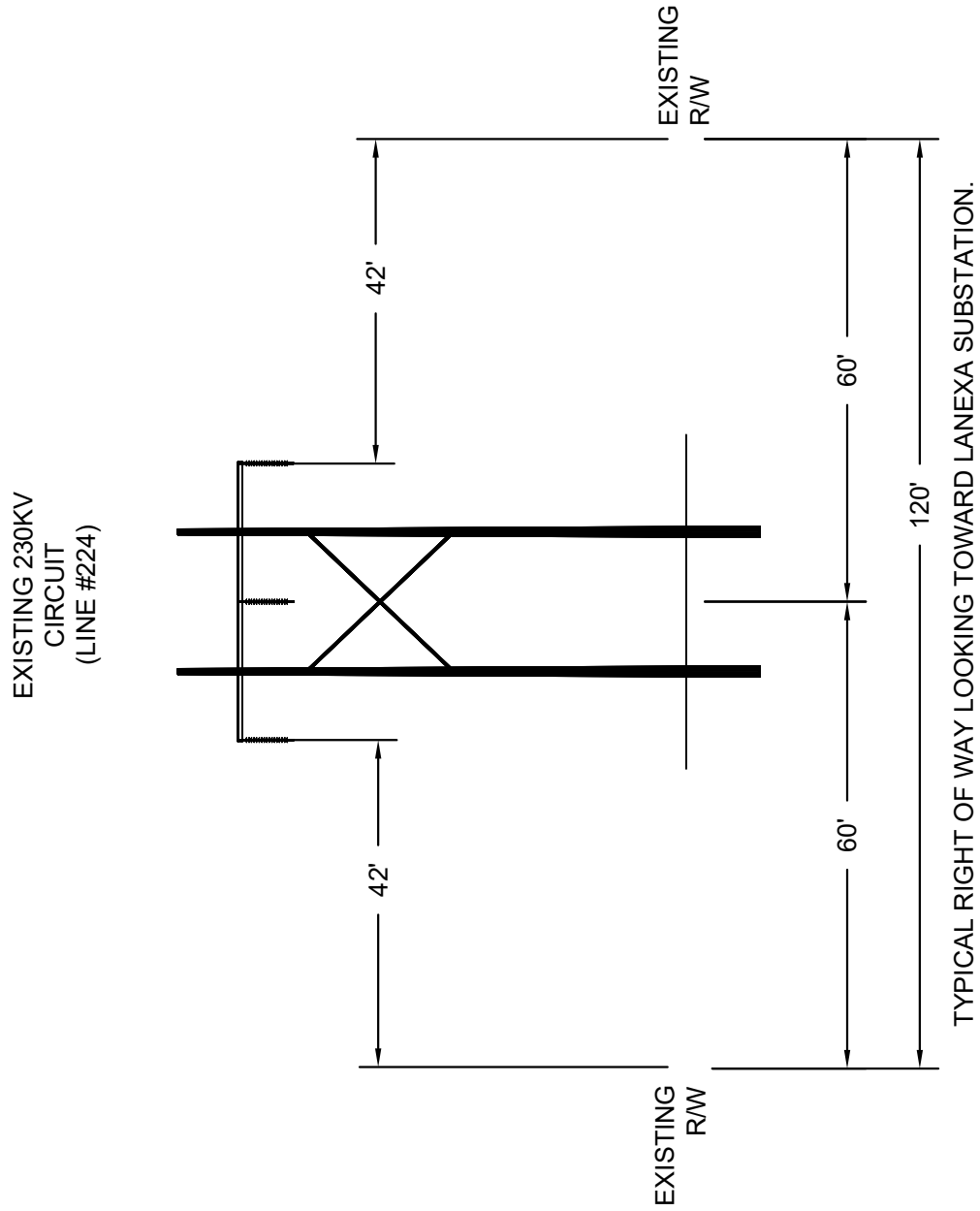
PROPOSED 230KV CIRCUIT (LINE #224)
PROPOSED 230KV CIRCUIT (LINE #2208)



NOTES:

1. Proposed structure shown with approximate average height of 90' (line 224) and does not include foundation reveal.
2. Approximate average height is measured from the groundline at structure centerline.
3. Information contained on drawing is to be considered preliminary in nature and subject to changed based on final design.

STRUCTURES 224/4- 224/51; 224/60-224/180;
224/186-224/227; 224/234-224/296

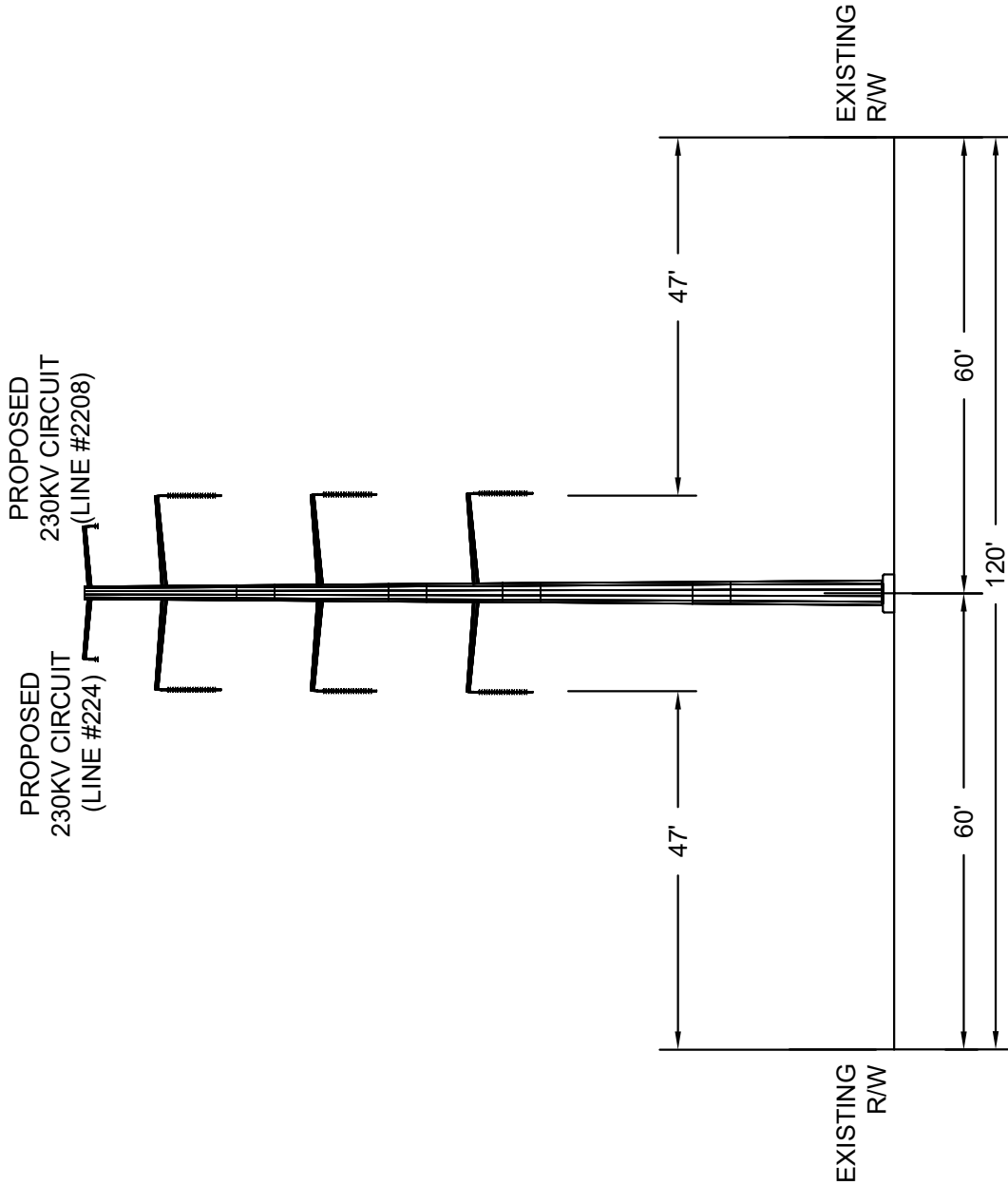


NOTES:

1. Existing structure shown with approximate average height of 65'.
2. Approximate average height is measured from the groundline at structure centerline.

**STRUCTURES 224/4-224/51; 224/60-224/180;
224/186-224/227 & 224/234-224/296**

PROPOSED CONFIGURATION

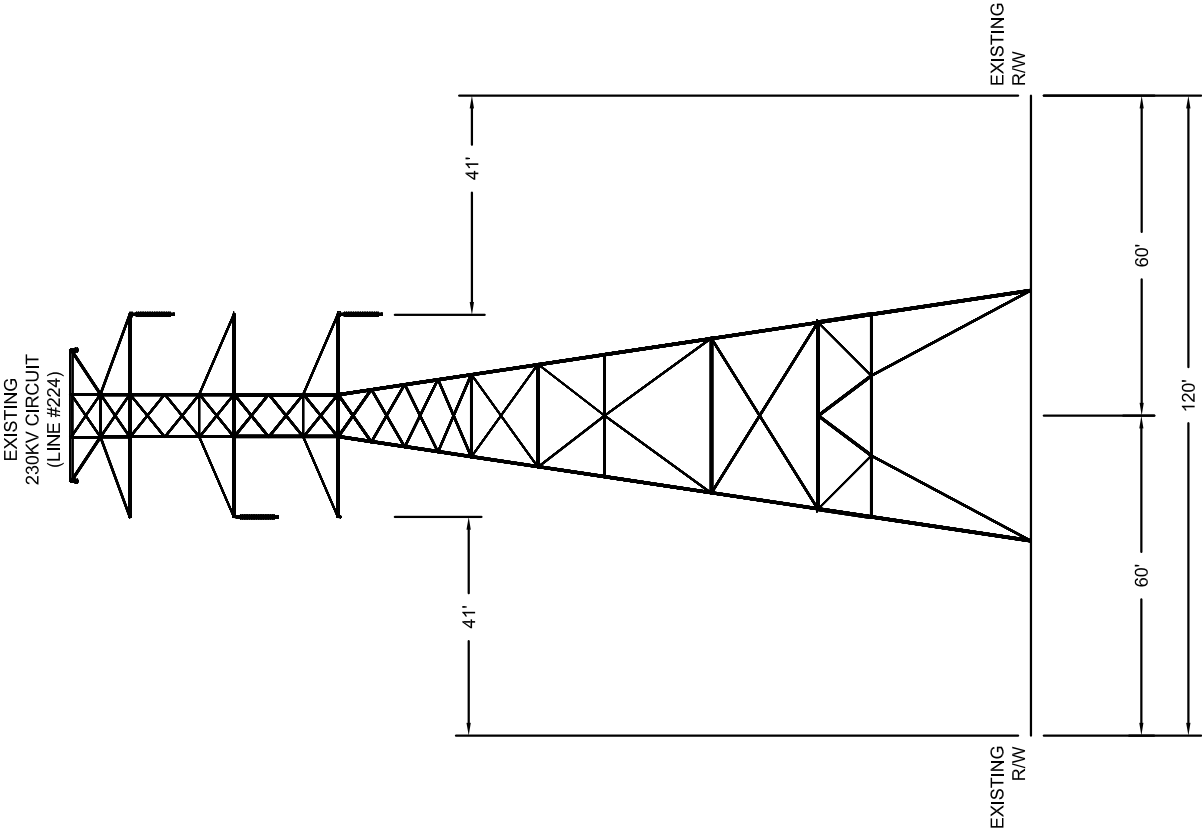


TYPICAL RIGHT OF WAY LOOKING TOWARD LANEXA SUBSTATION.

NOTES:

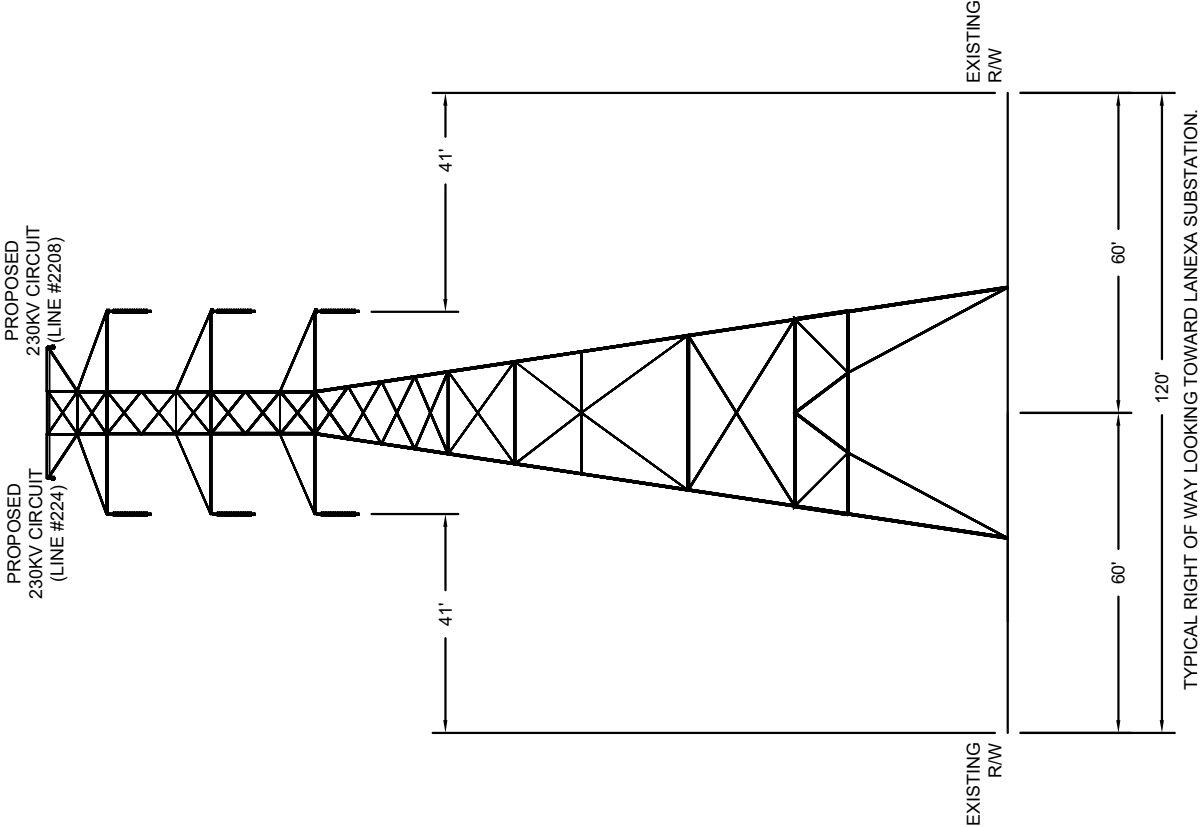
1. Proposed structure shown with approximate average height of 105' and does not include foundation reveal.
2. Approximate average height is measured from the groundline at structure centerline.
3. Information contained on drawing is to be considered preliminary in nature and subject to changed based on final design.

STRUCTURES 224/52-224/59
EXISTING CONFIGURATION



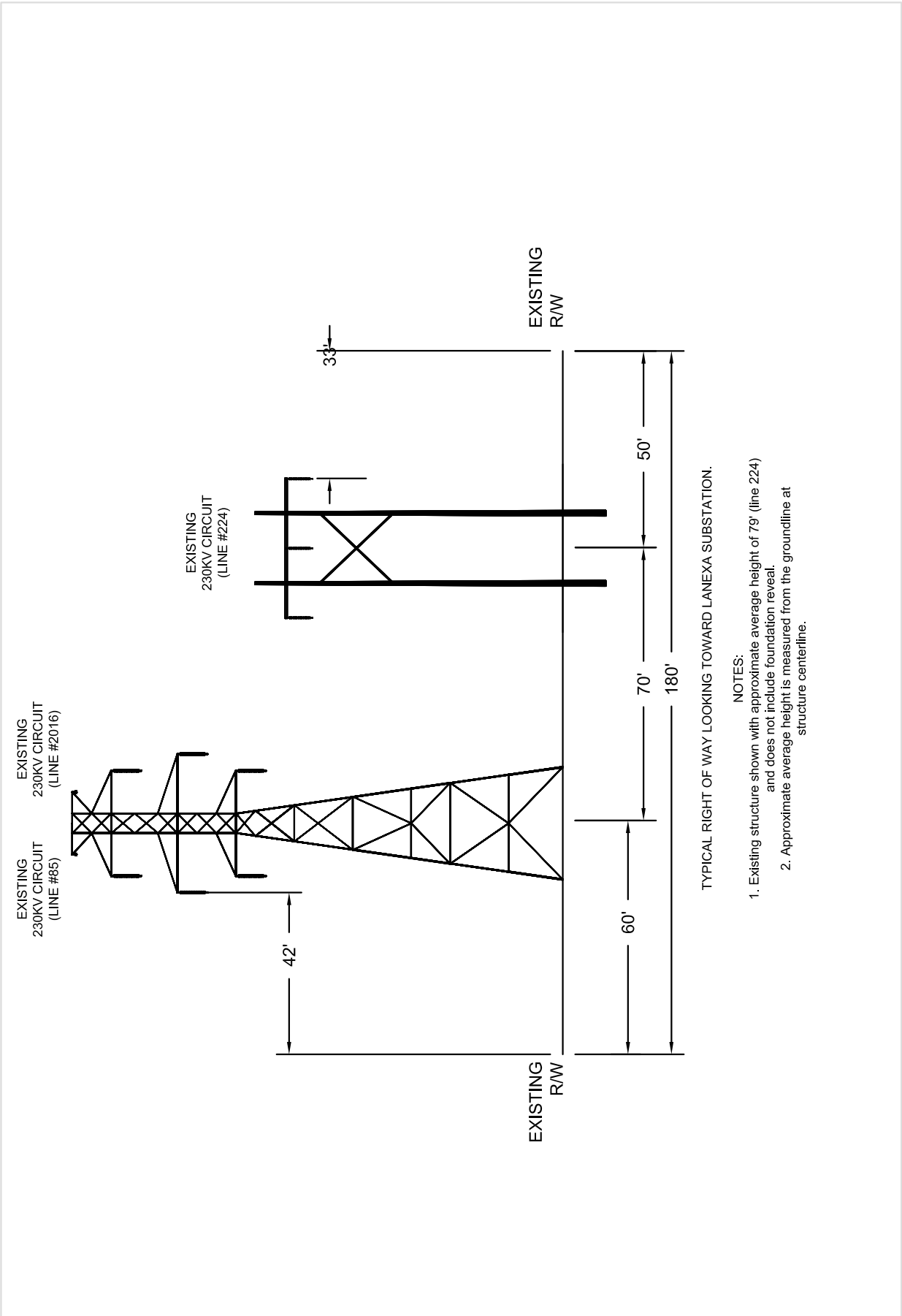
STRUCTURE 224/52-224/59

PROPOSED CONFIGURATION

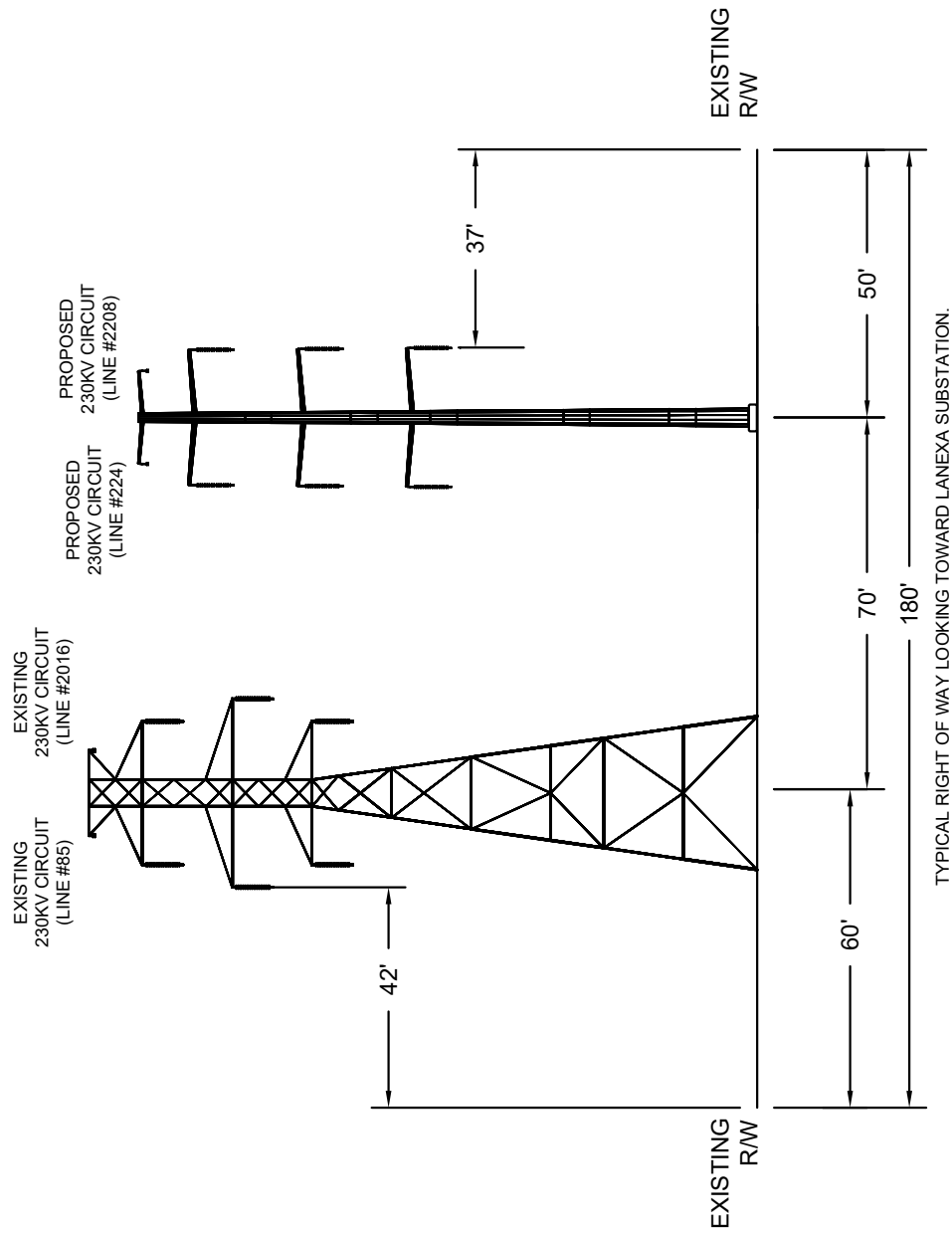


- NOTES:
1. Proposed structure shown with approximate average height of 180' and does not include foundation reveal.
 2. Approximate average height is measured from the groundline at structure centerline.
 3. Information contained on drawing is to be considered preliminary in nature and subject to change based on final design.

STRUCTURE 224/297- LANEXA
EXISTING CONFIGURATION



STRUCTURE 224/297 - LANEXA PROPOSED CONFIGURATION

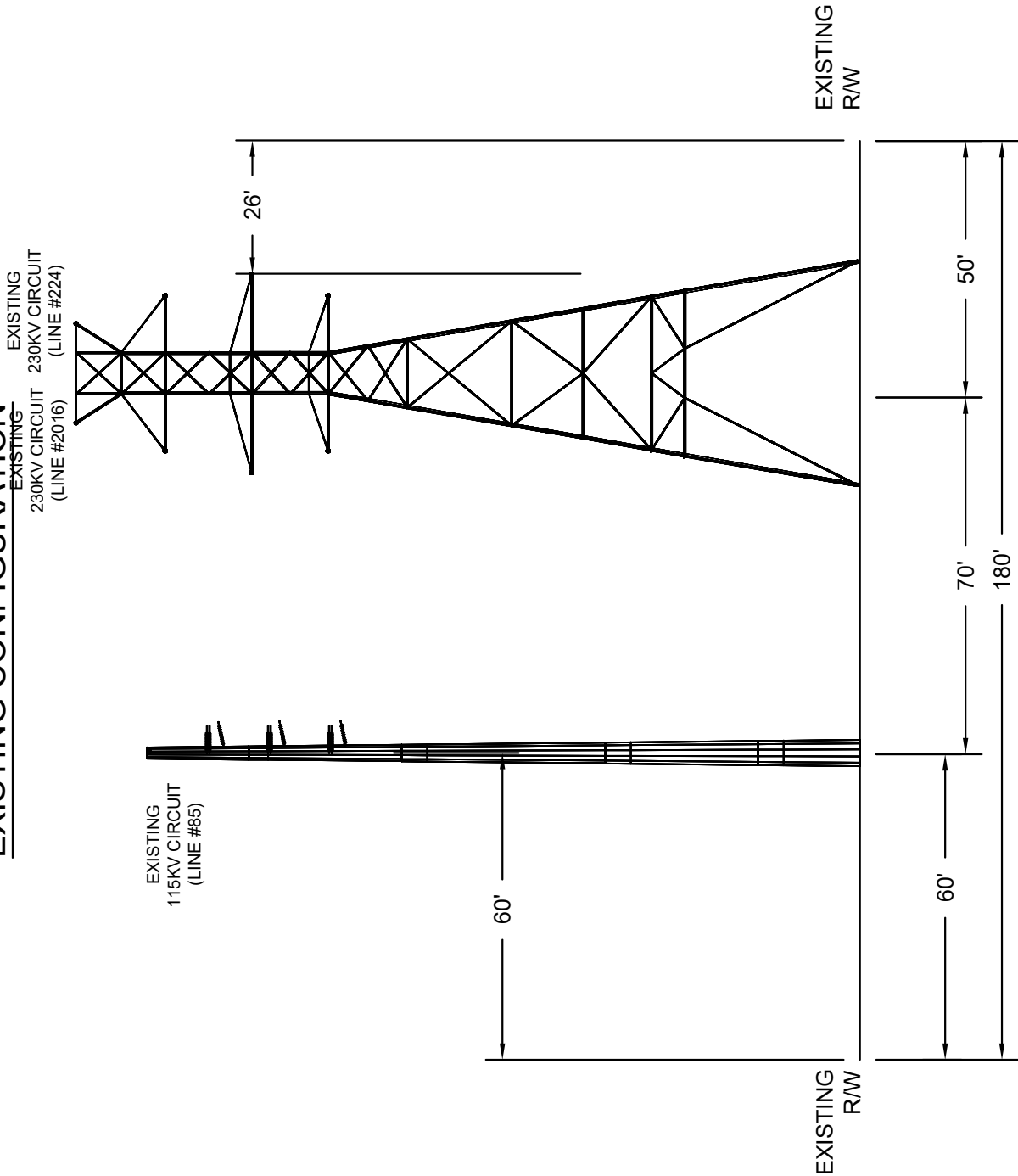


NOTES:

1. Proposed structure shown with approximate average height of 115' (line 224) and does not include foundation reveal.
2. Approximate average height is measured from the groundline at structure centerline.
3. Information contained on drawing is to be considered preliminary in nature and subject to changed based on final design.

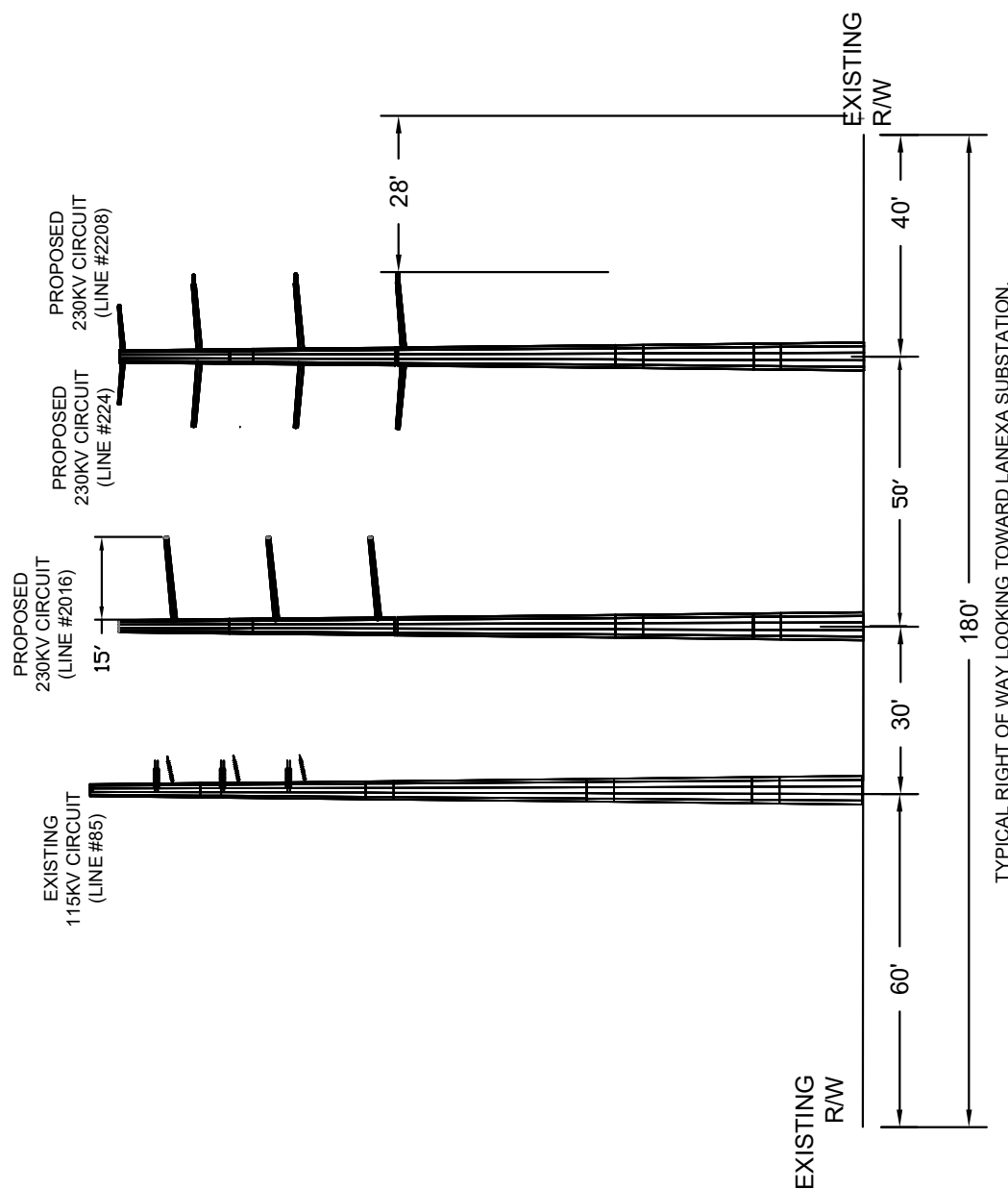
STRUCTURE 224/297 (DIASCUND CREEK)

EXISTING CONFIGURATION



TYPICAL RIGHT OF WAY LOOKING TOWARD LANEXA SUBSTATION.

- NOTES:
- 1. Existing structure shown with approximate average height of 141' (line 224 & 2016) and does not include foundation reveal.
 - 2. Approximate average height is measured from the groundline at structure centerline.



- NOTES:
1. Proposed structure shown with approximate average height of 140' (line 224) and does not include foundation reveal.
 2. Approximate average height is measured from the groundline at structure centerline.
 3. Information contained on drawing is to be considered preliminary in nature and subject to changed based on final design.

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way (“ROW”)

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

Response: The Company obtained easements along the existing right-of-way of the Lanexa-Northern Neck transmission corridor in the 1960s. The existing transmission corridor crosses New Kent, King William, King and Queen, Essex, and Richmond Counties. The Company does not expect new easements will be required as the Project is within existing right-of-way or on Company-owned property.

Within the existing right-of-way, there are five existing conservation easements. The conservation easements are held by the Historic Virginia Land Conservancy, the Virginia Department of Forestry (“DOF”), the Virginia Outdoors Foundation (“VOF”), and the Nature Conservancy (“TNC”), which holds two, as shown on Attachment II.A.6.a. These conservation easements were established after the construction of Line #224. Specifically, the Historic Virginia Land Conservancy obtained the easement in 2013, the DOF obtained the easement in 2009, the TNC obtained the easements in 2010, and the VOF obtained the easement in 2018. The Company notified the DOF, VOF, TNC, and the Historic Virginia Land Conservancy about the Project by letter dated September 2, 2020. See Section 2.K of the DEQ Supplement.

Figure No.
II.A.6

Title
Conservation Easement Map

Client/Project
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208
203401404

Prepared by LJB on 2019-11-11
TR by ECL on 2019-11-22
IR by CPG on 2020-02-14
Project Location
New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia

01500030000
Feet
(At original document size of 11x17)
1:180,000

Substation

Proposed 230 kV Line Rebuild and New 230 kV Circuit

Project Centerline, Second Circuit Only (PUR-2018-00090)

Structures and Two Circuits Previously Authorized (PUR-2018-00090)

Streams

NHD Waterbody

Historic Virginia Land Conservancy

Northern Neck Land Conservancy

The Nature Conservancy

VA DHR

VA Dept of Forestry

VA Outdoors Foundation

VIMS and NOAA

Railroad

Freeway or Other Major Road

Other Major Road

Secondary Road

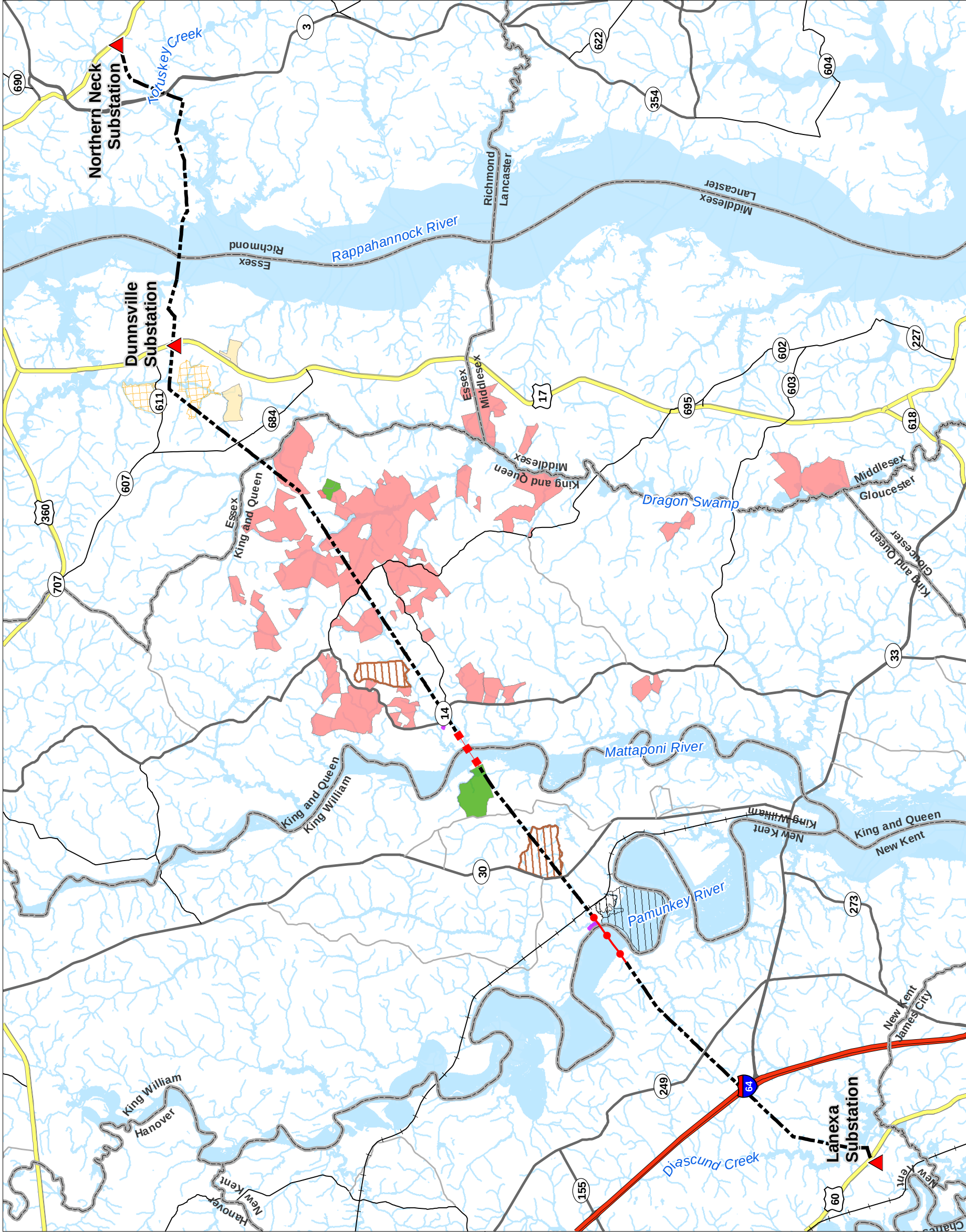
Local Connecting Road

Important Local Road

Notes

1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet

2. Data Sources: Dominion Energy Virginia, Stantec, ESRI, NHD, DCR, PADUS, U.S. National Transportation Atlas Railroads



II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way (“ROW”)

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

Response: The existing transmission line corridor, which is primarily 120 feet wide¹⁶ is currently maintained for operation of the existing transmission facilities. Some trimming of tree limbs along the edge of the upland right-of-way may be conducted to support construction activities for the Project. For any such minimal clearing, trees will be cut to no more than three inches above ground level. Trees located outside of the right-of-way that are tall enough to potentially impact the transmission facilities, commonly referred to as “danger trees,” may also need to be cut. Danger trees will be cut to be no more than three inches above ground level, will be limbed, and will remain where felled. Debris that is adjacent to homes will be disposed of by chipping or removal. In other areas, debris may be mulched or chipped as practicable. Danger tree removal will be accomplished by hand in wetland areas and within 100 feet of streams, if applicable. Care will be taken not to leave debris in streams or wetland areas. Matting may be used for heavy equipment in these areas. Erosion control devices will be used on an ongoing basis during all clearing and construction activities.

Erosion control will be maintained and temporary stabilization for all soil-disturbing activities will be used until the right-of-way has been restored. Upon completion of the Project, the Company will restore the right-of-way utilizing site rehabilitation procedures outlined in the Company’s *Standards & Specifications for Erosion & Sediment Control and Stormwater Management for Construction and Maintenance of Linear Electric Transmission Facilities* that was approved by the Virginia Department of Environmental Quality (“DEQ”). Time of year and weather conditions may affect when permanent stabilization takes place.

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

¹⁶ As shown in Attachments II.A.5.a-b, there are two spans with a right-of-way width of 170 feet. In addition, as shown in Attachments II.A.5.g-j, there are nine spans with a right-of-way width of 180 feet.

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way (“ROW”)

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

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

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

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

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

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way (“ROW”)

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

Response: The Company’s route selection for transmission line rebuilds begins with a review of existing rights-of-way. This approach generally minimizes impacts on the natural and human environments. This approach also is consistent with Attachment 1 of these Guidelines, which provides a tool routinely used by the Company in routing its transmission line projects. Specifically, this approach is consistent with Guideline #1, which states that existing rights-of-way should be given priority when adding new transmission facilities, and Va. Code §§ 56-46.1 and 56-259, which promote the use of existing rights-of-way for new transmission facilities. For the proposed Project, the existing right-of-way that currently contains Line #224 is adequate.

Because the existing right-of-way and Company-owned property is adequate to construct the proposed Project, no new right-of-way is necessary. Given the availability of existing right-of-way and the statutory preference given to the use of existing rights-of-way, and because additional costs and environmental impacts would be associated with the acquisition and construction of new right-of-way, the Company did not consider any alternate routes requiring new right-of-way for this Project.

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way (“ROW”)

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

Response: No service to customers will be interrupted during construction of the Project, as the Company plans to segment the construction into two sequential phases. Assuming a final order from the Commission by September 1, 2021, as requested in Section I.H of this Appendix, the Company estimates that construction should begin on September 15, 2021, and be completed by December 31, 2023.

The first outage (ITOA Number 21-00088) is scheduled to begin following Commission approval for the 31.6-mile section of Line #224 between Lanexa and Dunnsville. During non-peak periods, this line section will not be part of the contingency plan for restoration. However, during peak periods of the year, the Company will maintain the line in a condition in which it could be returned to service within four hours. The Company plans to complete all of the construction work on this section of Line #224 before commencing the second outage.

The second outage (ITOA Number 22-00052) is scheduled to begin as soon as the first outage is completed for the 9.7-mile section of Line #224 between Dunnsville and Northern Neck. All construction work on the Project will be completed by December 31, 2023, in accordance with the desired in-service date for the Project.

The Company will request line outages from PJM prior to the date of such outages. It is customary for PJM to not grant approval of the outages until shortly before the outages are expected to occur and, therefore, they may be subject to change.

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way (“ROW”)

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

Response: As noted in Section II.A.9, Attachment 1 to these Guidelines provides a tool routinely used by the Company in routing its transmission line projects.

The Company utilized Guideline #1 (existing rights-of-way should be given priority when adding additional facilities) by siting the proposed Project within the existing transmission corridor, as discussed in Section II.A.9.

By utilizing the existing transmission corridor, the proposed Project will minimize impact to any site listed on the National Register of Historic Places (“NRHP”). Thus, the Project is consistent with Guideline #2 (where practical, rights-of-way should avoid sites listed on the National Register of Historic Places). See Section III.A for a description of the resources identified in the Stage I Pre-Application Analysis prepared by Stantec Consulting Services, Inc. (“Stantec”) on behalf of the Company, which is included with the DEQ Supplement as Attachment 2.H.2. Consistent with its customary practice, the Company will coordinate with the Virginia Department of Historic Resources (“VDHR”) regarding the findings of the Stage I Pre-Application Analysis.

The Company has communicated with a number of local, state, and federal agencies prior to filing this application consistent with Guideline #4 (where government land is involved, the applicant should contact the agencies early in the planning process). See Sections III.B, III.J, and the DEQ Supplement.

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

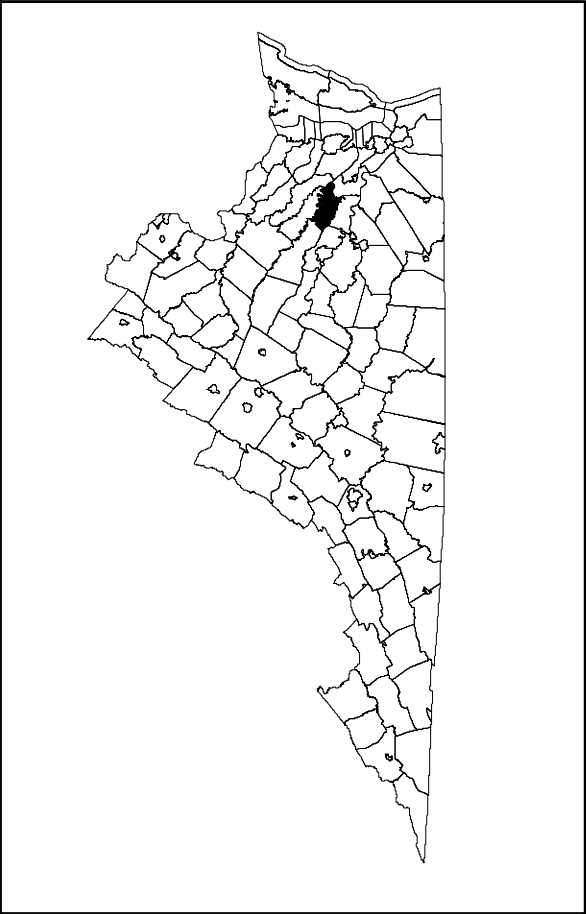
The Company also utilizes recommended guidelines in the clearing of right-of-way, constructing facilities and maintaining rights-of-way after construction. Moreover, secondary uses of right-of-way that are consistent with the safe maintenance and operation of facilities are permitted.

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way (“ROW”)

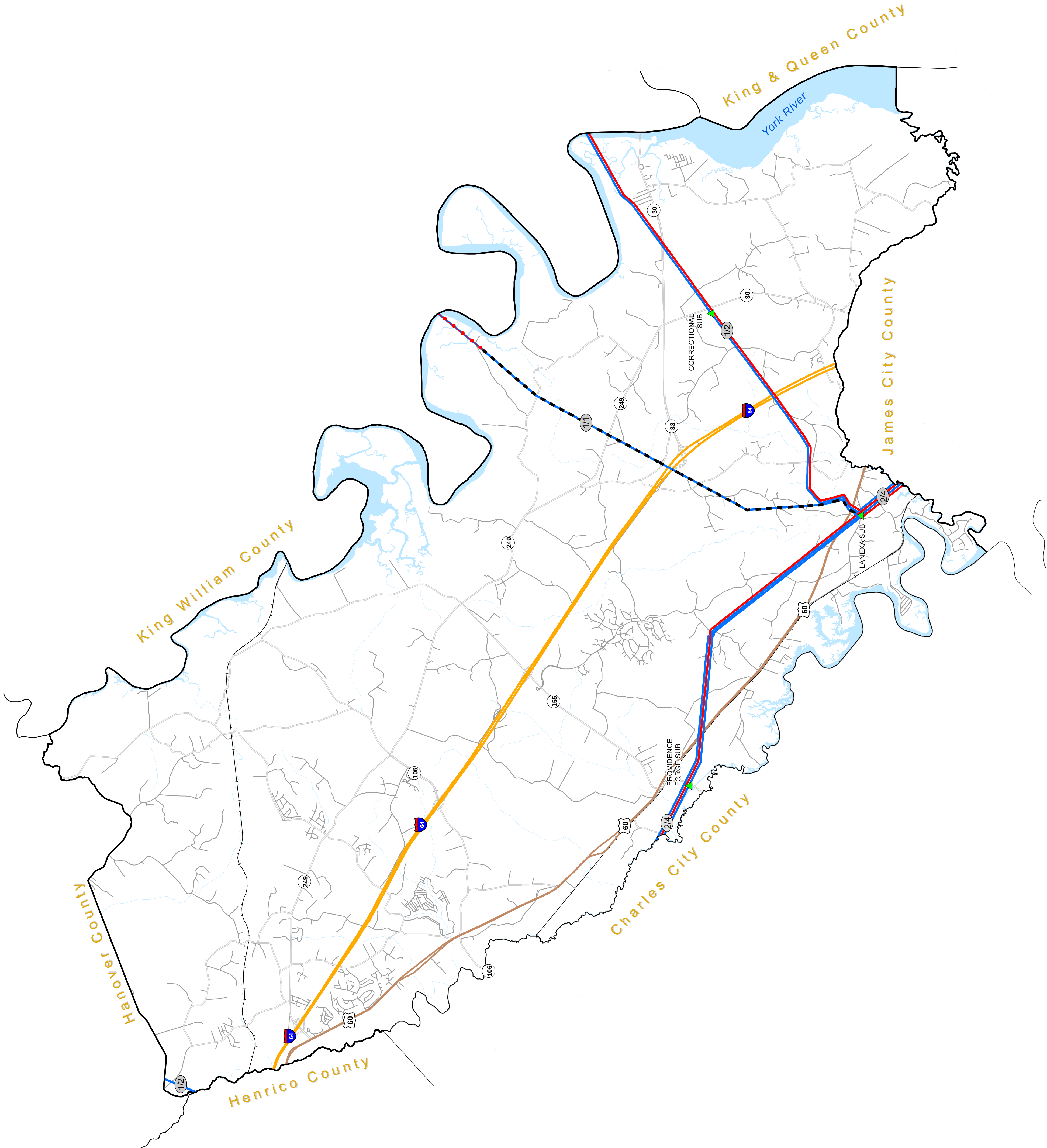
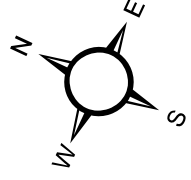
- 12. a. Detail counties and localities through which the line will pass. If any portion of the line will be located outside of the Applicant's certificated service area: (1) identify each electric utility affected; (2) state whether any affected electric utility objects to such construction; and (3)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

- Response:
- a. The Project will pass through New Kent, King William, King and Queen, Essex, and Richmond Counties. Line #224 crosses through 9.1 miles of REC’s service territory and 4.7 miles of NNEC’s service territory. The Company has confirmed that neither REC nor NNEC object to the Project. See Attachment I.G.1 for a map that includes the relevant service territories.
 - b. Three copies of the map of the Virginia Department of Transportation “General Highway Map” for New Kent, King William, King and Queen, Essex, and Richmond Counties have been marked as required and filed with the Application. Reduced copies of the maps are provided as Attachments II.A.12.b.1-5.



This digital map depicts the Virginia Electric and Power Company ("Company") transmission facilities in this county as approved by the Virginia State Corporation Commission ("SCC"), and any proposed transmission facilities in this county as of 8/31/2020. Other Company facilities previously authorized by the SCC may be depicted on prior SCC approved county maps.

New Kent County Road Map



VIRGINIA ELECTRIC AND POWER COMPANY
PLANS TO BUILD TRANSMISSION LINES AND
SUBSTATIONS AS SHOWN IN BLACK DASHES
ON THIS MAP.

Legend

- Proposed 230 kV Line Rebuild and New 230 kV Circuit
- Project Centerline, Second Circuit Only (PUR-2018-00090)
- ① Number of Lines of Structures/Number of Circuits

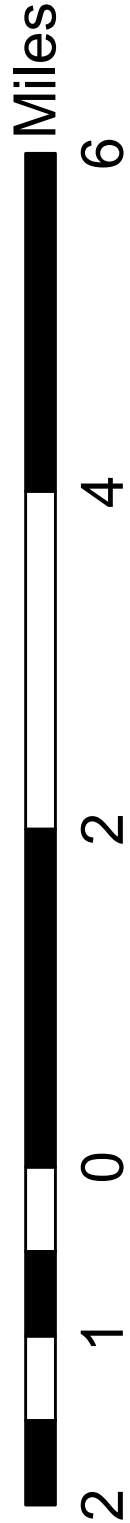
▲ Existing Substation

115 kV

230 kV

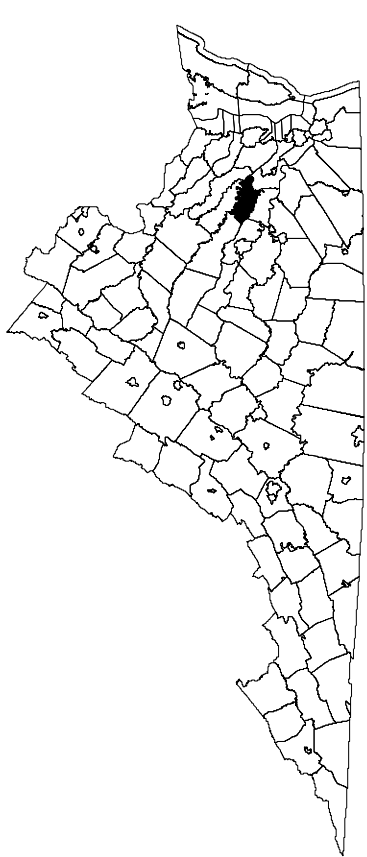
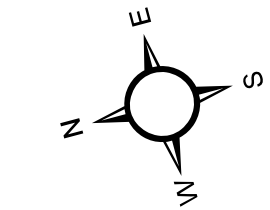
Provider Service Territory

VEPCO

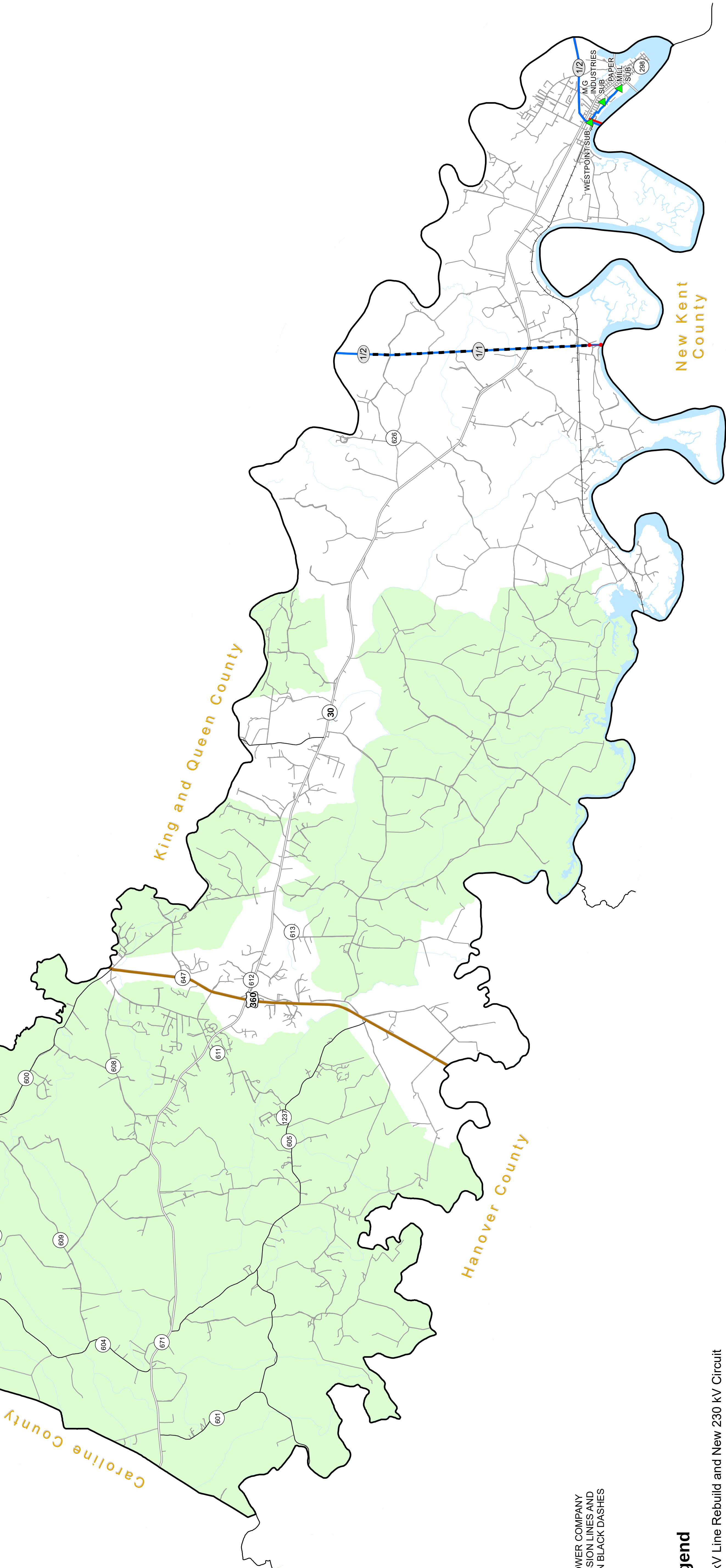


*VDOT and other road data
obtained from Navteq and
County data, current as of
August 2011.

King William County Road Map



This digital map depicts the Virginia Electric and Power Company ("Company") transmission facilities in this county as approved by the Virginia State Corporation Commission ("SCC"), and any proposed transmission facilities in this county as of 8/31/2020. Other Company facilities previously authorized by the SCC may be depicted on prior SCC approved county maps.



VIRGINIA ELECTRIC AND POWER COMPANY
PLANS TO BUILD TRANSMISSION LINES AND
SUBSTATIONS AS SHOWN IN BLACK DASHES
ON THIS MAP.

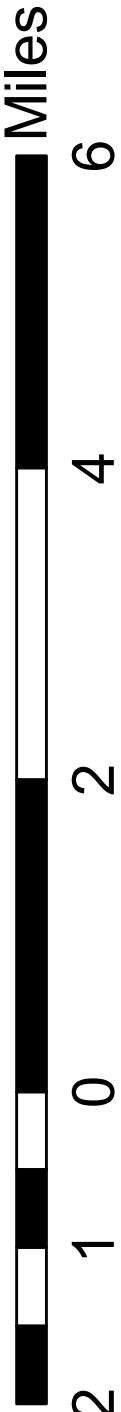
Legend

- Proposed 230 kV Line Rebuild and New 230 kV Circuit
- Project Centerline, Second Circuit Only (PUR-2018-00090)
- Number of Lines of Structures/Number of Circuits
- Existing Substation

- 115 kV
- 230 kV

Provider Service Territory

- REC
- VEPCO

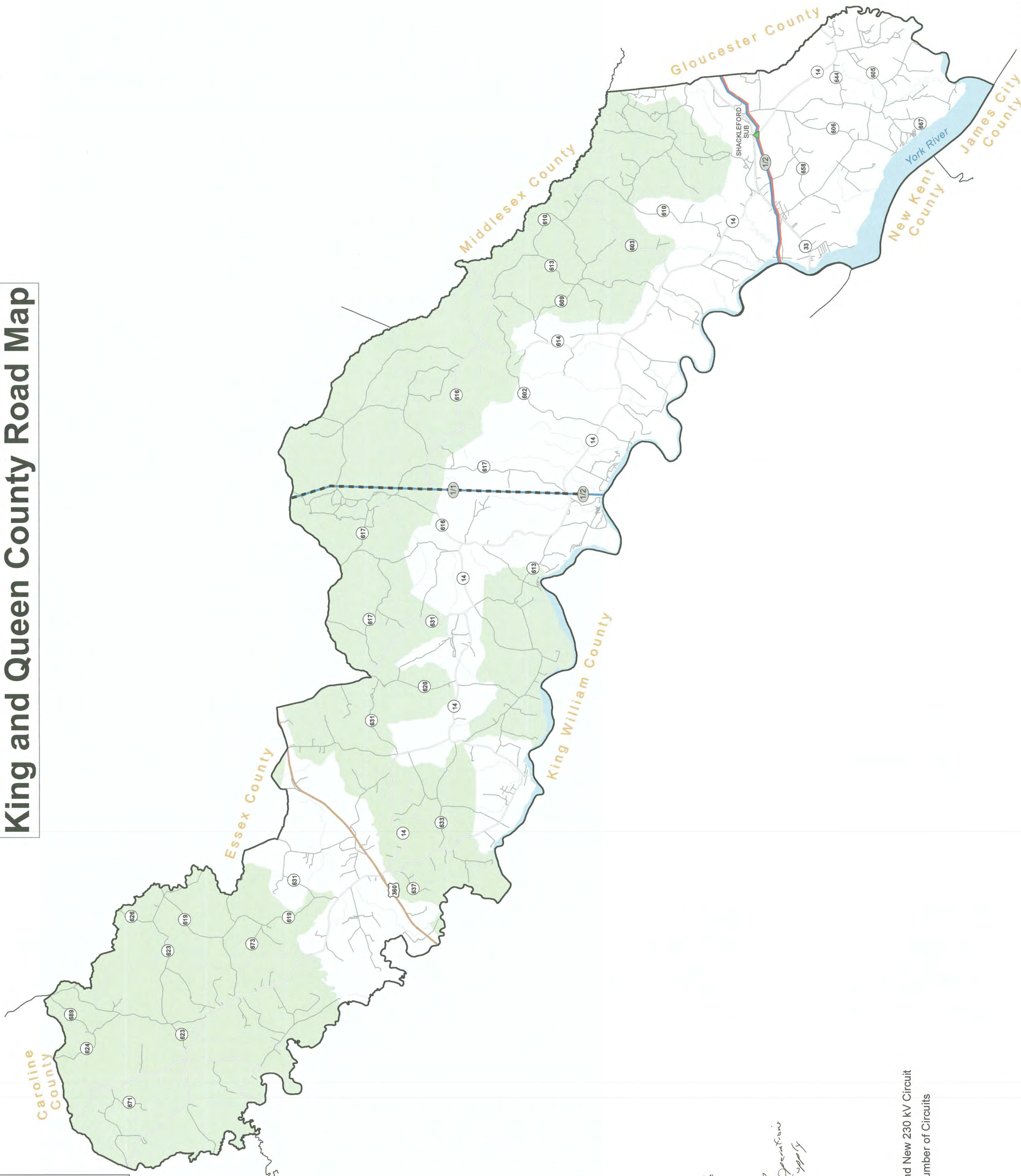
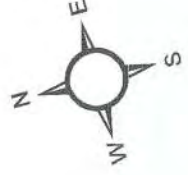


*VDOT and other road data
obtained from ESRI USA
Major Roads, VGIN, and
ESRI NADS streets.



This digital map depicts the Virginia Electric and Power Company ("Company") transmission facilities in this county as approved by the Virginia State Corporation Commission ("SCC"), and any proposed transmission facilities in this county, as of 10/2/2020. Other Company facilities previously authorized by the SCC may be depicted on prior SCC approved county maps.

King and Queen County Road Map



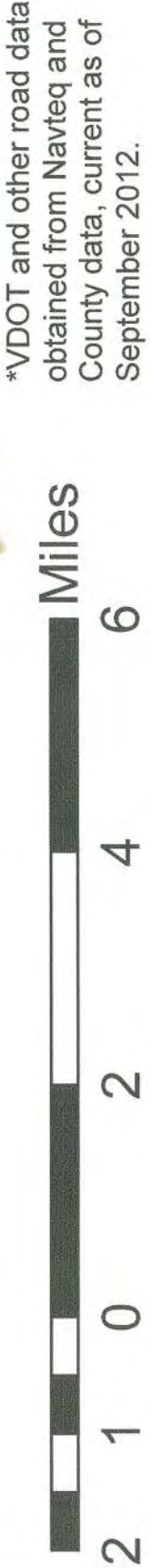
VIRGINIA ELECTRIC AND POWER COMPANY
PLANS TO BUILD TRANSMISSION LINES AND
SUBSTATIONS AS SHOWN IN BLACK DASHES
ON THIS MAP.

Ronald W. Harris
AS NOT OPPOSED TO SUCH CONSTRUCTION IN
ITS SERVICE TERRITORY.

SIGNATURE *Ronald W. Harris*
DATE 10/1/20
TITLE Sr. VP
Engineering Operations
Power Supply

Legend

- Proposed 230 kV Line Rebuild and New 230 kV Circuit
- ①② Number of Lines of Structures/Number of Circuits
- ▲ Existing Substation
- 115 kV
- 230 kV
- Provider Service Territory**
- REC
- VEPCO

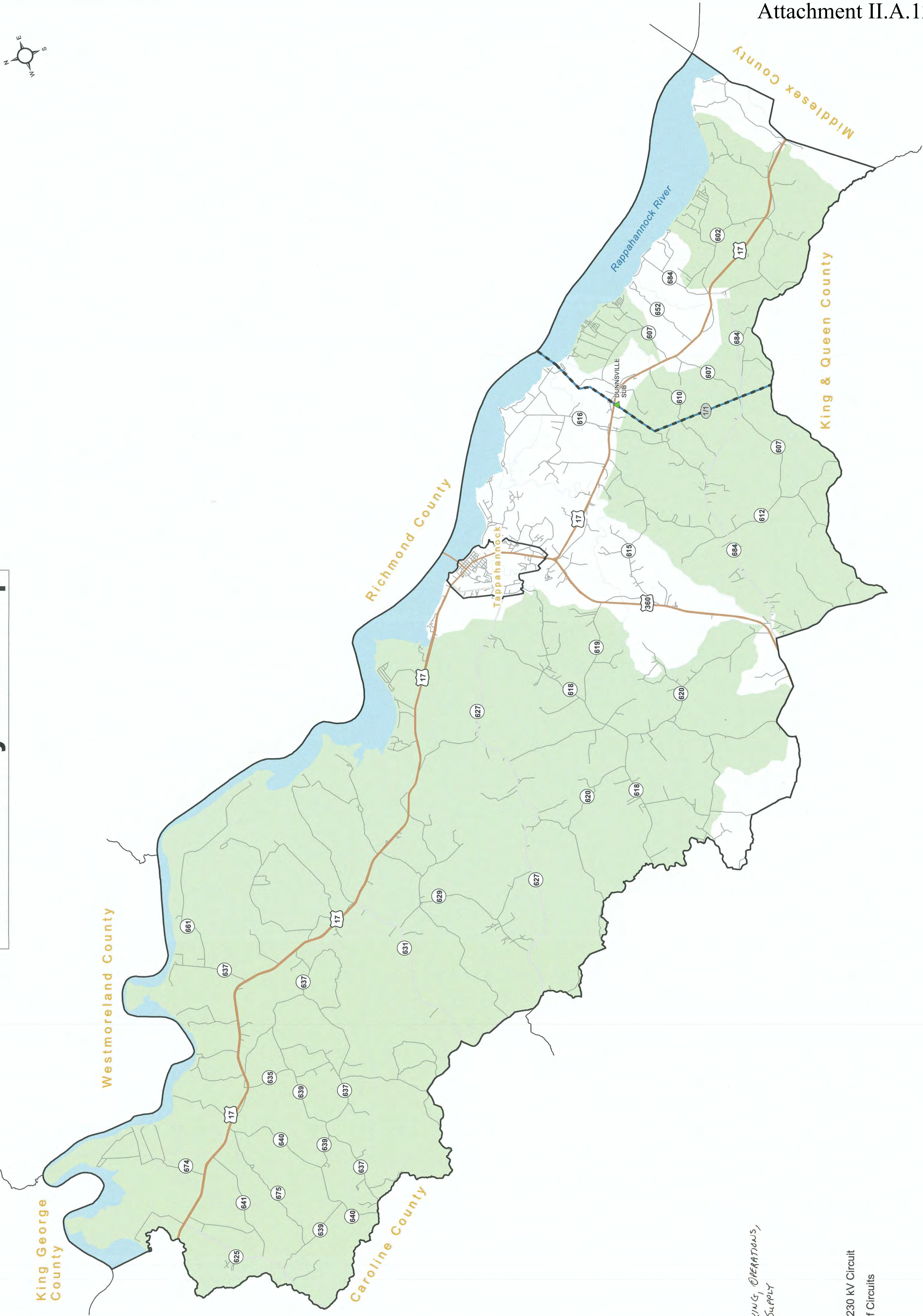


*VDOT and other road data
obtained from Navteq and
County data, current as of
September 2012.

Essex County Road Map



This digital map depicts the Virginia Electric and Power Company ("Company") transmission facilities in this county as approved by the Virginia State Corporation Commission ("SCC"), and any proposed transmission facilities in this county, as of 8/31/2020. Other Company facilities previously authorized by the SCC may be depicted on prior SCC approved county maps.



VIRGINIA ELECTRIC AND POWER COMPANY
PLANS TO BUILD TRANSMISSION LINES AND
SUBSTATIONS AS SHOWN IN BLACK DASHES
ON THIS MAP.
RAPPAHANNOCK ELECTRIC COOPERATIVE
IS NOT OPPOSED TO SUCH CONSTRUCTION IN
ITS SERVICE TERRITORY.
SIGNATURE *Ken W. Nanni*
DATE 9/9/2020 TITLE V.P. OF ENGINEERING, OPERATIONS,
& POWER SUPPLY

Legend

- Proposed 230 kV Line Rebuild and New 230 kV Circuit
- ①② Number of Lines of Structures/Number of Circuits
- ▲ Existing Substation
- 230 kV

Provider Service Territory

- REC
- VEPCO

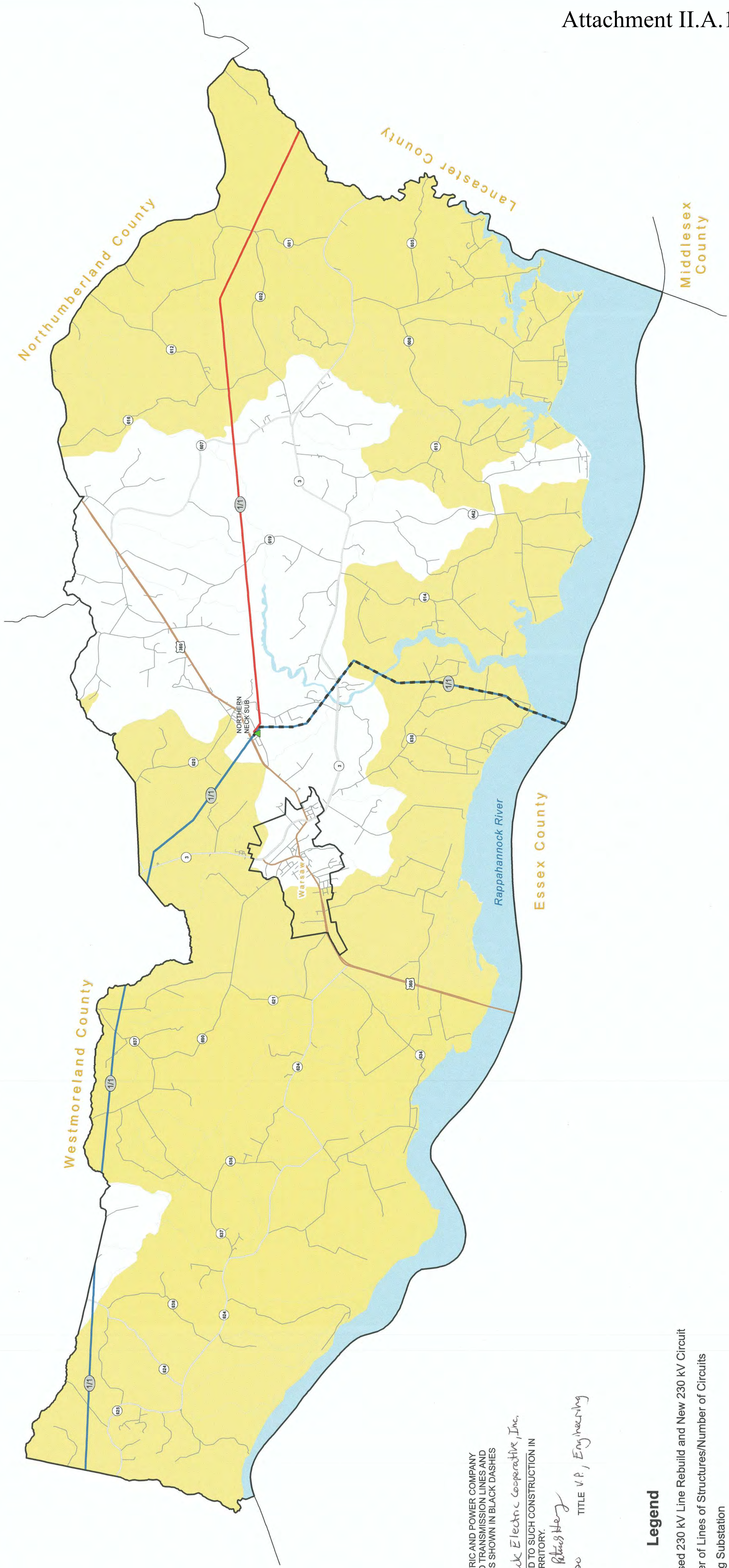
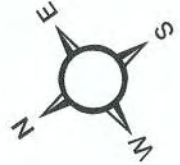
*VDOT and other road data
obtained from Navteq and
County data, current as of
September 2011.



Richmond County Road Map



This digital map depicts the Virginia Electric and Power Company ("Company") transmission facilities in this county as approved by the Virginia State Corporation Commission ("SCC"), and any proposed transmission facilities in this county, as of 8/31/2020. Other Company facilities previously authorized by the SCC may be depicted on prior SCC approved county maps.



VIRGINIA ELECTRIC AND POWER COMPANY
PLANS TO BUILD TRANSMISSION LINES AND
SUBSTATIONS AS SHOWN IN BLACK DASHES
ON THIS MAP.
Northern Neck Electric Cooperative, Inc.
IS NOT OPPOSED TO SUCH CONSTRUCTION IN
ITS SERVICE TERRITORY.

SIGNATURE *A. Blumley* TITLE V.P., Engineering
DATE 9/14/20

Legend

- Proposed 230 kV Line Rebuild and New 230 kV Circuit
- ④ Number of Lines of Structures/Number of Circuits
- ▲ Existing Substation
- 115 kV
- 230 kV
- Provider Service Territory
- NNEC
- VEPCO

*VDOT and other road data
obtained from Navteq and
County data, current as of
August 2011.



II. DESCRIPTION OF THE PROPOSED PROJECT

B. Line Design and Operational Features

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

Response: Single circuit 230 kV Line #224 and Line #2208 will be designed and operated at 230 kV with no anticipated voltage upgrade. The 3-phase twin-bundled 636 ACSR conductors will have a transfer capability of 1047 MVA, except along the Rappahannock River, where 3-phase twin-bundled 768 ACSS TW (HS285) conductor will be installed. The twin-bundled ACSS has a transfer capability of 1059 MVA.¹⁷

¹⁷ In order to re-use the existing foundations within the Rappahannock River, the same tower design and height needed to be used. ACSS conductor was selected for the river crossings as it is lighter in weight and can be strung at a higher tension than ACSR, which allows the line to have the required clearances crossing the Rappahannock River while maintaining the equivalent rating of ACSR.

II. DESCRIPTION OF THE PROPOSED PROJECT

B. Line Design and Operational Features

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

Response: The existing Line #224 is built horizontally. The proposed Project structures will have predominantly 3-phase twin-bundled 636 ACSR conductors arranged vertically, except at substations where the conductors will be arranged horizontally. The twin-bundled 636 ACSR conductors are the Company's standard for new 230 kV construction. In addition to the phase conductors, shield wires will also be installed with one fiber optic shield wire over each side of the structures.

The Rappahannock River crossing section of Line #224 and Line #2208 will have predominantly 3-phase twin-bundled 768 ACSS/TW (HS 285) conductors arranged vertically. The 768 ACSS/TW (HS 285) trapezoidal conductor meets the minimum transfer capabilities while providing additional mechanical properties conducive for river crossings including decreased sag, increased self-dampening properties and improved corrosion resistance. In addition to the phase conductor, the shield wires will also be replaced with one fiber optic shield wire above each line. The twin-bundled 768 ACSS wires that were installed as part of the Partial Rebuild Project crossing the Pamunkey and Mattaponi Rivers will remain in place. However, due to the need for the second 230 kV circuit, the vacant side of the existing towers on the Pamunkey River will be strung in with 3-phase twin-bundled 768 ACSS/TW (HS 285) conductors.

See Section I.F for a discussion of the conductors being replaced or re-used on Lines #2016, #2076, #2113, and #2129.

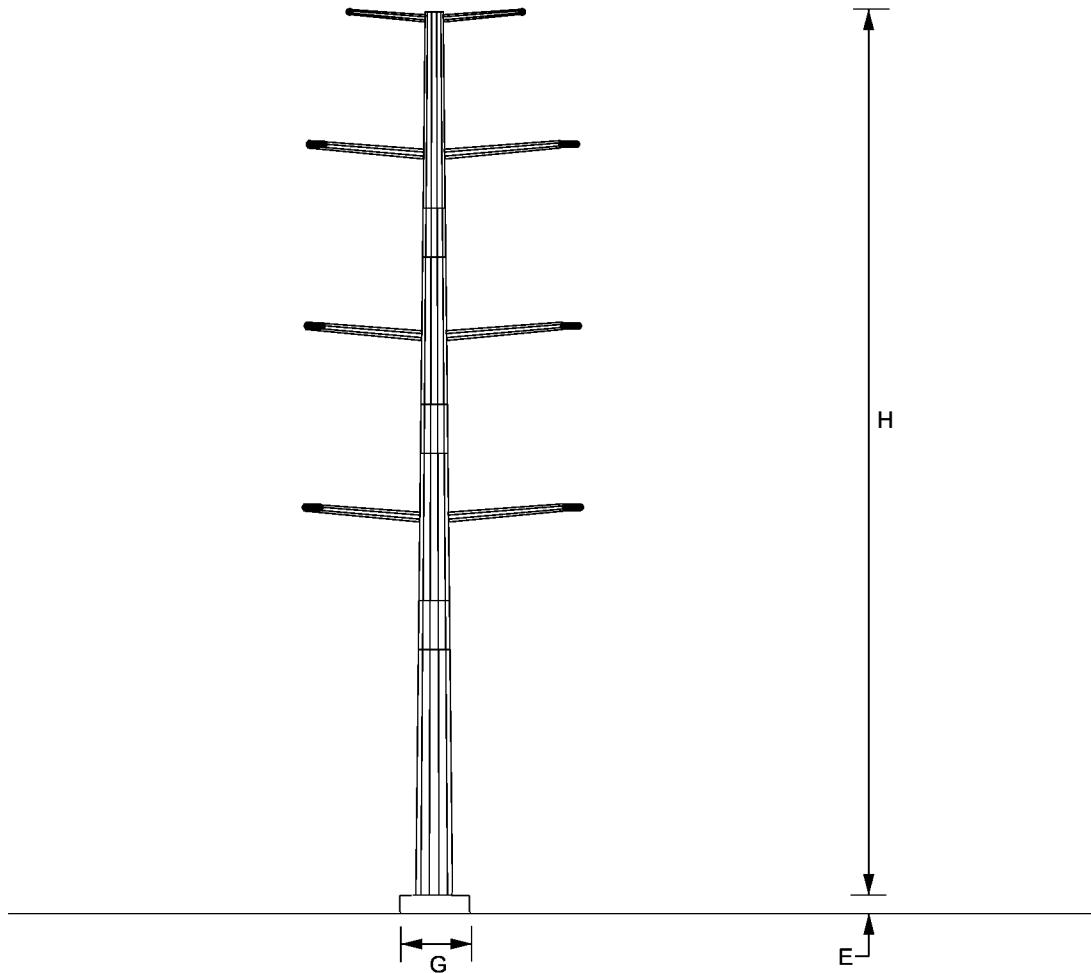
II. DESCRIPTION OF THE PROPOSED PROJECT

B. Line Design and Operational Features

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

Response: For subpart (a), see Attachment II.B.5.a. For subparts (b)-(j), see Attachments II.B.3.i-II.B.3.xvii.

NORTHERN NECK - STRUCTURE 224/3



DOUBLE CIRCUIT MONOPOLE DOUBLE DEAD-END STRUCTURE

B. RATIONALE FOR STRUCTURE TYPE:	DOUBLE CIRCUIT MONOPOLES CAN BE BUILT ON THE EXISTING RW
C. LENGTH OF R/W (STRUCTURE QUANTITY):	0.15 MILES (1 STRUCTURE)
D. STRUCTURE MATERIAL:	WEATHERING STEEL
RATIONALE FOR STRUCTURE MATERIAL:	TO MATCH THE EXISTING WOOD POLES
E. FOUNDATION MATERIAL:	CONCRETE
AVERAGE FOUNDATION REVEAL:	SEE NOTE 4
F. AVERAGE WIDTH AT CROSSARM:	N/A
G. AVERAGE WIDTH AT BASE:	6' DIAMETER FOUNDATION (SEE NOTE 2)
H. MINIMUM STRUCTURE HEIGHT:	90'
MAXIMUM STRUCTURE HEIGHT:	90'
AVERAGE STRUCTURE HEIGHT:	90'
I. AVERAGE SPAN LENGTH:	390' (257'-523')
J. MINIMUM CONDUCTOR-TO-GROUND:	22.5' (AT MAXIMUM OPERATING TEMPERATURE)

- NOTES
1. INFORMATION ON DRAWING IS PRELIMINARY AND SUBJECT TO CHANGE DURING FINAL ENGINEERING
 2. FINAL FOUNDATION DIAMETER SHALL BE BASED UPON FINAL ENGINEERING
 3. STRUCTURE HEIGHTS ARE MEASURED FROM STRUCTURE CENTERLINE
 4. MINIMUM FOUNDATION REVEAL SHALL BE 1.5', MAX REVEAL SUBJECT TO FINAL LOCATION AND TERRAIN

Electric Transmission

SECTION 1:

DRAWING NO.

**NORTHERN NECK -
STRUCTURE 224/3**

ATTACHMENT II.B.3.i

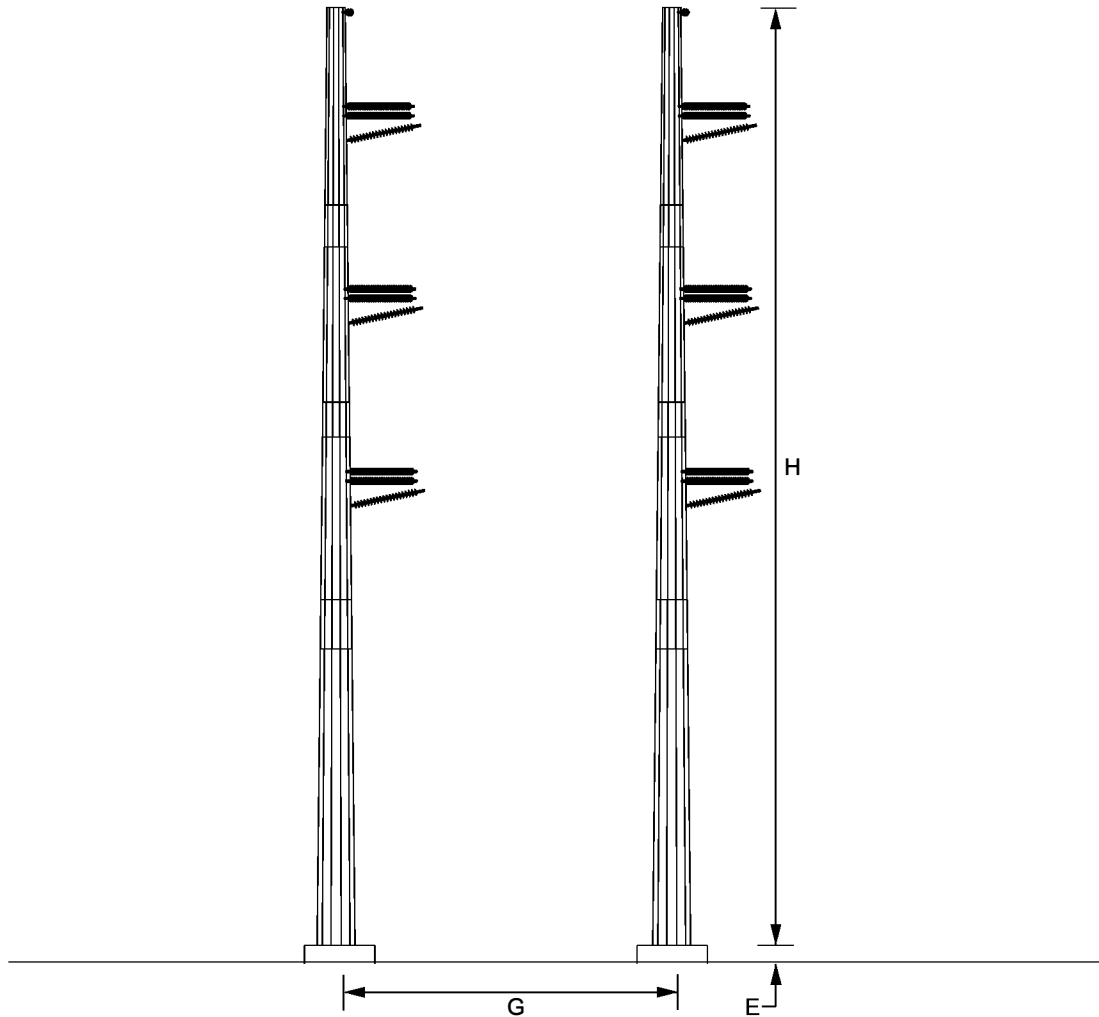


**Dominion
Energy**

Dominion Energy
10900 Nuckols Road
Glen Allen, VA 23060

DRAWN RAS

NORTHERN NECK - STRUCTURE 224/3



DOUBLE CIRCUIT 2-POLE DOUBLE DEAD-END STRUCTURE

B. RATIONALE FOR STRUCTURE TYPE:	DOUBLE CIRCUIT 2-POLES CAN BE BUILT ON THE EXISTING R/W
C. LENGTH OF R/W (STRUCTURE QUANTITY):	0.15 MILES (1 STRUCTURE)
D. STRUCTURE MATERIAL:	WEATHERING STEEL
RATIONALE FOR STRUCTURE MATERIAL:	TO MATCH THE EXISTING WOOD POLES
E. FOUNDATION MATERIAL:	CONCRETE
AVERAGE FOUNDATION REVEAL:	SEE NOTE 4
F. AVERAGE WIDTH AT CROSSARM:	N/A
G. AVERAGE WIDTH AT BASE:	34'; 6" DIAMETER FOUNDATION (SEE NOTE 2)
H. MINIMUM STRUCTURE HEIGHT:	95'
MAXIMUM STRUCTURE HEIGHT:	95'
AVERAGE STRUCTURE HEIGHT:	95'
I. AVERAGE SPAN LENGTH:	390' (257'-523')
J. MINIMUM CONDUCTOR-TO-GROUND:	22.5' (AT MAXIMUM OPERATING TEMPERATURE)

NOTES	1. INFORMATION ON DRAWING IS PRELIMINARY AND SUBJECT TO CHANGE DURING FINAL ENGINEERING
	2. FINAL FOUNDATION DIAMETER SHALL BE BASED UPON FINAL ENGINEERING
	3. STRUCTURE HEIGHTS ARE MEASURED FROM STRUCTURE CENTERLINE
	4. MINIMUM FOUNDATION REVEAL SHALL BE 1.5', MAX REVEAL SUBJECT TO FINAL LOCATION AND TERRAIN

Electric Transmission



Dominion Energy

Dominion Energy
10900 Nuckols Road
Glen Allen, VA 23060

SECTION 1:

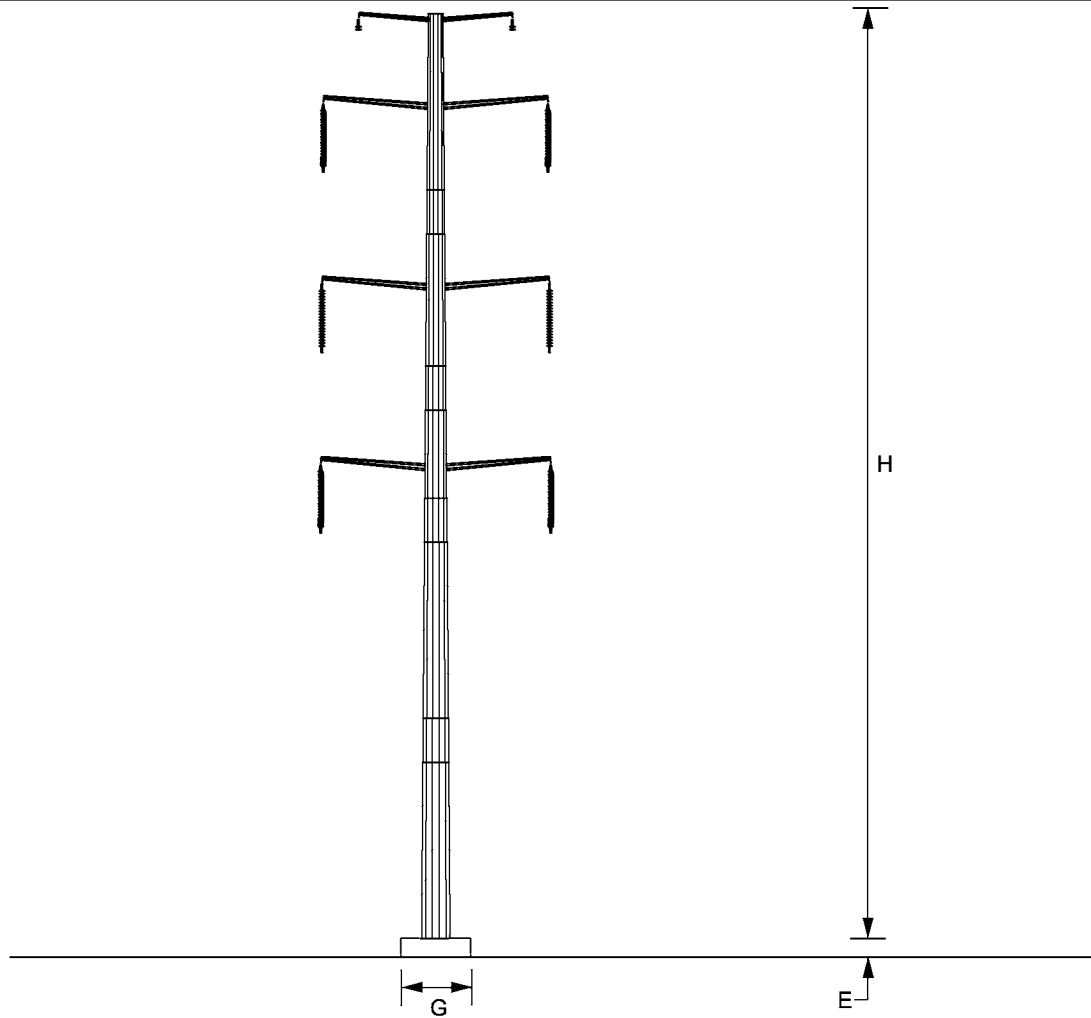
NORTHERN NECK -
STRUCTURE 224/3

DRAWING NO.

ATTACHMENT II.B.3.ii

DRAWN RAS

STRUCTURE 224/4-224/51; 224/60-224/180; 224/186-224/227 & 224/234-224/296



DOUBLE CIRCUIT MONOPOLE SUSPENSION STRUCTURE

B. RATIONALE FOR STRUCTURE TYPE:	DOUBLE CIRCUIT MONOPOLES CAN BE BUILT ON THE EXISTING R/W
C. LENGTH OF R/W (STRUCTURE QUANTITY):	36.01 MILES (241 STRUCTURES)
D. STRUCTURE MATERIAL:	WEATHERING STEEL
RATIONALE FOR STRUCTURE MATERIAL:	TO MATCH THE EXISTING WOOD POLES
E. FOUNDATION MATERIAL:	CONCRETE
AVERAGE FOUNDATION REVEAL:	SEE NOTE 4
F. AVERAGE WIDTH AT CROSSARM:	N/A
G. AVERAGE WIDTH AT BASE:	6' DIAMETER FOUNDATION (SEE NOTE 2)
H. MINIMUM STRUCTURE HEIGHT:	90'
MAXIMUM STRUCTURE HEIGHT:	125'
AVERAGE STRUCTURE HEIGHT:	107'
I. AVERAGE SPAN LENGTH:	686' (63'-1096')
J. MINIMUM CONDUCTOR-TO-GROUND:	22.5' (AT MAXIMUM OPERATING TEMPERATURE)

NOTES

1. INFORMATION ON DRAWING IS PRELIMINARY AND SUBJECT TO CHANGE DURING FINAL ENGINEERING
2. FINAL FOUNDATION DIAMETER SHALL BE BASED UPON FINAL ENGINEERING
3. STRUCTURE HEIGHTS ARE MEASURED FROM STRUCTURE CENTERLINE
4. MINIMUM FOUNDATION REVEAL SHALL BE 1.5', MAX REVEAL SUBJECT TO FINAL LOCATION AND TERRAIN

Electric Transmission

SECTION 2:

DRAWING NO.

STRUCTURE 224/4-224/51;
224/60-224/180;
224/186-224/227 &
224/234-224/296

ATTACHMENT II.B.3.iii

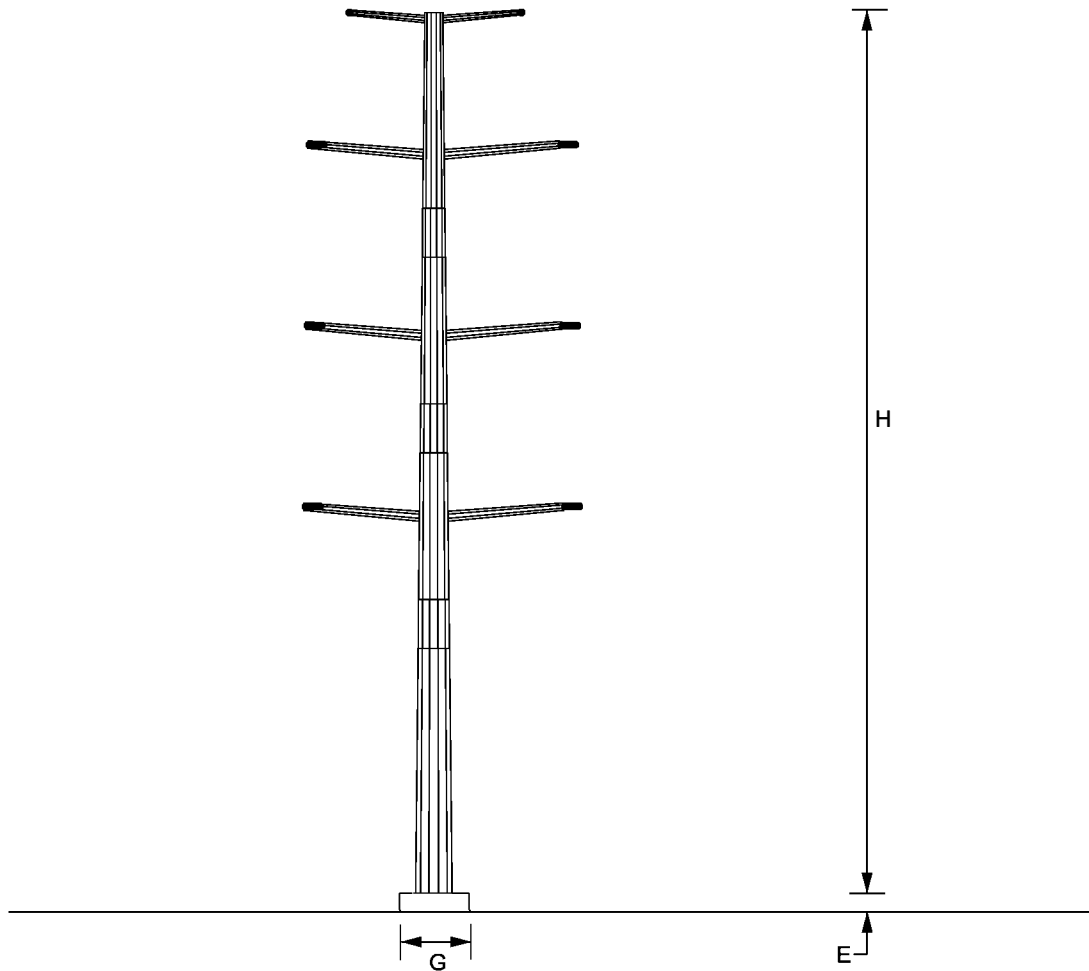


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DRAWN RAS

STRUCTURE 224/4-224/51; 224/60-224/180; 224/186-224/227 & 224/234-224/296



DOUBLE CIRCUIT MONOPOLE DOUBLE DEAD-END STRUCTURE

B. RATIONALE FOR STRUCTURE TYPE:	DOUBLE CIRCUIT MONOPOLES CAN BE BUILT ON THE EXISTING RW
C. LENGTH OF RW (STRUCTURE QUANTITY):	36.01 MILES (24 STRUCTURES)
D. STRUCTURE MATERIAL:	WEATHERING STEEL
RATIONALE FOR STRUCTURE MATERIAL:	TO MATCH THE EXISTING WOOD POLES
E. FOUNDATION MATERIAL:	CONCRETE
AVERAGE FOUNDATION REVEAL:	SEE NOTE 4
F. AVERAGE WIDTH AT CROSSARM:	N/A
G. AVERAGE WIDTH AT BASE:	6' DIAMETER FOUNDATION (SEE NOTE 2)
H. MINIMUM STRUCTURE HEIGHT:	85'
MAXIMUM STRUCTURE HEIGHT:	110'
AVERAGE STRUCTURE HEIGHT:	97'
I. AVERAGE SPAN LENGTH:	686' (63'-1096')
J. MINIMUM CONDUCTOR-TO-GROUND:	22.5' (AT MAXIMUM OPERATING TEMPERATURE)

NOTES	1. INFORMATION ON DRAWING IS PRELIMINARY AND SUBJECT TO CHANGE DURING FINAL ENGINEERING 2. FINAL FOUNDATION DIAMETER SHALL BE BASED UPON FINAL ENGINEERING 3. STRUCTURE HEIGHTS ARE MEASURED FROM STRUCTURE CENTERLINE 4. MINIMUM FOUNDATION REVEAL SHALL BE 1.5', MAX REVEAL SUBJECT TO FINAL LOCATION AND TERRAIN
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Electric Transmission

SECTION 2:

DRAWING NO.

STRUCTURE 224/4-224/51;
224/60-224/180;
224/186-224/227 &
224/234-224/296

ATTACHMENT II.B.3.iv

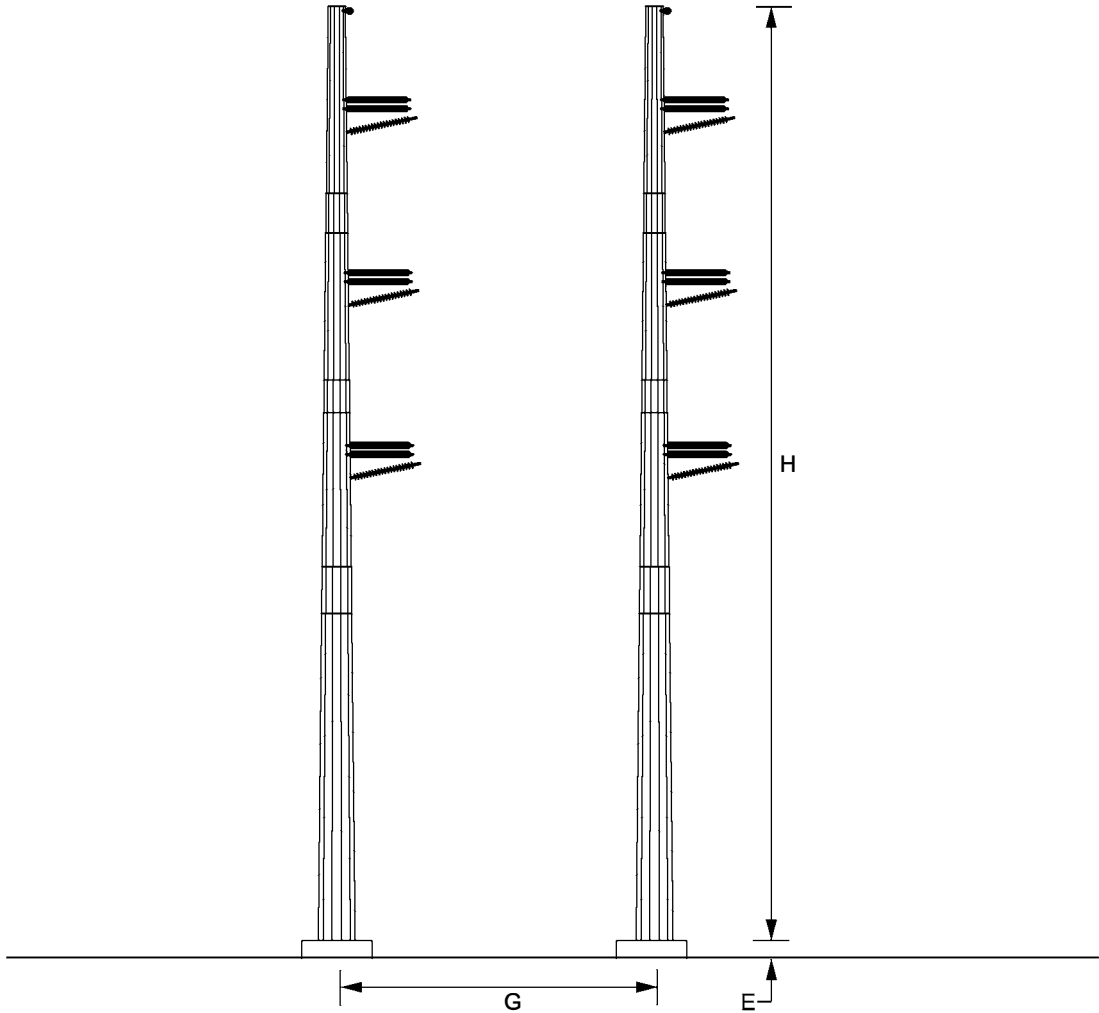


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STRUCTURE 224/4-224/51; 224/60-224/180; 224/186-224/227 & 224/234-224/296



DOUBLE CIRCUIT 2-POLE DOUBLE DEAD-END STRUCTURE

B. RATIONALE FOR STRUCTURE TYPE:	DOUBLE CIRCUIT 2-POLES CAN BE BUILT ON THE EXISTING R/W
C. LENGTH OF R/W (STRUCTURE QUANTITY):	36.01 MILES (4 STRUCTURES)
D. STRUCTURE MATERIAL:	WEATHERING STEEL
RATIONALE FOR STRUCTURE MATERIAL:	TO MATCH THE EXISTING WOOD POLES
E. FOUNDATION MATERIAL:	CONCRETE
AVERAGE FOUNDATION REVEAL:	SEE NOTE 4
F. AVERAGE WIDTH AT CROSSARM:	N/A
G. AVERAGE WIDTH AT BASE:	34'; 6' DIAMETER FOUNDATION (SEE NOTE 2)
H. MINIMUM STRUCTURE HEIGHT:	95'
MAXIMUM STRUCTURE HEIGHT:	105'
AVERAGE STRUCTURE HEIGHT:	100'
I. AVERAGE SPAN LENGTH:	686' (63'-1096')
J. MINIMUM CONDUCTOR-TO-GROUND:	22.5' (AT MAXIMUM OPERATING TEMPERATURE)

NOTES	1. INFORMATION ON DRAWING IS PRELIMINARY AND SUBJECT TO CHANGE DURING FINAL ENGINEERING 2. FINAL FOUNDATION DIAMETER SHALL BE BASED UPON FINAL ENGINEERING 3. STRUCTURE HEIGHTS ARE MEASURED FROM STRUCTURE CENTERLINE 4. MINIMUM FOUNDATION REVEAL SHALL BE 1.5', MAX REVEAL SUBJECT TO FINAL LOCATION AND TERRAIN
-------	--

Electric Transmission

SECTION 2:

DRAWING NO.

STRUCTURE 224/4-224/51;
224/60-224/180;
224/186-224/227 &
224/234-224/296

ATTACHMENT II.B.3.v

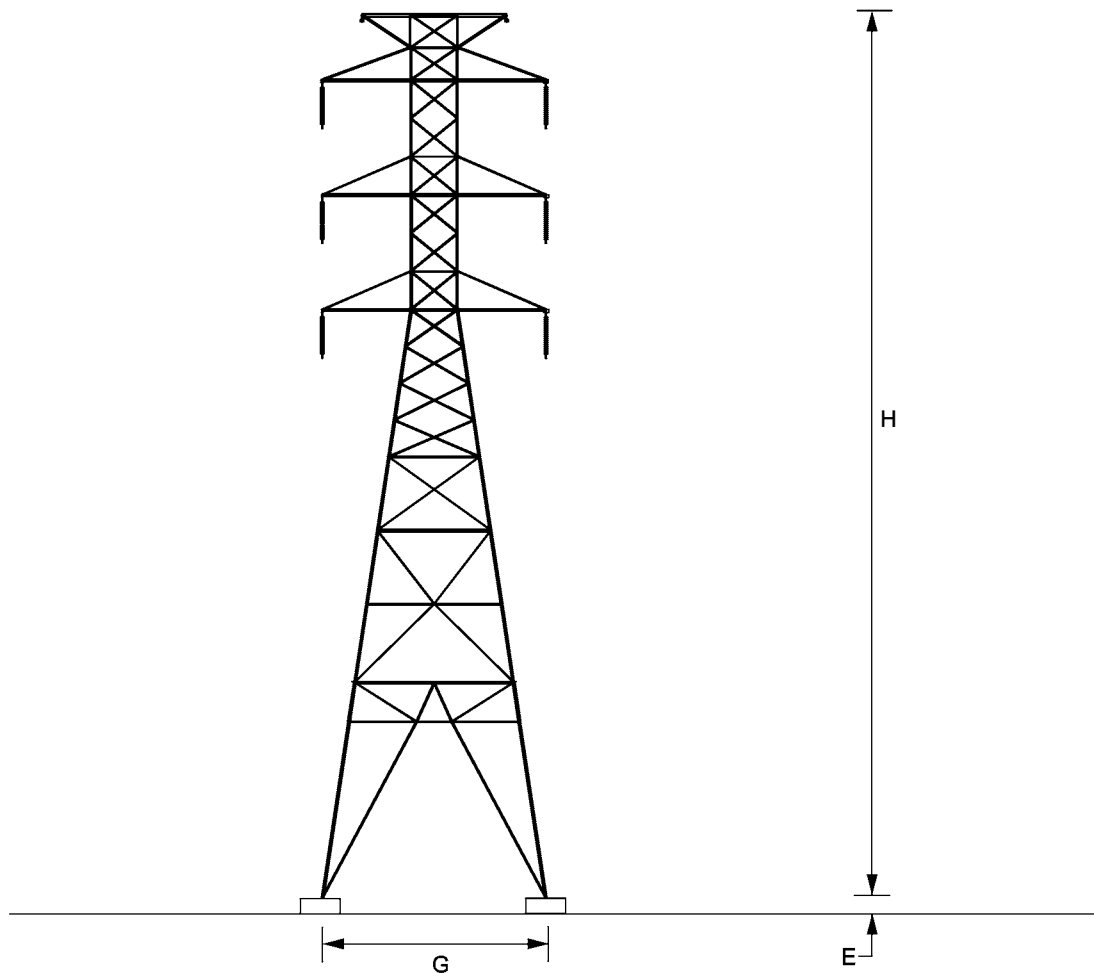


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STRUCTURE 224/4-224/51; 224/60-224/180; 224/186-224/227 & 224/234-224/296



DOUBLE CIRCUIT N-SERIES SUSPENSION TOWER STRUCTURE

B. RATIONALE FOR STRUCTURE TYPE:	REPLACING TOWER TO RE-USE THE EXISTING FOUNDATIONS
C. LENGTH OF R/W (STRUCTURE QUANTITY):	36.01 MILES (2 STRUCTURES)
D. STRUCTURE MATERIAL:	GALVANIZED STEEL
RATIONALE FOR STRUCTURE MATERIAL:	GALVANIZED STEEL IS THE ONLY APPROVED MATERIAL FOR NEW TOWER BUILDS
E. FOUNDATION MATERIAL:	CONCRETE
AVERAGE FOUNDATION REVEAL:	SEE NOTE 3
F. AVERAGE WIDTH AT CROSSARM:	N/A
G. AVERAGE WIDTH AT BASE:	41.18'
H. MINIMUM STRUCTURE HEIGHT:	150'
MAXIMUM STRUCTURE HEIGHT:	170'
AVERAGE STRUCTURE HEIGHT:	160'
I. AVERAGE SPAN LENGTH:	686' (63'-1096')
J. MINIMUM CONDUCTOR-TO-GROUND:	75' (AT MAXIMUM OPERATING TEMPERATURE) TO RIVER CHANNEL

NOTES

1. INFORMATION ON DRAWING IS PRELIMINARY AND SUBJECT TO CHANGE DURING FINAL ENGINEERING.
2. STRUCTURE HEIGHTS ARE MEASURED FROM STRUCTURE CENTERLINE.
3. EXISTING FOUNDATIONS ARE TO BE RE-USED.

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SECTION 2:

STRUCTURE 224/4-224/51;
224/60-224/180;
224/186-224/227 &
224/234-224/296

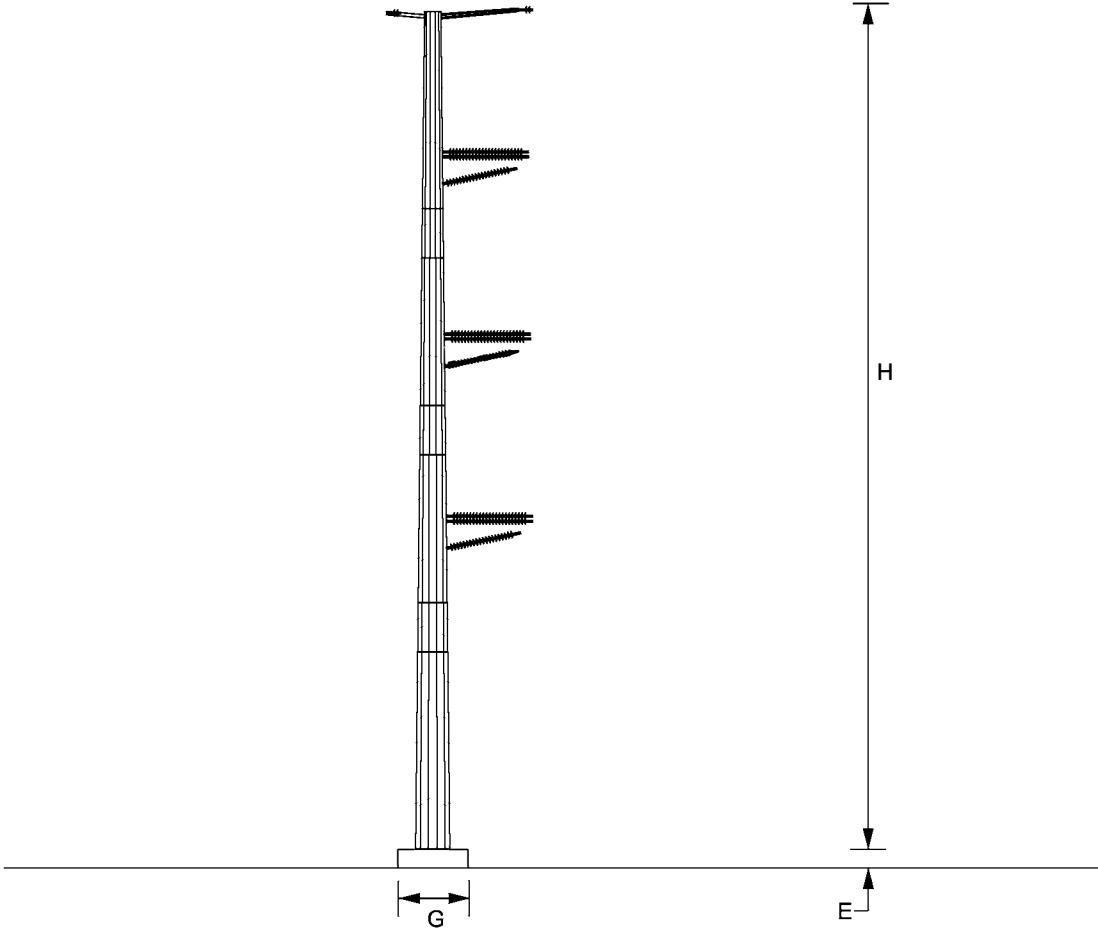
DRAWING NO.

ATTACHMENT II.B.3.vi

DRAWN RAS

SYTIME\$

STRUCTURE 224/4-224/51; 224/60-224/180; 224/186-224/227 & 224/234-224/296



SINGLE CIRCUIT MONOPOLE DOUBLE DEAD-END STRUCTURE

B. RATIONALE FOR STRUCTURE TYPE:	SINGLE CIRCUIT POLE FOR THE TAP INTO DUNNSVILLE SUBSTATION
C. LENGTH OF R/W (STRUCTURE QUANTITY):	36.01 MILES (2 STRUCTURES)
D. STRUCTURE MATERIAL:	WEATHERING STEEL
RATIONALE FOR STRUCTURE MATERIAL:	TO MATCH THE EXISTING WOOD POLES
E. FOUNDATION MATERIAL:	CONCRETE
AVERAGE FOUNDATION REVEAL:	SEE NOTE 4
F. AVERAGE WIDTH AT CROSSARM:	N/A
G. AVERAGE WIDTH AT BASE:	6' DIAMETER FOUNDATION (SEE NOTE 2)
H. MINIMUM STRUCTURE HEIGHT:	85'
MAXIMUM STRUCTURE HEIGHT:	85'
AVERAGE STRUCTURE HEIGHT:	85'
I. AVERAGE SPAN LENGTH:	686' (63'-1096')
J. MINIMUM CONDUCTOR-TO-GROUND:	22.5' (AT MAXIMUM OPERATING TEMPERATURE)

NOTES

1. INFORMATION ON DRAWING IS PRELIMINARY AND SUBJECT TO CHANGE DURING FINAL ENGINEERING
2. FINAL FOUNDATION DIAMETER SHALL BE BASED UPON FINAL ENGINEERING
3. STRUCTURE HEIGHTS ARE MEASURED FROM STRUCTURE CENTERLINE
4. MINIMUM FOUNDATION REVEAL SHALL BE 1.5', MAX REVEAL SUBJECT TO FINAL LOCATION AND TERRAIN

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SECTION 2 :

STRUCTURE 224/4-224/51;
224/60-224/180;
224/186-224/227 &
224/234-224/296

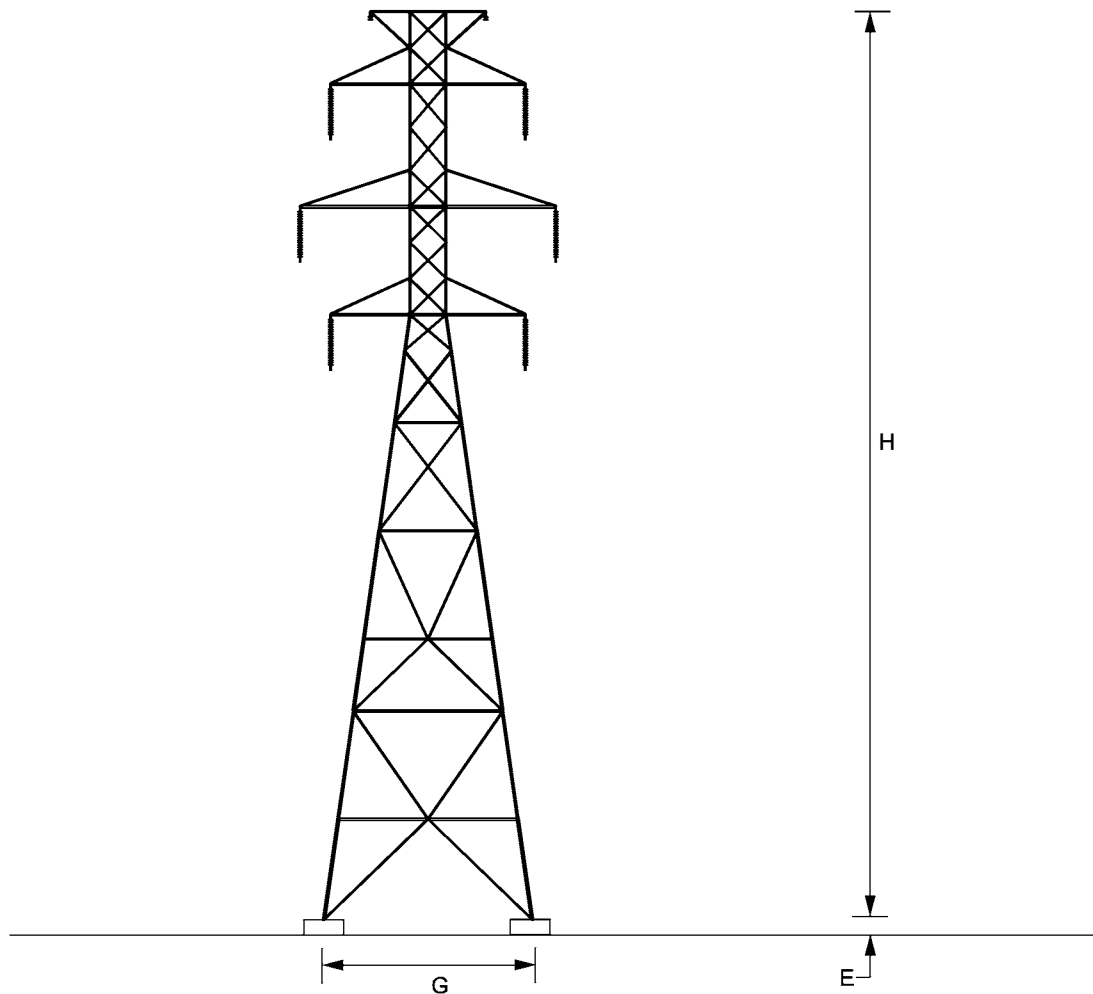
DRAWING NO.

ATTACHMENT II.B.3.vii

DRAWN RAS

\$SYTIME\$

STRUCTURE 224/4-224/51; 224/60-224/180; 224/186-224/227 & 224/234-224/296



DOUBLE CIRCUIT V-SERIES SUSPENSION TOWER STRUCTURE

B. RATIONALE FOR STRUCTURE TYPE:	REPLACING TOWER TO RE-USE THE EXISTING FOUNDATIONS
C. LENGTH OF R/W (STRUCTURE QUANTITY):	36.01 MILES (2 STRUCTURES)
D. STRUCTURE MATERIAL:	GALVANIZED STEEL
RATIONALE FOR STRUCTURE MATERIAL:	GALVANIZED STEEL IS THE ONLY APPROVED MATERIAL FOR NEW TOWER BUILDS
E. FOUNDATION MATERIAL:	CONCRETE
AVERAGE FOUNDATION REVEAL:	SEE NOTE 3
F. AVERAGE WIDTH AT CROSSARM:	N/A
G. AVERAGE WIDTH AT BASE:	28.25'
H. MINIMUM STRUCTURE HEIGHT:	116'
MAXIMUM STRUCTURE HEIGHT:	131'
AVERAGE STRUCTURE HEIGHT:	124'
I. AVERAGE SPAN LENGTH:	686' (63'-1096')
J. MINIMUM CONDUCTOR-TO-GROUND:	22.5' (AT MAXIMUM OPERATING TEMPERATURE); 51' TO I-64

NOTES

1. INFORMATION ON DRAWING IS PRELIMINARY AND SUBJECT TO CHANGE DURING FINAL ENGINEERING.
2. STRUCTURE HEIGHTS ARE MEASURED FROM STRUCTURE CENTERLINE.
3. EXISTING FOUNDATIONS ARE TO BE RE-USED.

Electric Transmission

SECTION 2:

DRAWING NO.

STRUCTURE 224/4-224/51;
224/60-224/180;
224/186-224/227 &
224/234-224/296

ATTACHMENT II.B.3.viii



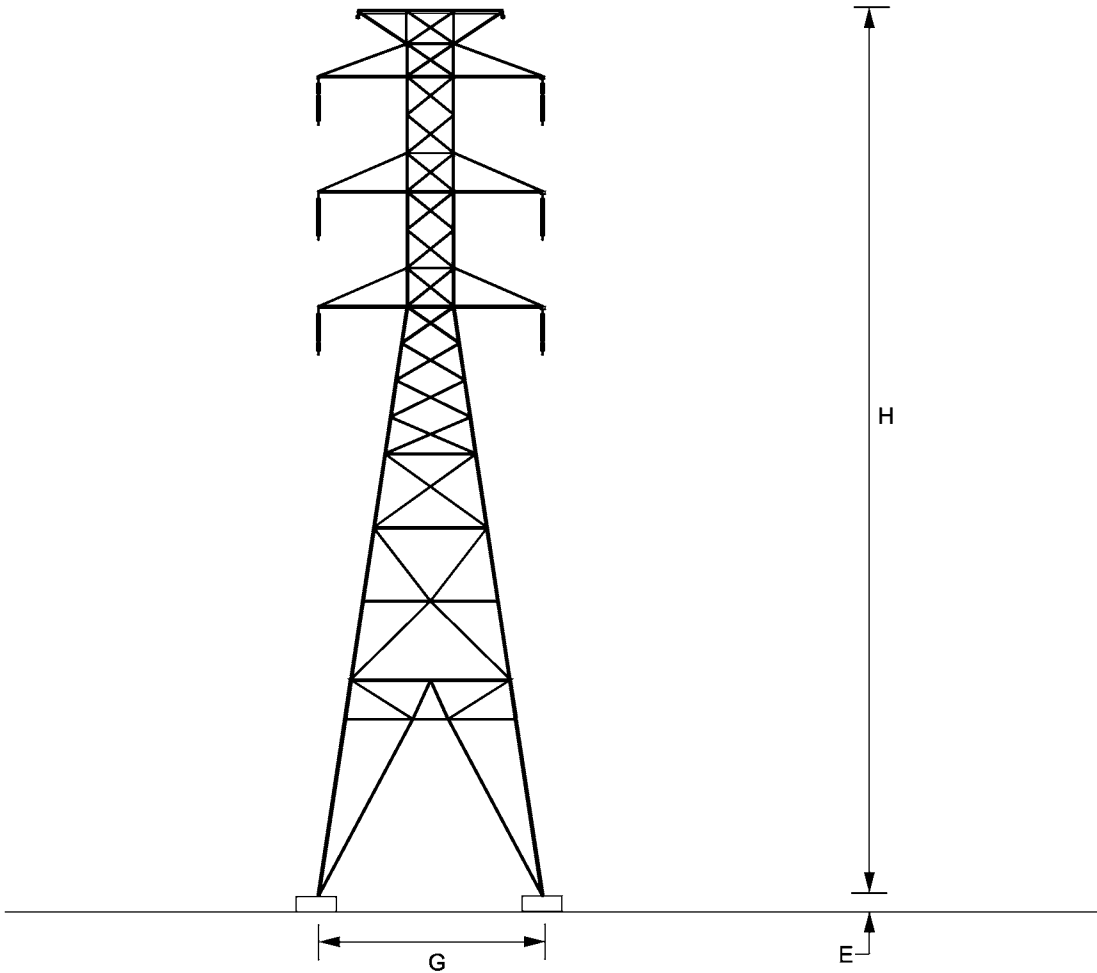
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STRUCTURE 224/52-224/59



DOUBLE CIRCUIT N-SERIES SUSPENSION TOWER STRUCTURE

B. RATIONALE FOR STRUCTURE TYPE:	REPLACING TOWER TO RE-USE THE EXISTING FOUNDATIONS
C. LENGTH OF R/W (STRUCTURE QUANTITY):	1.84 MILES (6 STRUCTURES)
D. STRUCTURE MATERIAL:	GALVANIZED STEEL
RATIONALE FOR STRUCTURE MATERIAL:	GALVANIZED STEEL IS THE ONLY APPROVED MATERIAL FOR NEW TOWER BUILDS
E. FOUNDATION MATERIAL:	CONCRETE
AVERAGE FOUNDATION REVEAL:	SEE NOTE 3
F. AVERAGE WIDTH AT CROSSARM:	N/A
G. AVERAGE WIDTH AT BASE:	43.19'
H. MINIMUM STRUCTURE HEIGHT:	140'
MAXIMUM STRUCTURE HEIGHT:	180'
AVERAGE STRUCTURE HEIGHT:	172'
I. AVERAGE SPAN LENGTH:	1212' (755'-1437')
J. MINIMUM CONDUCTOR-TO-GROUND:	22.5' (AT MAXIMUM OPERATING TEMPERATURE)

NOTES

1. INFORMATION ON DRAWING IS PRELIMINARY AND SUBJECT TO CHANGE DURING FINAL ENGINEERING.

2. STRUCTURE HEIGHTS ARE MEASURED FROM STRUCTURE CENTERLINE.

3. EXISTING FOUNDATIONS ARE TO BE RE-USED.

Electric Transmission

SECTION 3:

DRAWING NO.

ATTACHMENT II.B.3.ix



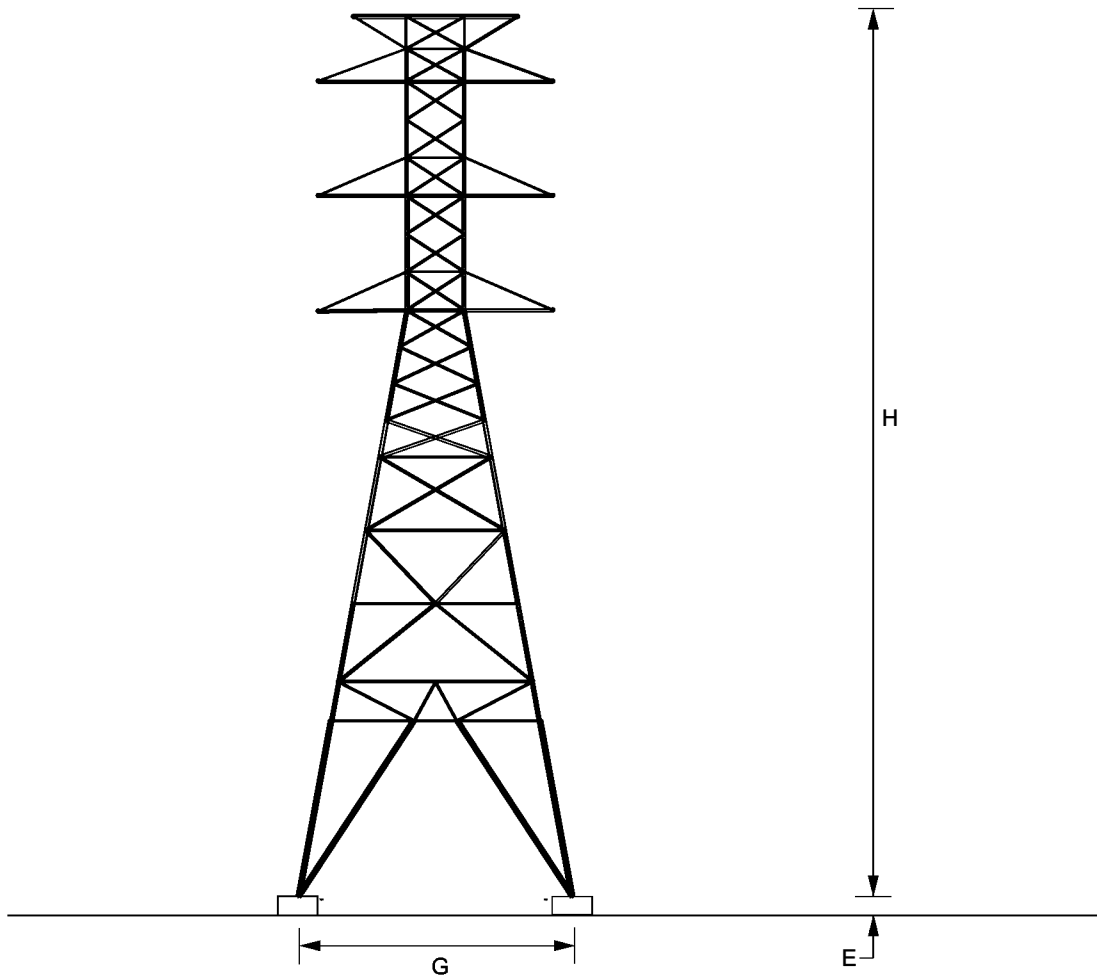
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STRUCTURE 224/52-224/59

DRAWN RAS

STRUCTURE 224/52-224/59



DOUBLE CIRCUIT N-SERIES DOUBLE DEAD-END TOWER STRUCTURE

B. RATIONALE FOR STRUCTURE TYPE:	REPLACING TOWER TO RE-USE THE EXISTING FOUNDATIONS
C. LENGTH OF R/W (STRUCTURE QUANTITY):	1.84 MILES (2 STRUCTURES)
D. STRUCTURE MATERIAL:	GALVANIZED STEEL
RATIONALE FOR STRUCTURE MATERIAL:	GALVANIZED STEEL IS THE ONLY APPROVED MATERIAL FOR NEW TOWER BUILDS
E. FOUNDATION MATERIAL:	CONCRETE
AVERAGE FOUNDATION REVEAL:	SEE NOTE 3
F. AVERAGE WIDTH AT CROSSARM:	N/A
G. AVERAGE WIDTH AT BASE:	42.08'
H. MINIMUM STRUCTURE HEIGHT:	150'
MAXIMUM STRUCTURE HEIGHT:	150'
AVERAGE STRUCTURE HEIGHT:	150'
I. AVERAGE SPAN LENGTH:	1212' (755'-1437')
J. MINIMUM CONDUCTOR-TO-GROUND:	22.5' (AT MAXIMUM OPERATING TEMPERATURE)

NOTES

1. INFORMATION ON DRAWING IS PRELIMINARY AND SUBJECT TO CHANGE DURING FINAL ENGINEERING.
2. STRUCTURE HEIGHTS ARE MEASURED FROM STRUCTURE CENTERLINE.
3. EXISTING FOUNDATIONS ARE TO BE RE-USED.

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SECTION 3:

STRUCTURE 224/52-224/59

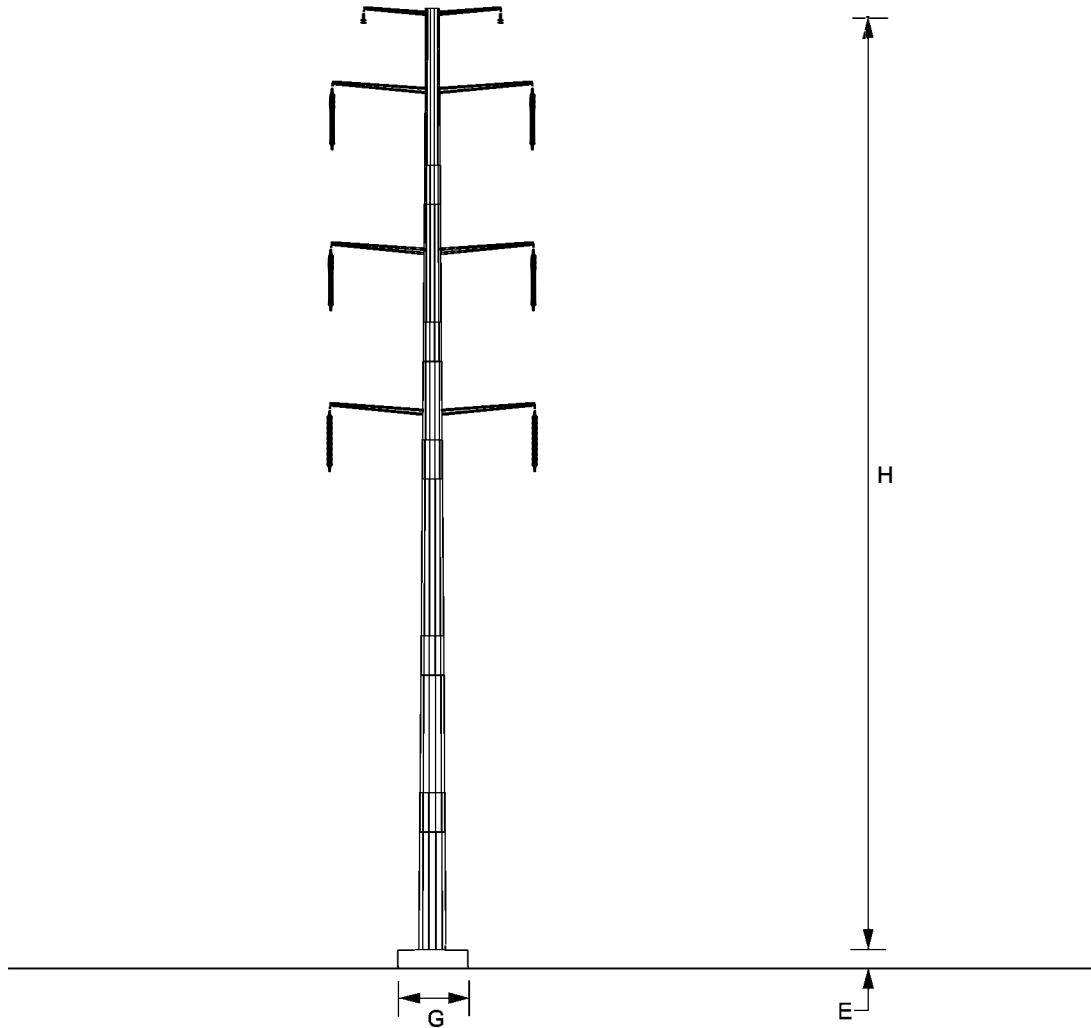
DRAWING NO.

ATTACHMENT II.B.3.x

DRAWN RAS

\$SYTIME\$

STRUCTURE 224/297-LANEXA



DOUBLE CIRCUIT MONOPOLE SUSPENSION STRUCTURE

B. RATIONALE FOR STRUCTURE TYPE:	DOUBLE CIRCUIT MONOPOLES CAN BE BUILT ON THE EXISTING R/W
C. LENGTH OF R/W (STRUCTURE QUANTITY):	1.01 MILES (3 STRUCTURES)
D. STRUCTURE MATERIAL:	WEATHERING STEEL
RATIONALE FOR STRUCTURE MATERIAL:	TO MATCH THE EXISTING WOOD POLES
E. FOUNDATION MATERIAL:	CONCRETE
AVERAGE FOUNDATION REVEAL:	SEE NOTE 4
F. AVERAGE WIDTH AT CROSSARM:	N/A
G. AVERAGE WIDTH AT BASE:	6' DIAMETER FOUNDATION (SEE NOTE 2)
H. MINIMUM STRUCTURE HEIGHT:	115'
MAXIMUM STRUCTURE HEIGHT:	125'
AVERAGE STRUCTURE HEIGHT:	120'
I. AVERAGE SPAN LENGTH:	591' (109'-1112')
J. MINIMUM CONDUCTOR-TO-GROUND:	22.5' (AT MAXIMUM OPERATING TEMPERATURE)

NOTES

1. INFORMATION ON DRAWING IS PRELIMINARY AND SUBJECT TO CHANGE DURING FINAL ENGINEERING
2. FINAL FOUNDATION DIAMETER SHALL BE BASED UPON FINAL ENGINEERING
3. STRUCTURE HEIGHTS ARE MEASURED FROM STRUCTURE CENTERLINE
4. MINIMUM FOUNDATION REVEAL SHALL BE 1.5', MAX REVEAL SUBJECT TO FINAL LOCATION AND TERRAIN

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SECTION 4:

DRAWING NO.

ATTACHMENT II.B.3.xi



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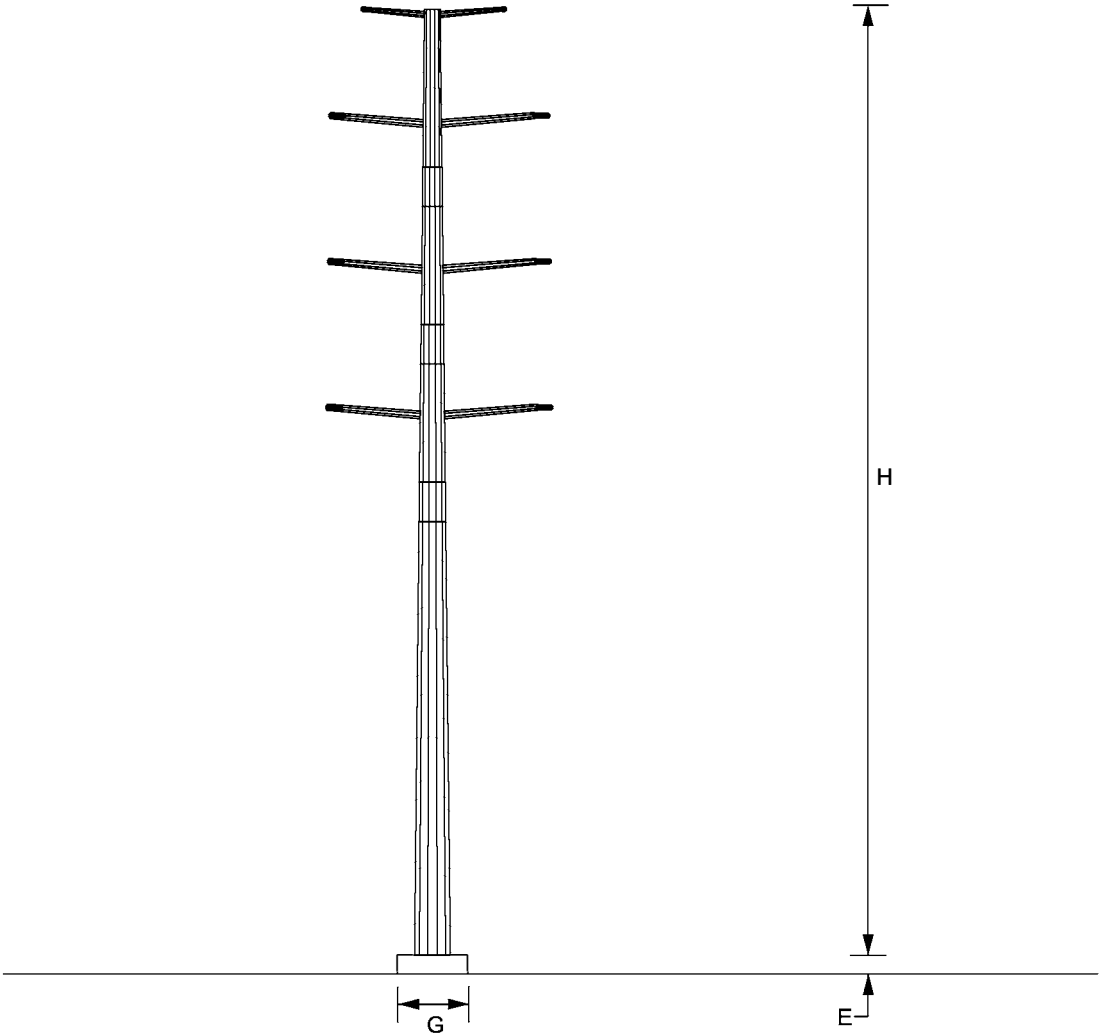
STRUCTURE 224/297-
LANEXA

DRAWN RAS

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STRUCTURE 224/297-LANEXA



DOUBLE CIRCUIT MONOPOLE DOUBLE DEAD-END STRUCTURE

B. RATIONALE FOR STRUCTURE TYPE:	DOUBLE CIRCUIT MONOPOLES CAN BE BUILT ON THE EXISTING R/W
C. LENGTH OF R/W (STRUCTURE QUANTITY):	1.01 MILES (4 STRUCTURES)
D. STRUCTURE MATERIAL:	WEATHERING STEEL
RATIONALE FOR STRUCTURE MATERIAL:	TO MATCH THE EXISTING WOOD POLES
E. FOUNDATION MATERIAL:	CONCRETE
AVERAGE FOUNDATION REVEAL:	SEE NOTE 4
F. AVERAGE WIDTH AT CROSSARM:	N/A
G. AVERAGE WIDTH AT BASE:	6' DIAMETER FOUNDATION (SEE NOTE 2)
H. MINIMUM STRUCTURE HEIGHT:	90'
MAXIMUM STRUCTURE HEIGHT:	140'
AVERAGE STRUCTURE HEIGHT:	119'
I. AVERAGE SPAN LENGTH:	591' (109'-1112')
J. MINIMUM CONDUCTOR-TO-GROUND:	22.5' (AT MAXIMUM OPERATING TEMPERATURE)

NOTES 1. INFORMATION ON DRAWING IS PRELIMINARY AND SUBJECT TO CHANGE DURING FINAL ENGINEERING
 2. FINAL FOUNDATION DIAMETER SHALL BE BASED UPON FINAL ENGINEERING
 3. STRUCTURE HEIGHTS ARE MEASURED FROM STRUCTURE CENTERLINE
 4. MINIMUM FOUNDATION REVEAL SHALL BE 1.5', MAX REVEAL SUBJECT TO FINAL LOCATION AND TERRAIN

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SECTION 4:

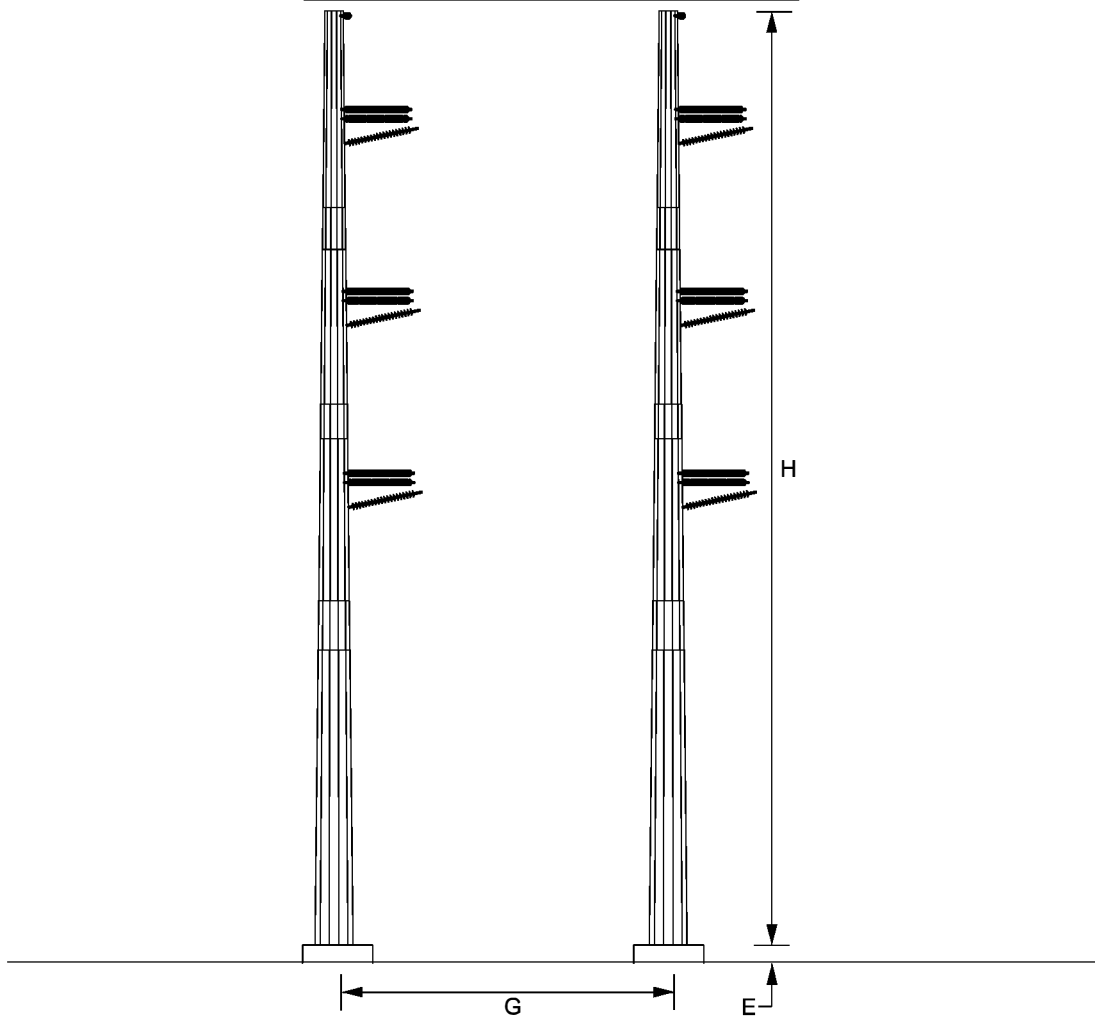
STRUCTURE 224/297-
LANEXA

DRAWING NO.

ATTACHMENT II.B.3.xii

DRAWN RAS

STRUCTURE 224/297-LANEXA



DOUBLE CIRCUIT 2-POLE DOUBLE DEAD-END STRUCTURE

B. RATIONALE FOR STRUCTURE TYPE:	DOUBLE CIRCUIT 2-POLES CAN BE BUILT ON THE EXISTING R/W
C. LENGTH OF R/W (STRUCTURE QUANTITY):	1.01 MILES (2 STRUCTURES)
D. STRUCTURE MATERIAL:	WEATHERING STEEL
RATIONALE FOR STRUCTURE MATERIAL:	TO MATCH THE EXISTING WOOD POLES
E. FOUNDATION MATERIAL:	CONCRETE
AVERAGE FOUNDATION REVEAL:	SEE NOTE 4
F. AVERAGE WIDTH AT CROSSARM:	N/A
G. AVERAGE WIDTH AT BASE:	34"; 6' DIAMETER FOUNDATION (SEE NOTE 2)
H. MINIMUM STRUCTURE HEIGHT:	95'
MAXIMUM STRUCTURE HEIGHT:	100'
AVERAGE STRUCTURE HEIGHT:	98'
I. AVERAGE SPAN LENGTH:	591' (109'-1112')
J. MINIMUM CONDUCTOR-TO-GROUND:	22.5' (AT MAXIMUM OPERATING TEMPERATURE)

NOTES

1. INFORMATION ON DRAWING IS PRELIMINARY AND SUBJECT TO CHANGE DURING FINAL ENGINEERING
2. FINAL FOUNDATION DIAMETER SHALL BE BASED UPON FINAL ENGINEERING
3. STRUCTURE HEIGHTS ARE MEASURED FROM STRUCTURE CENTERLINE
4. MINIMUM FOUNDATION REVEAL SHALL BE 1.5', MAX REVEAL SUBJECT TO FINAL LOCATION AND TERRAIN

Electric Transmission

SECTION 4:

DRAWING NO.

STRUCTURE 224/297-LANEXA

ATTACHMENT II.B.3.xiii

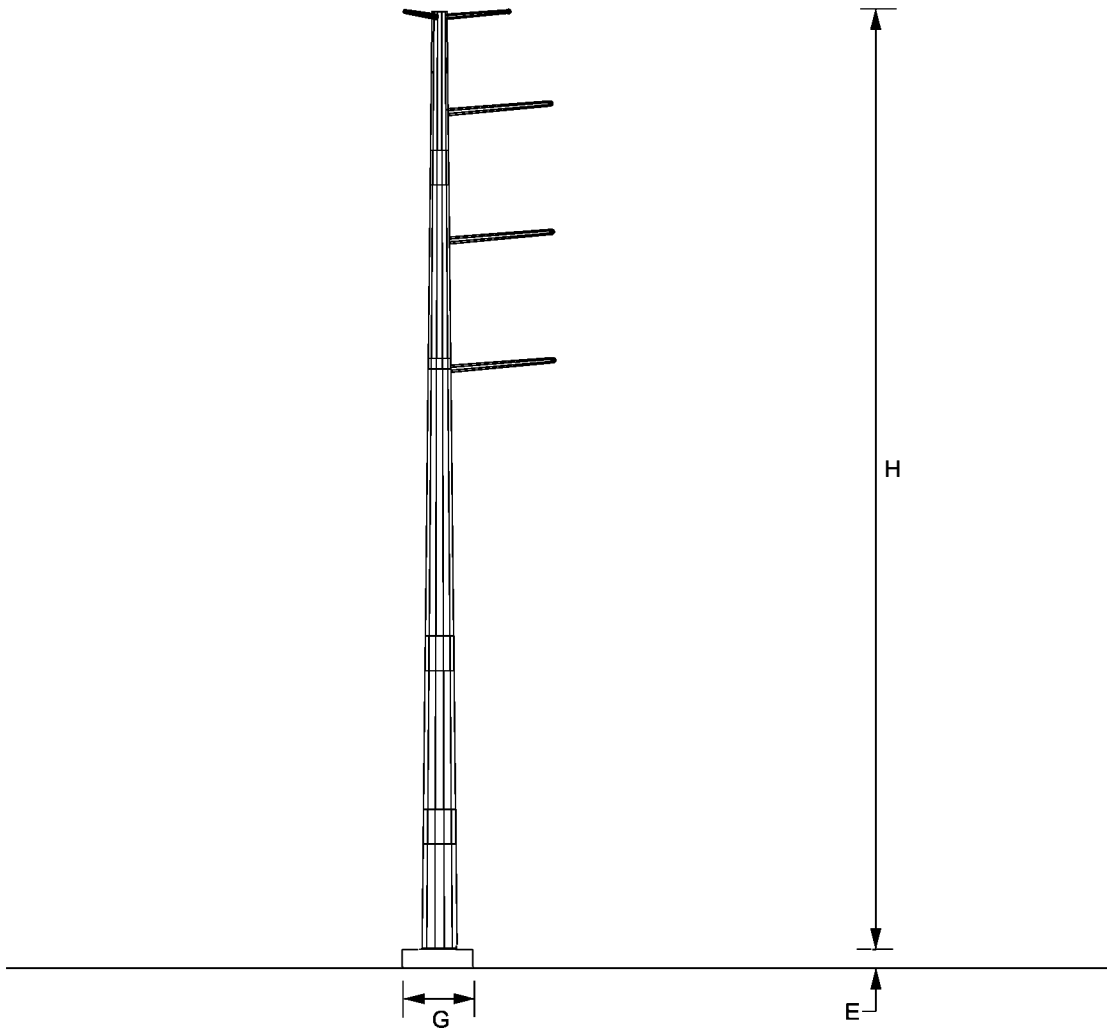


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STRUCTURE 224/297-LANEXA



SINGLE CIRCUIT MONOPOLE DOUBLE DEAD-END STRUCTURE

B. RATIONALE FOR STRUCTURE TYPE:	SINGLE CIRCUIT POLE FOR THE 2016 LINE DIASCUND CROSSING
C. LENGTH OF R/W (STRUCTURE QUANTITY):	1.01 MILES (1 STRUCTURE)
D. STRUCTURE MATERIAL:	WEATHERING STEEL
RATIONALE FOR STRUCTURE MATERIAL:	TO MATCH THE EXISTING WOOD POLES
E. FOUNDATION MATERIAL:	CONCRETE
AVERAGE FOUNDATION REVEAL:	SEE NOTE 4
F. AVERAGE WIDTH AT CROSSARM:	N/A
G. AVERAGE WIDTH AT BASE:	6' DIAMETER FOUNDATION (SEE NOTE 2)
H. MINIMUM STRUCTURE HEIGHT:	135'
MAXIMUM STRUCTURE HEIGHT:	135'
AVERAGE STRUCTURE HEIGHT:	135'
I. AVERAGE SPAN LENGTH:	591' (109'-1112')
J. MINIMUM CONDUCTOR-TO-GROUND:	22.5' (AT MAXIMUM OPERATING TEMPERATURE)

NOTES

1. INFORMATION ON DRAWING IS PRELIMINARY AND SUBJECT TO CHANGE DURING FINAL ENGINEERING
2. FINAL FOUNDATION DIAMETER SHALL BE BASED UPON FINAL ENGINEERING
3. STRUCTURE HEIGHTS ARE MEASURED FROM STRUCTURE CENTERLINE
4. MINIMUM FOUNDATION REVEAL SHALL BE 1.5', MAX REVEAL SUBJECT TO FINAL LOCATION AND TERRAIN

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SECTION 4:

STRUCTURE 224/297-
LANEXA

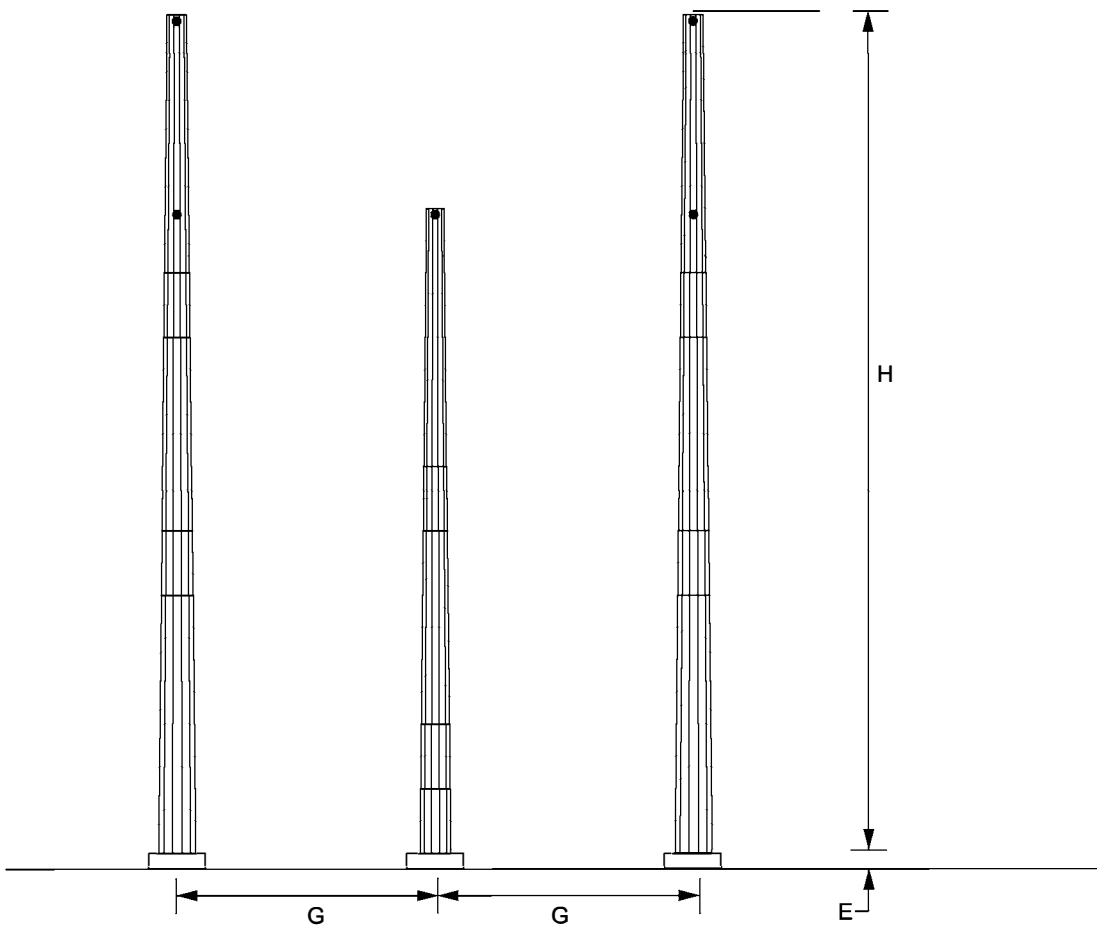
DRAWING NO.

ATTACHMENT II.B.3.xiv

DRAWN RAS

\$SYTIME\$

STRUCTURE 2076/458A (NORTHERN
NECK SUBSTATION EXPANSION)



SINGLE CIRCUIT 3-POLE DOUBLE DEAD-END STRUCTURE

B. RATIONALE FOR STRUCTURE TYPE:	SINGLE CIRCUIT 3-POLE FOR THE EXPANSION AT NORTHERN NECK
C. LENGTH OF R/W (STRUCTURE QUANTITY):	1 STRUCTURE
D. STRUCTURE MATERIAL:	WEATHERING STEEL
RATIONALE FOR STRUCTURE MATERIAL:	TO MATCH THE EXISTING WOOD POLES
E. FOUNDATION MATERIAL:	CONCRETE
AVERAGE FOUNDATION REVEAL:	SEE NOTE 4
F. AVERAGE WIDTH AT CROSSARM:	N/A
G. AVERAGE WIDTH AT BASE:	20' WITH A 6' DIAMETER FOUNDATION (SEE NOTE 2)
H. MINIMUM STRUCTURE HEIGHT:	50'
MAXIMUM STRUCTURE HEIGHT:	65'
AVERAGE STRUCTURE HEIGHT:	60'
I. AVERAGE SPAN LENGTH:	229' (167'-291')
J. MINIMUM CONDUCTOR-TO-GROUND:	22.5' (AT MAXIMUM OPERATING TEMPERATURE)

NOTES 1. INFORMATION ON DRAWING IS PRELIMINARY AND SUBJECT TO CHANGE DURING FINAL ENGINEERING
2. FINAL FOUNDATION DIAMETER SHALL BE BASED UPON FINAL ENGINEERING
3. STRUCTURE HEIGHTS ARE MEASURED FROM STRUCTURE CENTERLINE
4. MINIMUM FOUNDATION REVEAL SHALL BE 1.5', MAX REVEAL SUBJECT TO FINAL LOCATION AND TERRAIN

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SECTION N/A:

STRUCTURE 2076/458A

DRAWING NO.

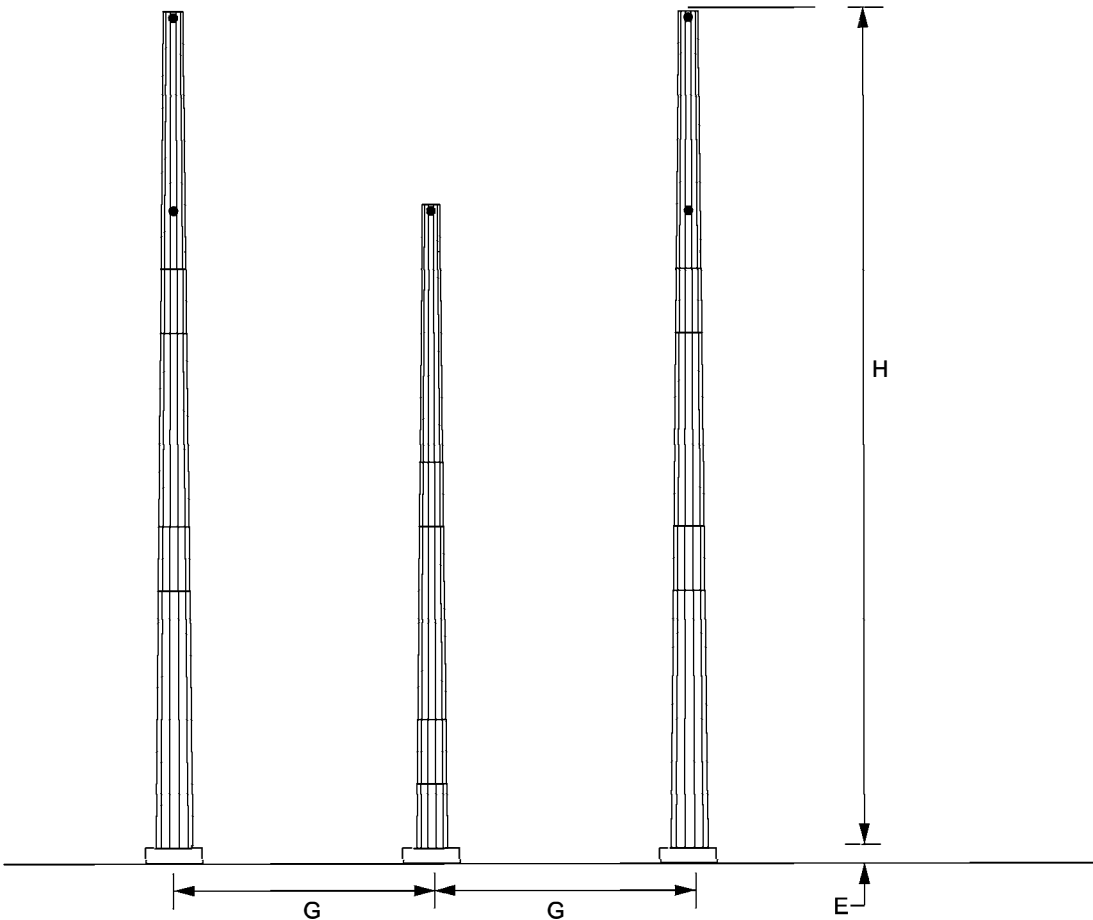
ATTACHMENT II.B.3.xv

DRAWN RAS

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STRUCTURE 2113/274D (LANEXA
SUBSTATION EXPANSION)



SINGLE CIRCUIT 3-POLE DOUBLE DEAD-END STRUCTURE

B. RATIONALE FOR STRUCTURE TYPE:	SINGLE CIRCUIT 3-POLE FOR THE EXPANSION AT LANEXA
C. LENGTH OF R/W (STRUCTURE QUANTITY):	1 STRUCTURE
D. STRUCTURE MATERIAL:	WEATHERING STEEL
RATIONALE FOR STRUCTURE MATERIAL:	TO MATCH THE EXISTING WOOD POLES
E. FOUNDATION MATERIAL: AVERAGE FOUNDATION REVEAL:	CONCRETE SEE NOTE 4
F. AVERAGE WIDTH AT CROSSARM:	N/A
G. AVERAGE WIDTH AT BASE:	22.5' WITH A 6' DIAMETER FOUNDATION (SEE NOTE 2)
H. MINIMUM STRUCTURE HEIGHT: MAXIMUM STRUCTURE HEIGHT: AVERAGE STRUCTURE HEIGHT:	55' 70' 65'
I. AVERAGE SPAN LENGTH:	122' (55'-189')
J. MINIMUM CONDUCTOR-TO-GROUND:	22.5' (AT MAXIMUM OPERATING TEMPERATURE)

NOTES	1. INFORMATION ON DRAWING IS PRELIMINARY AND SUBJECT TO CHANGE DURING FINAL ENGINEERING 2. FINAL FOUNDATION DIAMETER SHALL BE BASED UPON FINAL ENGINEERING 3. STRUCTURE HEIGHTS ARE MEASURED FROM STRUCTURE CENTERLINE 4. MINIMUM FOUNDATION REVEAL SHALL BE 1.5', MAX REVEAL SUBJECT TO FINAL LOCATION AND TERRAIN
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SECTION N/A:

STRUCTURE 2113/274D

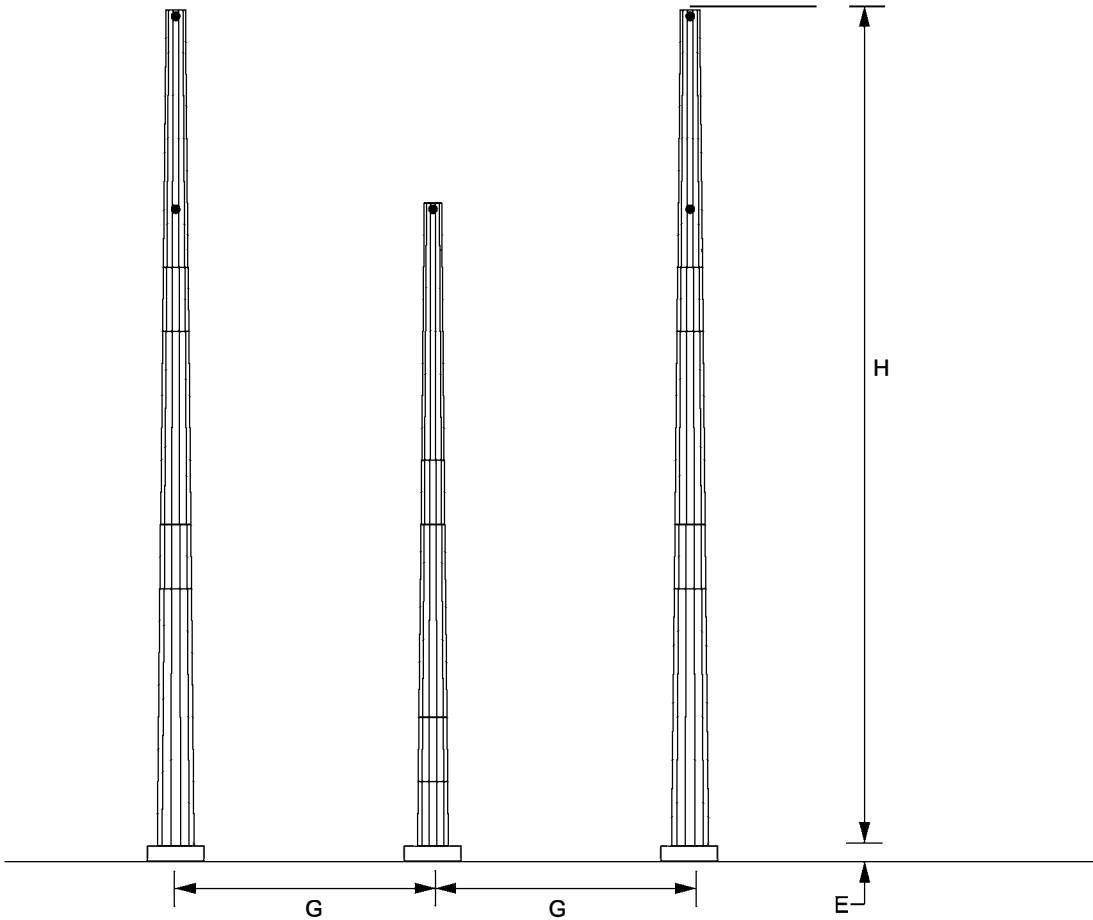
DRAWING NO.

ATTACHMENT II.B.3.xvi

DRAWN RAS

SYTIME\$

STRUCTURE 2129/137 (LANEXA
SUBSTATION EXPANSION)



SINGLE CIRCUIT 3-POLE DOUBLE DEAD-END STRUCTURE

B. RATIONALE FOR STRUCTURE TYPE:	SINGLE CIRCUIT 3-POLE FOR THE EXPANSION AT LANEXA
C. LENGTH OF R/W (STRUCTURE QUANTITY):	1 STRUCTURE
D. STRUCTURE MATERIAL:	WEATHERING STEEL
RATIONALE FOR STRUCTURE MATERIAL:	TO MATCH THE EXISTING WOOD POLES
E. FOUNDATION MATERIAL:	CONCRETE
AVERAGE FOUNDATION REVEAL:	SEE NOTE 4
F. AVERAGE WIDTH AT CROSSARM:	N/A
G. AVERAGE WIDTH AT BASE:	22.5' WITH A 6' DIAMETER FOUNDATION (SEE NOTE 2)
H. MINIMUM STRUCTURE HEIGHT:	40'
MAXIMUM STRUCTURE HEIGHT:	55'
AVERAGE STRUCTURE HEIGHT:	50'
I. AVERAGE SPAN LENGTH:	172' (85'-172')
J. MINIMUM CONDUCTOR-TO-GROUND:	22.5' (AT MAXIMUM OPERATING TEMPERATURE)

NOTES 1. INFORMATION ON DRAWING IS PRELIMINARY AND SUBJECT TO CHANGE DURING FINAL ENGINEERING
 2. FINAL FOUNDATION DIAMETER SHALL BE BASED UPON FINAL ENGINEERING
 3. STRUCTURE HEIGHTS ARE MEASURED FROM STRUCTURE CENTERLINE
 4. MINIMUM FOUNDATION REVEAL SHALL BE 1.5', MAX REVEAL SUBJECT TO FINAL LOCATION AND TERRAIN

DCNSPEC\$

TESBORDI

Electric Transmission



**Dominion
Energy**

Dominion Energy
10900 Nuckols Road
Glen Allen, VA 23060

SECTION N/A:

STRUCTURE 2129/137

DRAWING NO.

ATTACHMENT II.B.3.xvii

DRAWN RAS

II. DESCRIPTION OF THE PROPOSED PROJECT

B. Line Design and Operational Features

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

Response: Not applicable.

II. DESCRIPTION OF THE PROPOSED PROJECT

B. Line Design and Operational Features

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

Response: See Attachment II.B.5.a for existing structure locations.

The table below provides the existing and proposed structure heights. The proposed approximate structure heights are from the conceptual design created to estimate the cost of the proposed Project and are subject to change based on final engineering design. The approximate structure heights do not include foundation reveal.

Structure Number	Existing Structure Height (ft)	Proposed Structure Height (ft)	Attachment II.B.3 Structure Type
224/2	66	90	i
224/3	66	95	ii
224/4	61	110	iii
224/5	57	100	iii
224/6	61	100	iii
224/7	52	100	iii
224/8	66	100	iv
224/9	66	115	iii
224/10	61	105	iii
224/11	57	85	iv
224/12	52	95	iii
224/13	52	100	iii
224/14	61	105	iii
224/15	66	115	iii
224/16	57	115	iii
224/17	84	115	iii
224/18	66	115	iii
224/19	66	105	iii
224/20	70	110	iii
224/21	61	105	iii
224/22	70	90	iv
224/23	52	95	iii
224/24	56	100	v
224/25	70	115	iii
224/26	66	110	iii
224/27	61	95	iv
224/28*	150	150	vi

Structure Number	Existing Structure Height (ft)	Proposed Structure Height (ft)	Attachment II.B.3 Structure Type
224/29*	170	170	vi
224/30	61	95	iv
224/31	61	95	iv
224/32	52	95	iii
224/33	57	100	iii
224/34	57	105	iii
224/35	57	105	iii
224/36	70	105	iii
224/37	52	95	iv
224/38	70	110	iii
224/39	70	120	iii
224/40	75	110	iii
224/41	70	115	iii
224/42	57	100	iii
224/43	66	115	iii
224/44	66	110	iii
224/45	66	105	iii
224/46	66	110	iii
224/47	61	100	iii
224/48	61	100	iv
224/49	57	100	iii
224/50	61	100	iii
224/51	66	105	iv
224/52*	147	147	ix
224/53*	181	181	ix
224/54*	191	191	ix
224/55*	191	191	ix
224/56*	190	190	ix
224/57*	190	190	ix
224/58*	159	159	x
224/59*	156	156	x
224/60	66	100	iv
224/61	70	110	iii
224/62	70	115	iii
224/63	66	110	iii
224/64	66	100	v
224/65	70	110	iii
224/66	66	105	v
224/67	66	110	iii
224/68	66	110	iii
224/69	59	105	iii

Structure Number	Existing Structure Height (ft)	Proposed Structure Height (ft)	Attachment II.B.3 Structure Type
224/70	55	105	iii
224/71	70	110	iii
224/72	70	115	iii
224/73	70	105	iv
224/73A	75	85	vii
224/73B	75	85	vii
224/74	70	100	iv
224/75	70	110	iii
224/76	57	105	iii
224/77	52	95	iii
224/78	66	110	iii
224/79	70	115	iii
224/80	61	100	iii
224/81	66	105	iv
224/82	48	95	iii
224/83	61	95	v
224/84	57	110	iii
224/85	61	105	iii
224/86	66	110	iii
224/87	70	110	iv
224/88	70	115	iii
224/89	70	110	iii
224/90	66	115	iii
224/91	52	100	iii
224/92	61	100	iii
224/93	61	105	iii
224/94	66	105	iii
224/95	61	105	iii
224/96	52	100	iii
224/97	66	110	iii
224/98	66	105	iii
224/99	61	105	iii
224/100	66	110	iii
224/101	70	115	iii
224/102	66	110	iii
224/103	66	105	iii
224/104	57	105	iii
224/105	52	100	iii
224/106	61	100	iii
224/107	61	110	iii
224/108	70	115	iii

Structure Number	Existing Structure Height (ft)	Proposed Structure Height (ft)	Attachment II.B.3 Structure Type
224/109	61	105	iii
224/110	66	110	iii
224/111	66	115	iii
224/112	70	110	iii
224/113	70	115	iii
224/114	61	100	iii
224/115	66	110	iii
224/116	70	110	iii
224/117	66	100	iv
224/118	70	110	iii
224/119	70	115	iii
224/120	70	115	iii
224/121	61	105	iii
224/122	52	95	iii
224/123	66	105	iii
224/124	61	105	iii
224/125	61	100	iii
224/126	52	100	iii
224/127	75	115	iii
224/128	70	115	iii
224/129	70	120	iii
224/130	64	105	iii
224/131	66	115	iii
224/132	57	95	iii
224/133	61	105	iii
224/134	70	105	iii
224/135	57	100	iii
224/136	66	110	iii
224/137	70	115	iii
224/138	70	110	iii
224/139	66	110	iii
224/140	66	110	iii
224/141	66	110	iii
224/142	52	100	iii
224/143	61	115	iii
224/144	61	100	iii
224/145	61	110	iii
224/146	61	100	iii
224/147	66	110	iii
224/148	52	95	iii
224/149	70	115	iii

Structure Number	Existing Structure Height (ft)	Proposed Structure Height (ft)	Attachment II.B.3 Structure Type
224/150	64	115	iii
224/151	70	90	iii
224/152	52	105	iii
224/153	61	105	iii
224/154	52	100	iii
224/155	52	100	iii
224/156	52	85	iv
224/157	66	110	iii
224/158	61	105	iii
224/159	55	110	iii
224/160	59	100	iii
224/161	52	90	iii
224/162	66	105	iii
224/163	66	105	iii
224/164	59	110	iii
224/165	57	100	iii
224/166	70	115	iii
224/167	70	115	iii
224/168	61	105	iii
224/169	61	100	iii
224/170	61	115	iii
224/171	52	100	iii
224/172	52	95	iii
224/173	70	110	iii
224/174	75	120	iii
224/175	72	110	iii
224/176	70	110	iii
224/177	61	105	iii
224/178	70	115	iii
224/179	70	110	iii
224/180	66	110	iii
224/186	61	90	iv
224/187	61	110	iii
224/188	61	105	iii
224/189	57	105	iii
224/190	57	100	iii
224/191	68	110	iii
224/192	70	100	iv
224/193	66	110	iii
224/194	70	115	iii
224/195	70	110	iii

Structure Number	Existing Structure Height (ft)	Proposed Structure Height (ft)	Attachment II.B.3 Structure Type
224/196	52	95	iii
224/197	61	110	iii
224/198	66	110	iii
224/199	61	105	iii
224/200	52	95	iii
224/201	63	105	iii
224/202	68	110	iii
224/203	51	105	iii
224/204	52	95	iii
224/205	61	105	iii
224/206	66	105	iii
224/207	66	110	iii
224/208	61	100	iii
224/209	61	105	iii
224/210	61	105	iii
224/211	70	110	iii
224/212	70	115	iii
224/213	70	110	iii
224/214	70	110	iii
224/215	70	120	iii
224/216	61	110	iii
224/217	66	105	iii
224/218	66	110	iii
224/219	66	100	iv
224/220	70	115	iii
224/221	66	105	iii
224/222	57	105	iii
224/223	66	110	iii
224/224	70	110	iii
224/225	70	115	iii
224/226	66	95	iv
224/234	72	110	iii
224/235	72	115	iii
224/236	67	105	iii
224/237	62	105	iii
224/238	66	105	iii
224/239	70	115	iii
224/240	66	110	iii
224/241	66	105	iii
224/242	66	110	iii
224/243	68	105	iii

Structure Number	Existing Structure Height (ft)	Proposed Structure Height (ft)	Attachment II.B.3 Structure Type
224/244	61	105	iii
224/245	61	105	iii
224/246	70	100	iv
224/247	71	110	iii
224/248	71	110	iii
224/249	68	105	iii
224/250	66	110	iii
224/251	66	105	iii
224/252	52	95	iii
224/253	66	110	iii
224/254	70	110	iii
224/255	57	100	iii
224/256	61	105	iii
224/257	70	110	iii
224/258	70	115	iii
224/259	52	100	iii
224/260	70	115	iii
224/261	66	105	iii
224/262	66	110	iii
224/263	66	105	iii
224/264	61	105	iii
224/265	66	105	iii
224/266	48	95	iii
224/267	52	95	iii
224/268	61	95	iv
224/269*	116	116	viii
224/270*	131	131	viii
224/271	66	95	iv
224/272	68	115	iii
224/273	70	120	iii
224/274	70	115	iii
224/275	70	115	iii
224/276	66	110	iii
224/277	66	110	iii
224/278	61	105	iii
224/279	59	105	iii
224/280	57	105	iii
224/281	52	100	iii
224/282	62	110	iii
224/283	61	100	iii
224/284	57	100	iii

Structure Number	Existing Structure Height (ft)	Proposed Structure Height (ft)	Attachment II.B.3 Structure Type
224/285	61	95	iv
224/286	66	110	iii
224/287	70	125	iii
224/288	61	105	iii
224/289	75	110	iii
224/290	75	110	iii
224/291	63	100	iii
224/292	63	105	iii
224/293	60	95	iii
224/294	63	105	iii
224/295	70	110	iii
224/296	72	115	iii
224/297	149	140	xii
224/298	127	140	xii
224/299	84	120	xi
224/300	61	100	xiii
224/301	61	115	xi
224/302	70	105	xii
224/303	79	125	xi
224/304	61	95	xiii
224/305	93	90	xii
2016/6	149	135	xiv
2076/458A	N/A	65-50-65	xv
2113/274D	N/A	70-55-70	xvi
2129/137	55-40-55	55-40-55	xvii
minimum	40	40	
maximum	191	191	
average	69	108	

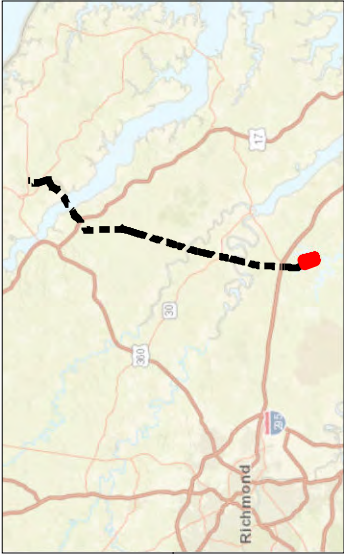
* These structures are not changing in height, but are being replaced as part of this Project.



Table II.B.5

Existing Structure Number	2129/137	2113/274D	224/305	224/304	224/303	224/302	224/301	224/300	224/299	224/298	224/297	2016/6	224/296	224/295	224/294
Existing Structure Height (Feet)	55-40-55	N/A	93	61	79	70	61	61	84	127	149	149	72	70	63

Proposed Structure Number	2129/137	2113/274D	224/305	224/304	224/303	224/302	224/301	224/300	224/299	224/298	224/297	2016/6	224/296	224/295	224/294
Proposed Structure Height (Feet)	55-40-55	70-55-70	90	95	125	105	115	100	120	140	140	135	115	110	105

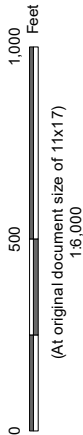


Substation

Proposed Structure

Existing Structure

☐ Structures, Second Circuit Only



Project Location	Prepared by LJB on 2020-03-31
New Kent, King and Queen, King William,	TR by TPS on 2020-03-31
	IR by CPG on 2020-03-31

Prepared by LJB on 2020-03-31
TR by TPS on 2020-03-31
IR by CPG on 2020-03-31

ation
King and Queen, King William,

Prepared by LJB on 2020-03-31
TR by TPS on 2020-03-31
IR by CPG on 2020-03-31

Client/Project	203401404
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Dominion Energy Virginia

Lanexa-Northern Neck 230 kV Transmission Line #224

Rebuild and New 230 kV Line #2208

Figure No.

||.B.5

Title	Author	Year	Journal	Volume	Page
1. The Effect of Temperature on the Rate of Reaction	John Doe	1998	Journal of Chemical Education	75	123-128
2. Kinetics of the Reaction Between Iodine and Sulfur Dioxide	Jane Smith	2001	Journal of Chemical Education	78	456-461
3. The Effect of Concentration on the Rate of Reaction	Robert Brown	2003	Journal of Chemical Education	80	789-794
4. The Effect of Surface Area on the Rate of Reaction	Emily White	2005	Journal of Chemical Education	82	321-326
5. The Effect of Catalyst on the Rate of Reaction	Michael Green	2007	Journal of Chemical Education	84	567-572

Existing and Proposed Structures

Page 1 of 30

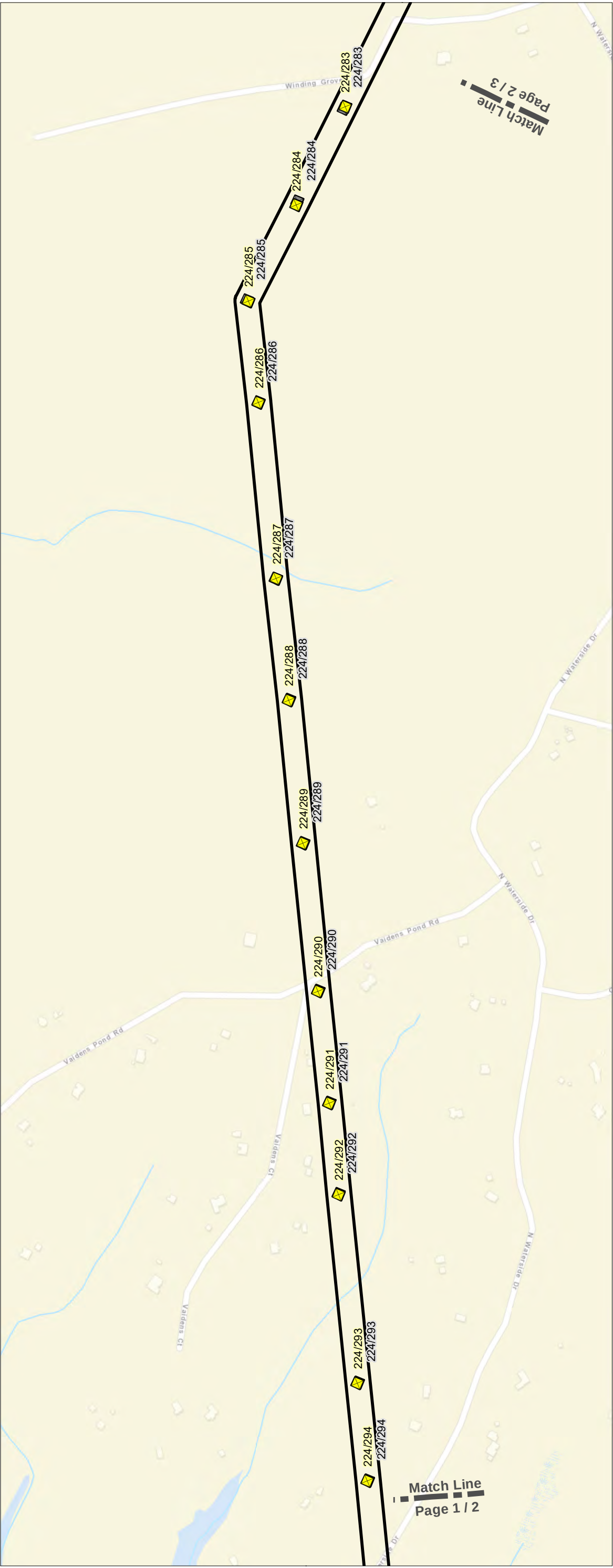
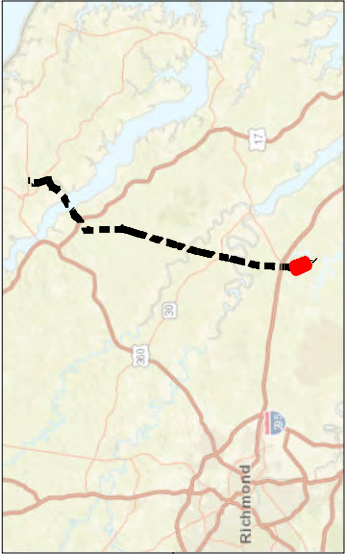


Table II.B.5

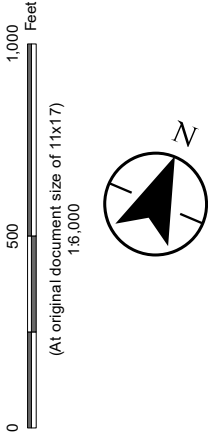
Existing Structure Number		224/294	224/293	224/292	224/291	224/290	224/289	224/288	224/287	224/286	224/285	224/284	224/283
Existing Structure Height (Feet)		63	60	63	63	75	75	61	70	66	61	57	61
Proposed Structure Number		224/294	224/293	224/292	224/291	224/290	224/289	224/288	224/287	224/286	224/285	224/284	224/283
Proposed Structure Height (Feet)		105	95	105	100	110	110	105	125	110	95	100	100



Notes

1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4602 Feet
2. Data Sources: Dominion Energy Virginia, Stantec, DCR, NHD
3. Structure locations and heights provided by Dominion Energy Virginia and information contained herein is preliminary in nature and subject to final engineering. Structure heights do not include foundation reveal
4. Base Map: © ESR

- Substation
- Proposed Structure
- Existing Structure
- Structures, Second Circuit Only



Project Location
New Kent, King and Queen, King William, Essex, and Richmond Counties, Virginia

Prepared by LJB on 2020-09-31
TR by TPS on 2020-09-31
IR by CPG on 2020-09-31

Client/Project
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208

Figure No.
203401404

II.B.5

Existing and Proposed Structures

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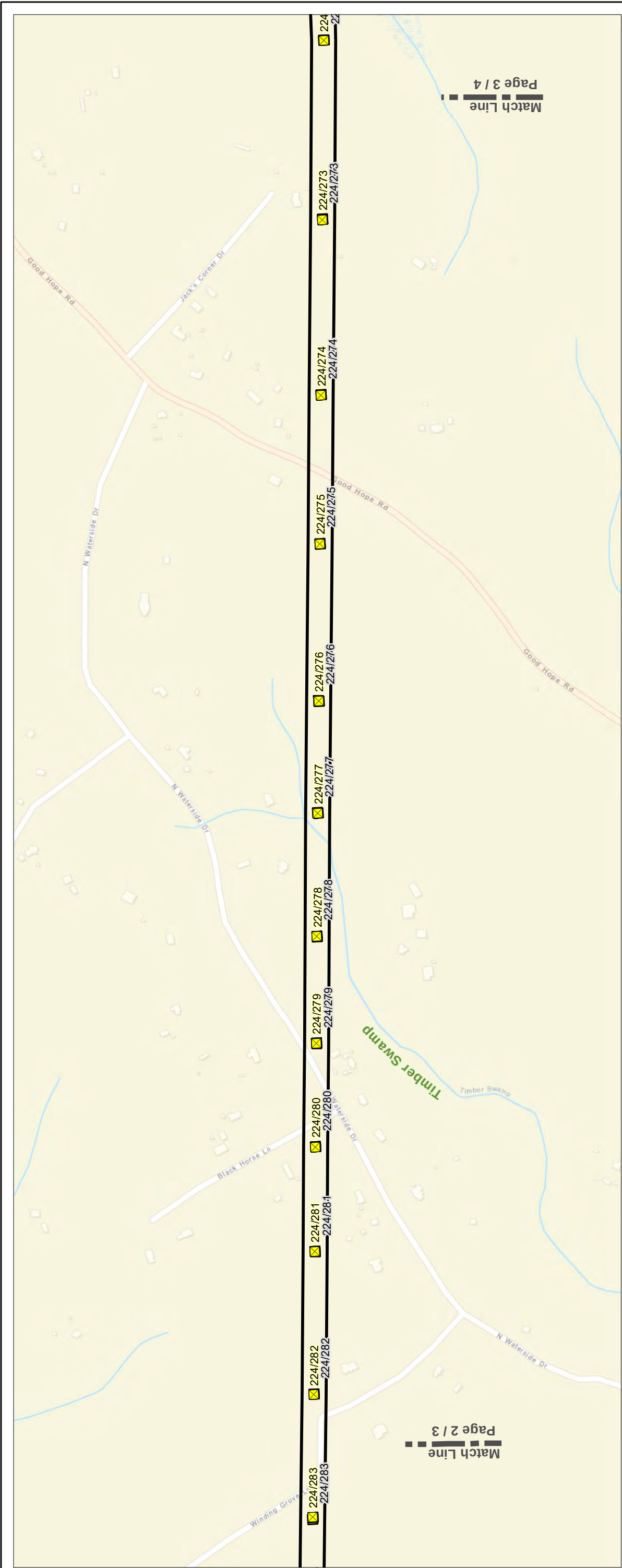
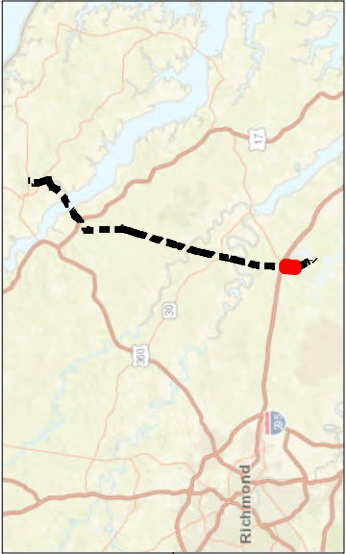


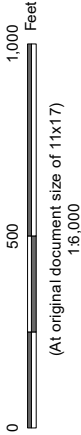
Table II.B.5

Existing Structure Number		224/283	224/282	224/281	224/280	224/279	224/278	224/277	224/276	224/275	224/274	224/273	224/272
Existing Structure Height (Feet)		61	62	52	57	59	61	66	66	70	70	70	68
Proposed Structure Number		224/283	224/282	224/281	224/280	224/279	224/278	224/277	224/276	224/275	224/274	224/273	224/272
Proposed Structure Height (Feet)		100	110	100	105	105	105	110	110	115	115	120	115



- Notes**
1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4602 Feet
 2. Data Sources: Dominion Energy Virginia, Stantec, DCR, NHD
 3. Structure locations and heights provided by Dominion Energy Virginia and information contained herein is preliminary in nature and subject to final engineering. Structure heights do not include foundation reveal
 4. Base Map: © ESR

- Legend**
- Substation
 - Proposed Structure
 - Existing Structure
 - Structures, Second Circuit Only



Project Location
New Kent, King and Queen, King William, Essex, and Richmond Counties, Virginia

Client/Project
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208

Figure No.
203401404

II.B.5

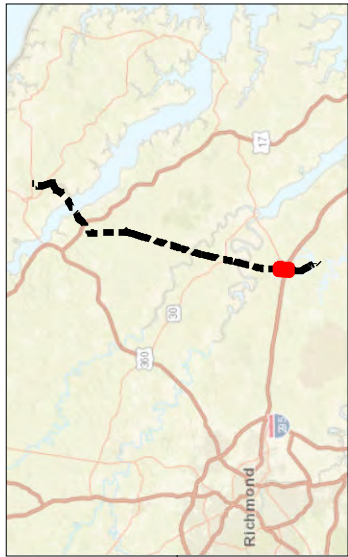
Existing and Proposed Structures

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Table 11.B.5

Existing Structure Number	224/272	224/271	224/270	224/269	224/268	224/267	224/266	224/265	224/264	224/263	224/262
Existing Structure Height (Feet)	68	66	131	116	61	52	48	66	61	66	66
Proposed Structure Number	224/272	224/271	224/270	224/269	224/268	224/267	224/266	224/265	224/264	224/263	224/262
Proposed Structure Height (Feet)	115	95	131	116	95	95	95	105	105	105	110



- Notes**
1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
 2. Data Sources: Dominion Energy Virginia, Sanctis, DCR, NHD
 3. Structure locations & heights provided by Dominion Energy Virginia and information contained herein is preliminary in nature and subject to final engineering. Structure heights do not include foundation reveal
 4. Base Map: © ESRI

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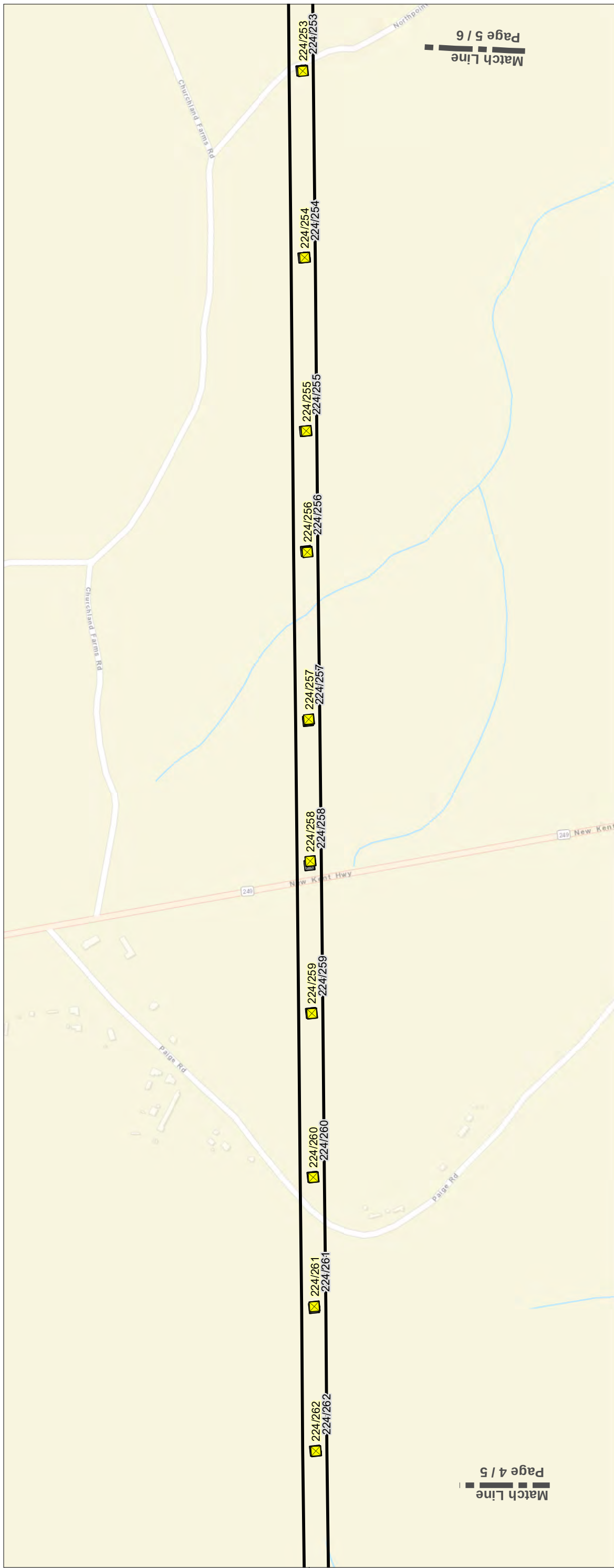
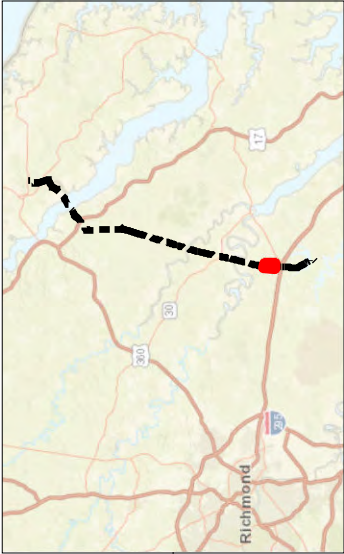


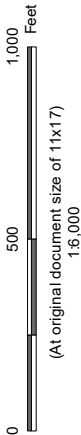
Table II.B.5

Existing Structure Number	224/262	224/261	224/260	224/259	224/258	224/257	224/256	224/255	224/254	224/253
Existing Structure Height (Feet)	66	66	70	52	70	70	61	57	70	66
Proposed Structure Number	224/262	224/261	224/260	224/259	224/258	224/257	224/256	224/255	224/254	224/253
Proposed Structure Height (Feet)	110	105	115	100	115	110	105	100	110	110



- Notes**
1. Coordinate System: NAD 1983 StatePlane, Virginia South FIPS 4502 Feet
 2. Data Sources: Dominion Energy Virginia, Santee, DCR, NHD
 3. Structure locations and heights provided by Dominion Energy Virginia and information contained herein is preliminary in nature and subject to final engineering. Structure heights do not include foundation reveal
 4. Base Map: © ESRI

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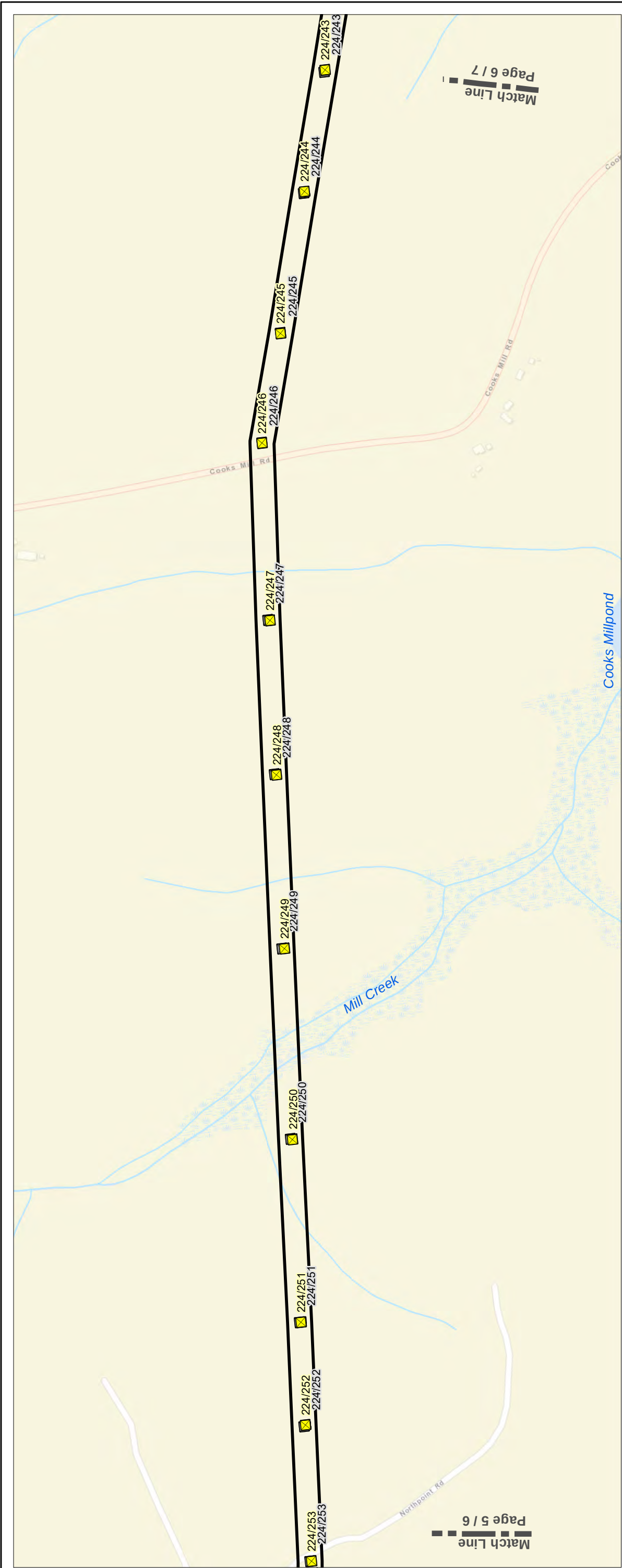
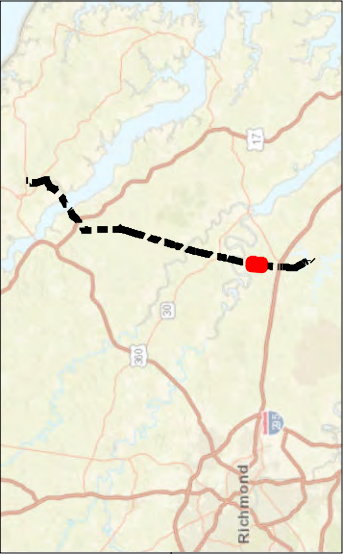


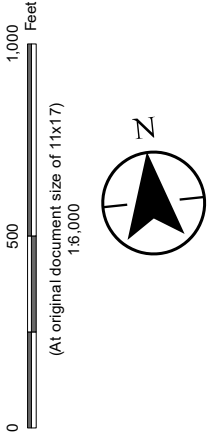
Table II.B.5

Existing Structure Number	Existing Structure Height (Feet)	224/253	224/252	224/251	224/250	224/249	224/248	224/247	224/246	224/245	224/244	224/243
		66	52	66	66	68	71	71	70	61	61	68
Proposed Structure Number	Proposed Structure Height (Feet)	224/253	224/252	224/251	224/250	224/249	224/248	224/247	224/246	224/245	224/244	224/243
		110	95	105	110	105	110	110	100	105	105	105



- Notes**
- 1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4602 Feet
 - 2. Data Sources: Dominion Energy Virginia, Stantec, DCR, NHD
 - 3. Structure locations and heights provided by Dominion Energy Virginia and information contained herein is preliminary in nature and subject to final engineering. Structure heights do not include foundation reveal
 - 4. Base Map: © ESR

- Substation**
- Proposed Structure
 - Existing Structure
 - Structures, Second Circuit Only



Project Location	Prepared by LJB on 2020-03-31
New Kent, King and Queen, King William, Essex, and Richmond Counties, Virginia	TR by TPS on 2020-03-31
Client/Project	IR by CPG on 2020-03-31
203401404	
Dominion Energy Virginia	
Lanexa-Northern Neck 230 kV Transmission Line #224	
Rebuild and New 230 kV Line #2208	
Figure No.	
II.B.5	
Title	

Existing and Proposed Structures

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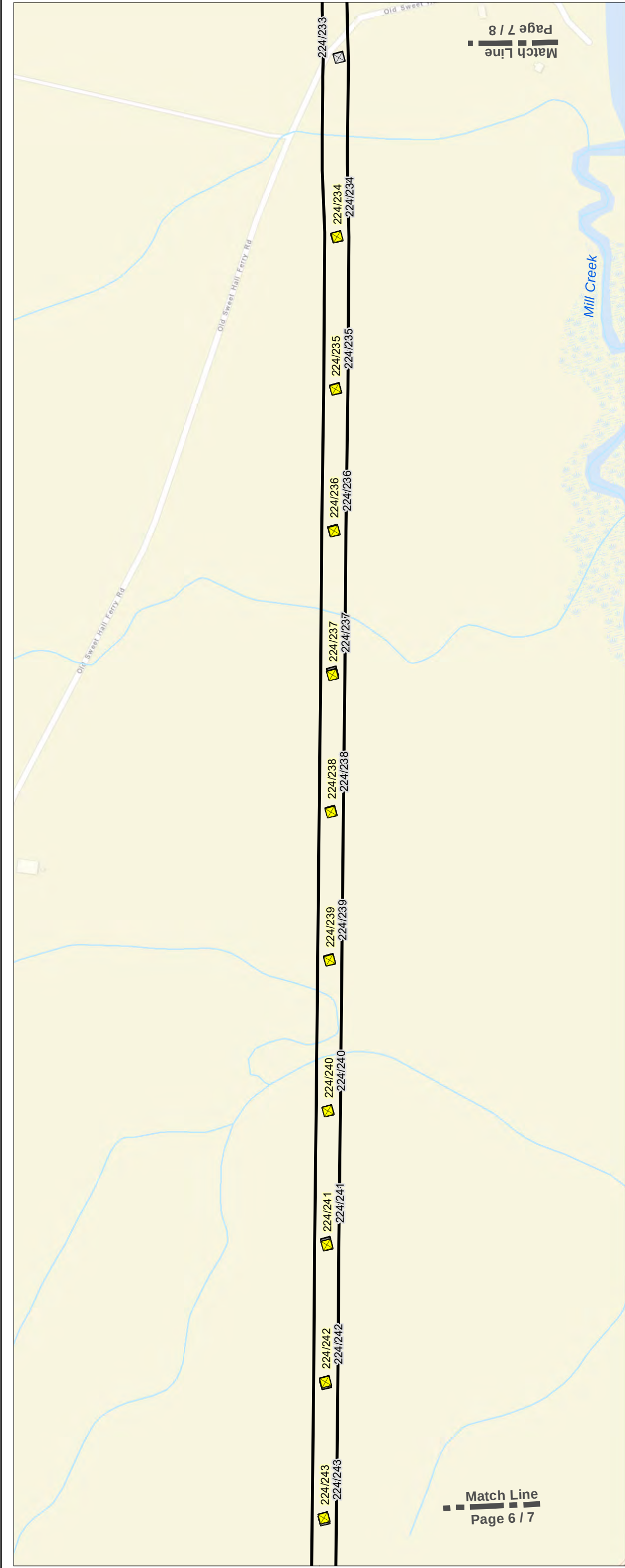
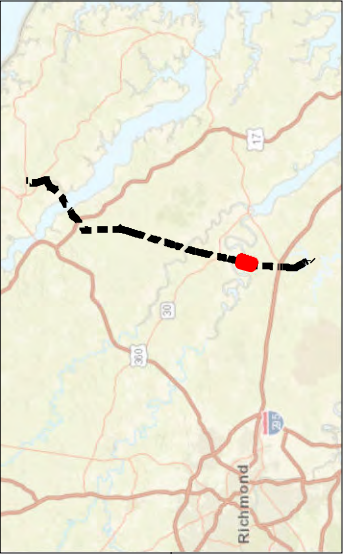
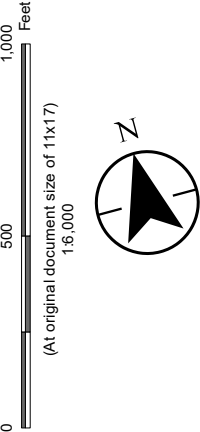


Table II.B.5

Existing Structure Number	Existing Structure Height (Feet)	224/243	224/242	224/241	224/240	224/239	224/238	224/237	224/236	224/235	224/234
		68	66	66	66	70	66	62	67	72	72
Proposed Structure Number	Proposed Structure Height (Feet)	224/243	224/242	224/241	224/240	224/239	224/238	224/237	224/236	224/235	224/234
		105	110	105	110	115	105	105	105	115	110



- Substation
- Proposed Structure
- Existing Structure
- Structures, Second Circuit Only



Project Location
New Kent, King and Queen, King William, Essex, and Richmond Counties, Virginia

Client/Project
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208

Figure No.
II.B.5

203401404

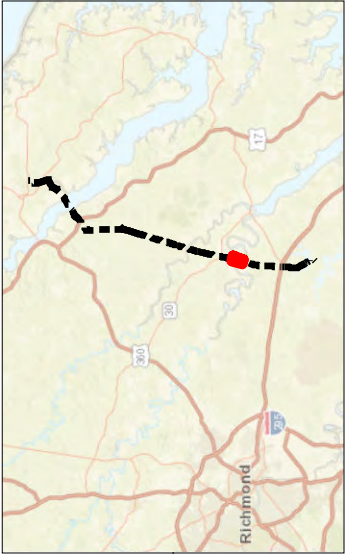
Existing and Proposed Structures



Table 11.B.5

Existing Structure Number	224/226
Existing Structure Height (Feet)	66

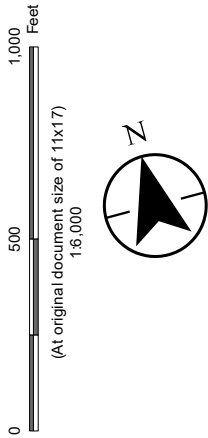
Proposed Structure Number	224/226
Proposed Structure Height (Feet)	95



Notes

1. Coordinate System: NAD 1983 StatePlane, Virginia South FIPS 4502 Feet
2. Data Sources: Dominion Energy Virginia, Santee, DCR, NHD
3. Structure locations and heights provided by Dominion Energy Virginia and information contained herein is preliminary in nature and subject to final engineering. Structure heights do not include foundation reveal
4. Base Map: © ESRI

 Substation
 Proposed Structure
 Existing Structure
 Structures, Second Circuit Only



Project Location	Prepared by LJB on 2020-03-31 TR by TFS on 2020-03-31 IR by CFG on 2020-03-31
New Kent, King and Queen, King William, Essex and Richmond Counties, Virginia Client/Project Dominion Energy Virginia Lanexa-Northern Neck 230 kV Transmission Line #224 Rebuild and New 230 kV Line #208	2034.01404

Figure No.

II.B.5 Existing and Proposed Structures

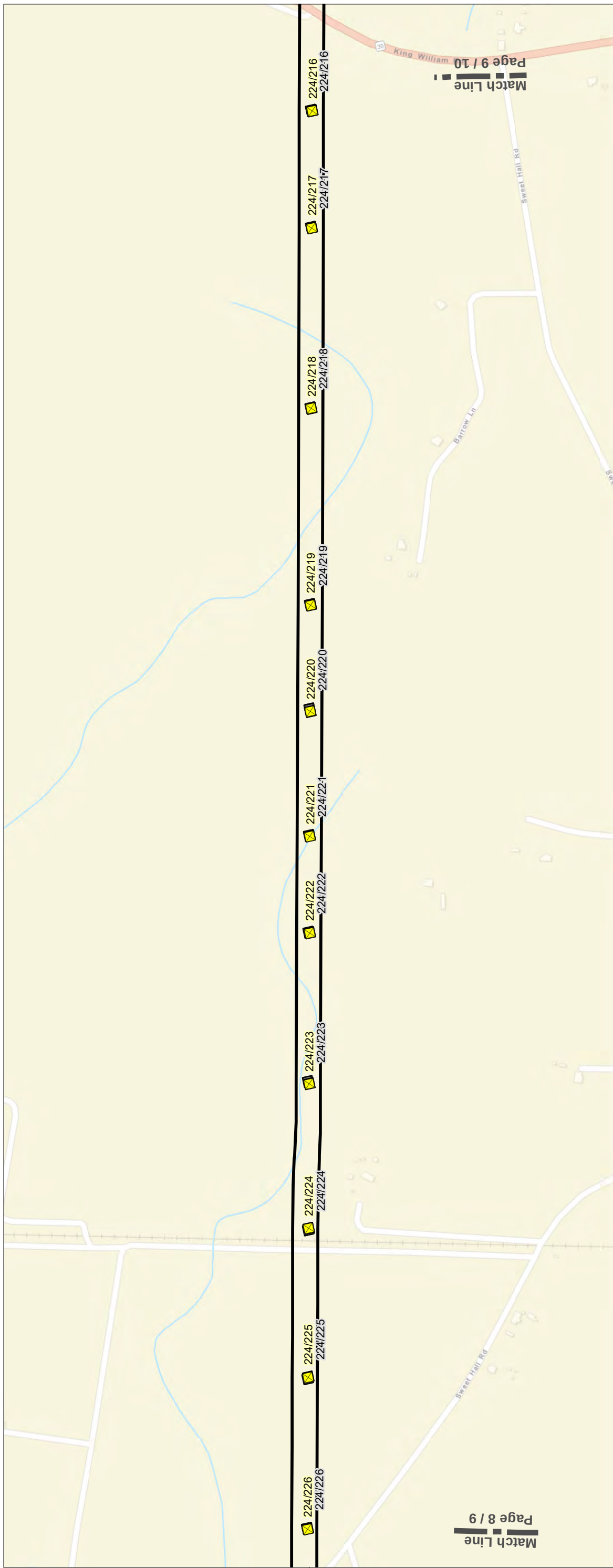
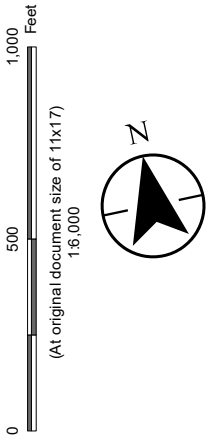
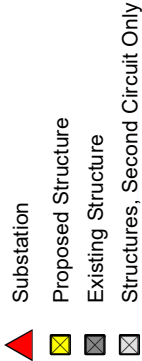
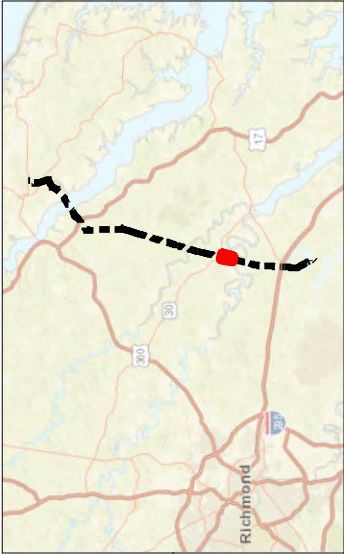


Table II.B.5

Existing Structure Number	224/226	224/225	224/224	224/223	224/222	224/221	224/220	224/219	224/218	224/217	224/216
Existing Structure Height (Feet)	66	70	70	66	57	66	70	66	66	66	61
Proposed Structure Number	224/226	224/225	224/224	224/223	224/222	224/221	224/220	224/219	224/218	224/217	224/216
Proposed Structure Height (Feet)	95	115	110	110	105	105	115	100	110	105	110



Project Location New Kent, King and Queen, King William, Essex, and Richmond Counties, Virginia	Prepared by LUB on 2020-03-31 TR by TPS on 2020-03-31 IR by CPG on 2020-03-31
Client/Project Dominion Energy Virginia Lanexa-Northern Neck 230 kV Transmission Line #224 Rebuild and New 230 kV Line #2208	203401404

Figure No.

II.B.5

Existing and Proposed Structures

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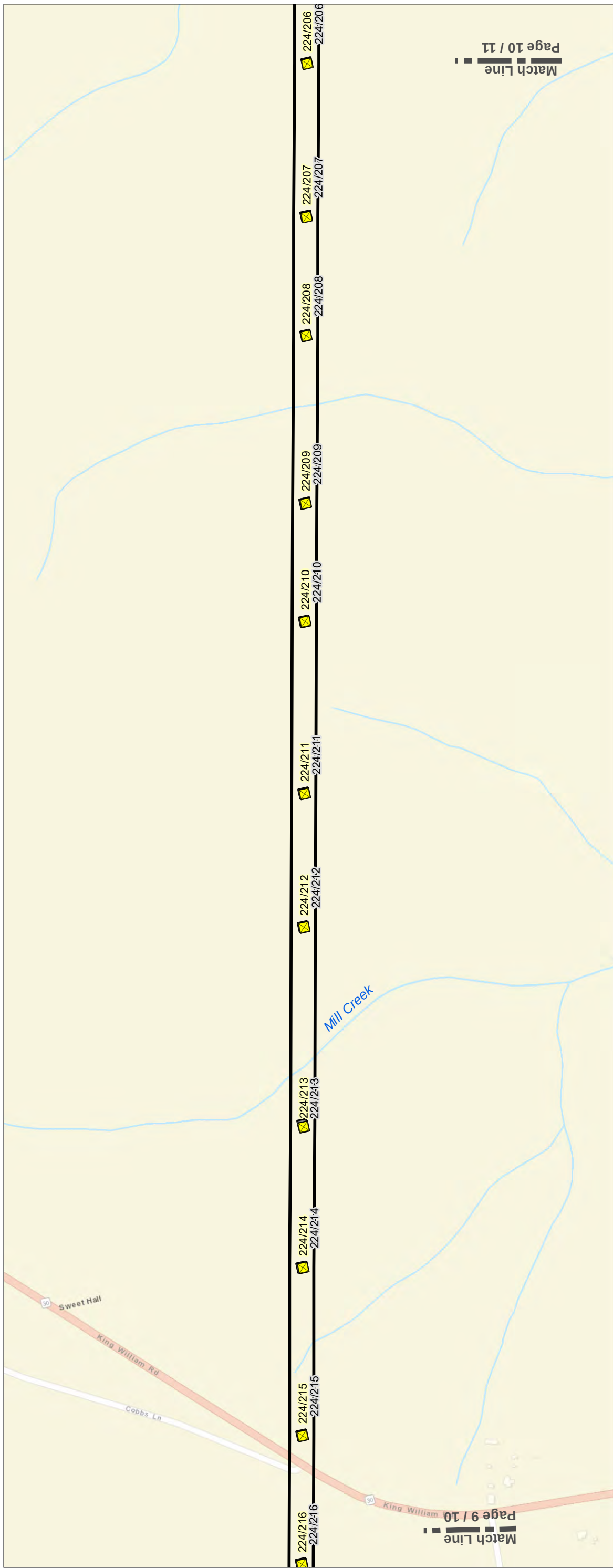
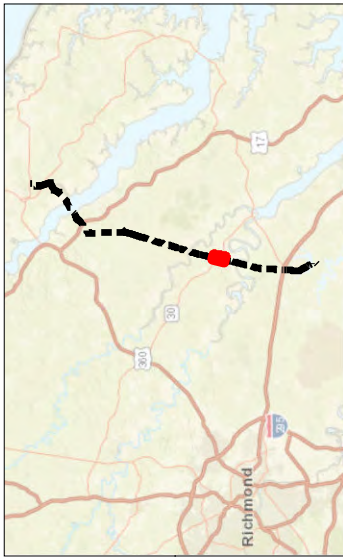


Table 11.B.5

Existing Structure Number	224/216	224/215	224/214	224/213	224/212	224/211	224/210	224/209	224/208	224/207	224/206
Existing Structure Height (Feet)	61	70	70	70	70	70	61	61	61	66	66
Proposed Structure Number	224/216	224/215	224/214	224/213	224/212	224/211	224/210	224/209	224/208	224/207	224/206
Proposed Structure Height (Feet)	110	120	110	110	115	110	105	105	100	110	105



Notes

1. Coordinate System: NAD 1983 StatePlane, Virginia South FIPS 4502 Feet
2. Data Sources: Dominion Energy Virginia, Santee, DCR, NHD
3. Structure locations and heights provided by Dominion Energy Virginia and information contained herein is preliminary in nature and subject to final engineering. Structure heights do not include foundation reveal
4. Base Map: © ESRI

 Substation
 Proposed Structure
 Existing Structure
 Structures, Second Circuit Only



Project Location New Kent, King and Queen, King William, Essex, and Richmond Counties, Virginia	Prepared by UEB on 2020-03-31 TR by TPS on 2020-03-31 IR by CPO on 2020-03-31
Client/Project Dominion Energy Virginia Lanexa-Northern Neck 230 kV Transmission Line #224 Rebuild and New 230 kV Line #2208	2034.01404

Existing and Proposed Structures

Page 10 of 30

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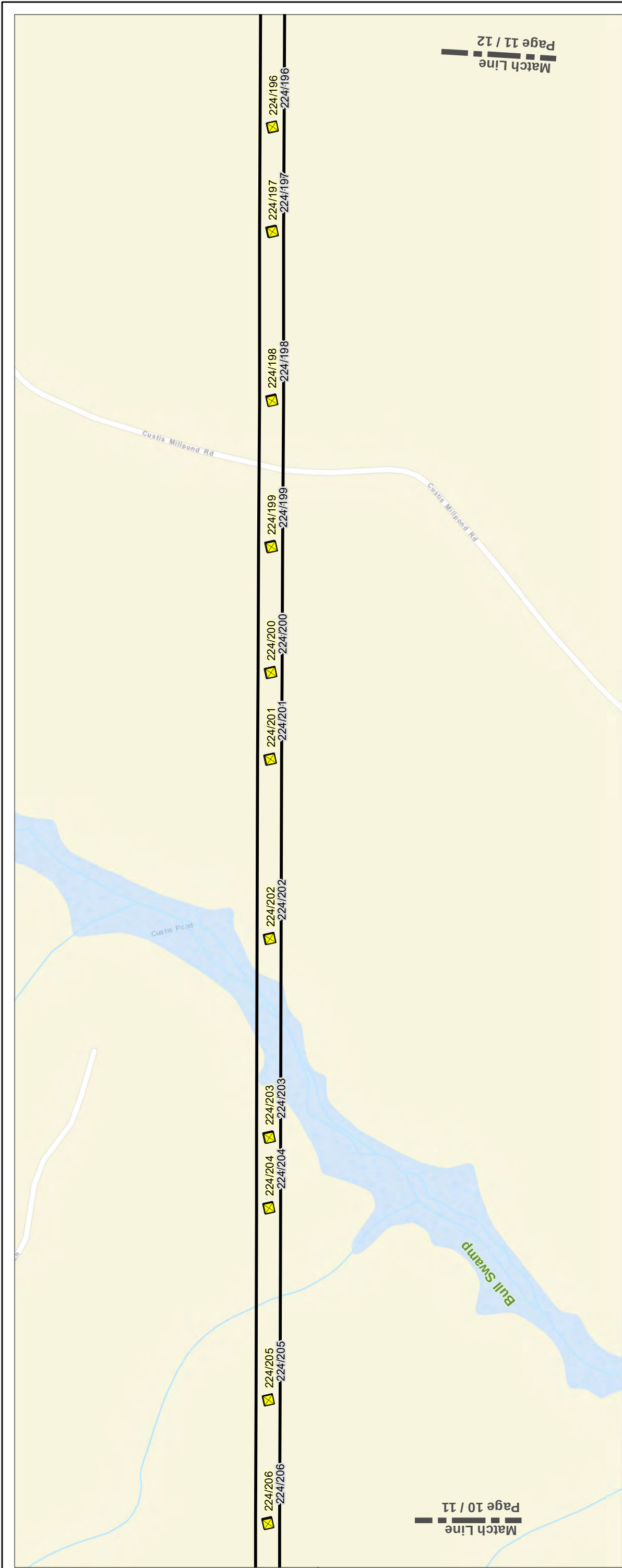
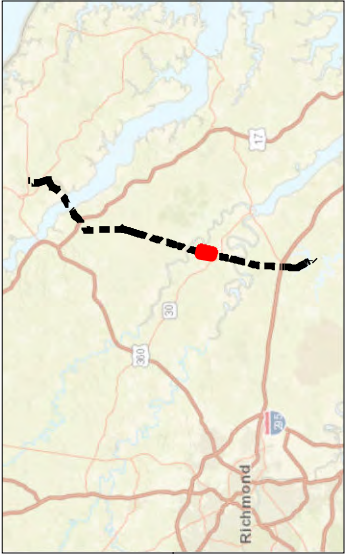


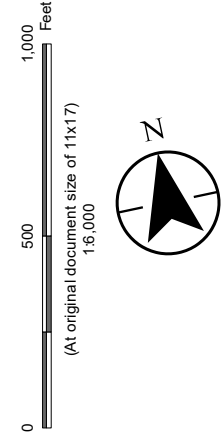
Table 11.B.5

Existing Structure Number	Existing Structure Height (Feet)										224/196
	224/206	224/205	224/204	224/203	224/202	224/201	224/200	224/199	224/198	224/197	
Existing Structure Height (Feet)	66	61	52	51	68	63	52	61	66	61	52
Proposed Structure Number	Proposed Structure Height (Feet)										224/196
	224/206	224/205	224/204	224/203	224/202	224/201	224/200	224/199	224/198	224/197	
Proposed Structure Height (Feet)	105	105	95	105	110	105	95	105	110	110	95



- Notes**
- 1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
 - 2. Data Sources: Dominion Energy Virginia, Stantec, DCR, NHD
 - 3. Structure locations and heights provided by Dominion Energy Virginia and information contained herein is preliminary in nature and subject to final engineering. Structure heights do not include foundation reveal
 - 4. Base Map: © ESR

- Legend**
- Substation
 - Proposed Structure
 - Existing Structure
 - Structures, Second Circuit Only



Project Location	Prepared by LJB on 2020-03-31
New Kent, King and Queen, King William, Essex, and Richmond Counties, Virginia	TR by TPS on 2020-03-31
Client/Project	IR by CPG on 2020-03-31
Dominion Energy Virginia	203401404
Lanexa-Northern Neck 230 kV Transmission Line #224	
Rebuild and New 230 kV Line #2208	
Figure No.	
11.B.5	

Existing and Proposed Structures

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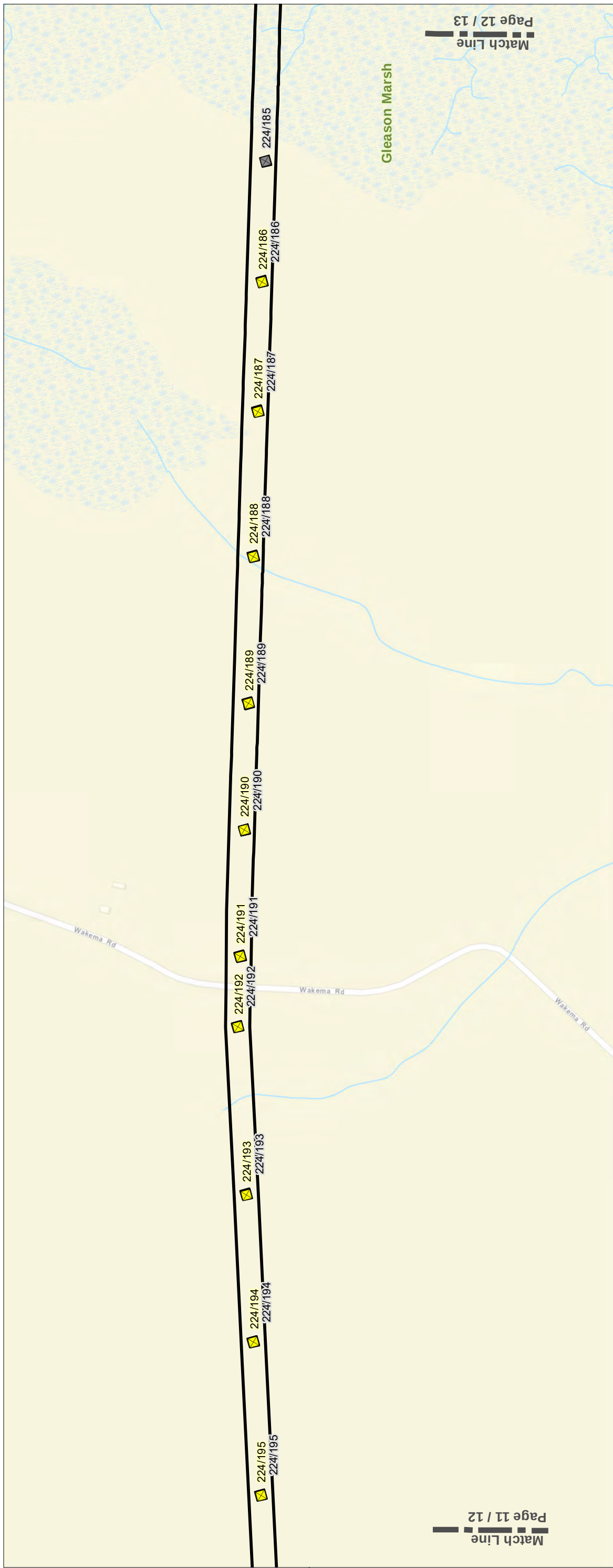
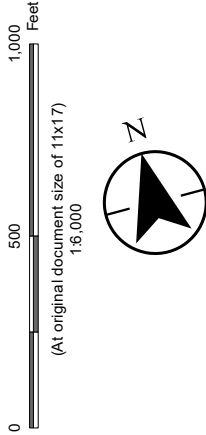
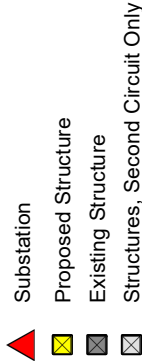
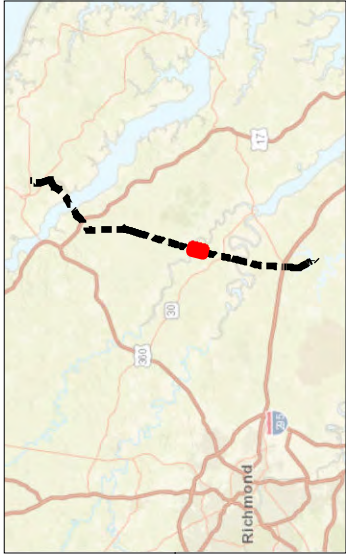


Table II.B.5

Existing Structure Number	224/195	224/194	224/193	224/192	224/191	224/190	224/189	224/188	224/187	224/186
Existing Structure Height (Feet)	70	70	66	70	68	57	57	61	61	61
Proposed Structure Number	224/195	224/194	224/193	224/192	224/191	224/190	224/189	224/188	224/187	224/186
Proposed Structure Height (Feet)	110	115	110	100	110	100	105	105	110	90



Project Location New Kent, King and Queen, King William, Essex, and Richmond Counties, Virginia	Prepared by LUB on 2020-03-31 TR by TPS on 2020-03-31 IR by CGP on 2020-03-31
Client/Project Dominion Energy Virginia Lanexa-Northern Neck 230 kV Transmission Line #224 Rebuild and New 230 kV Line #2208	203401404

Figure No.

II.B.5

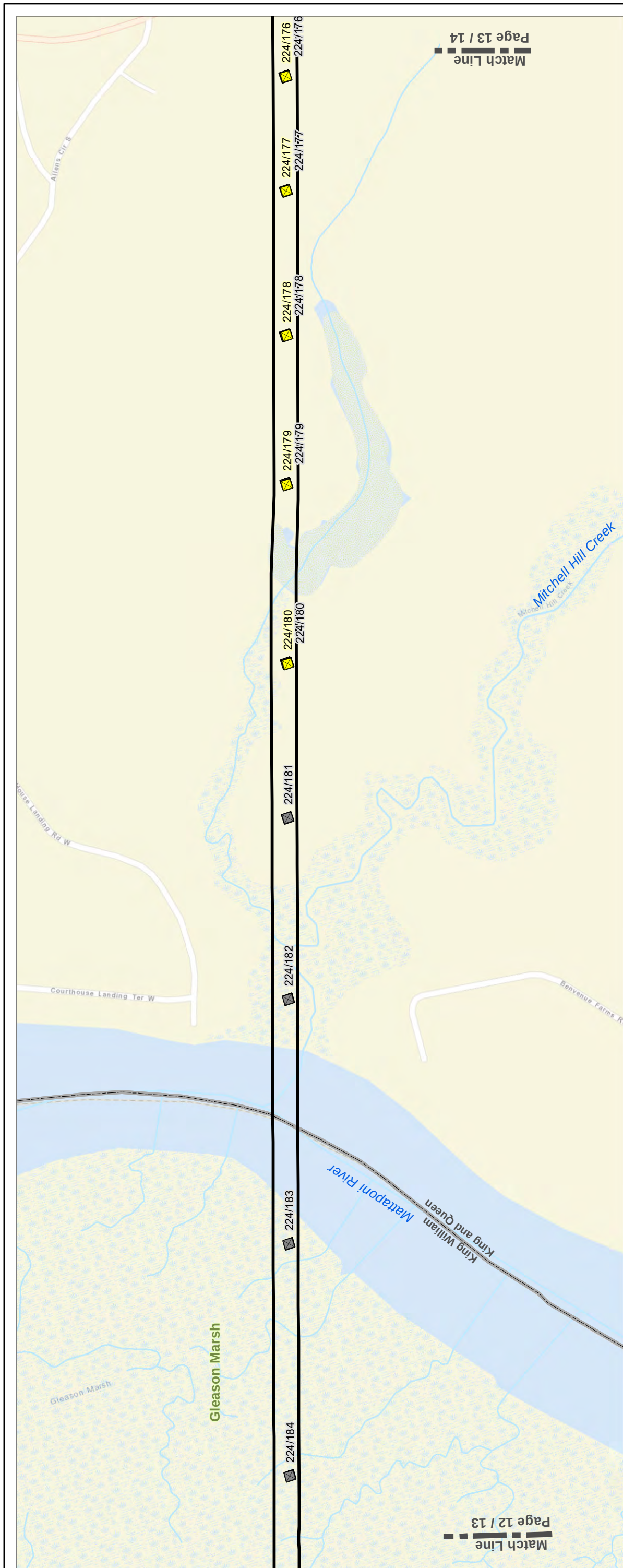
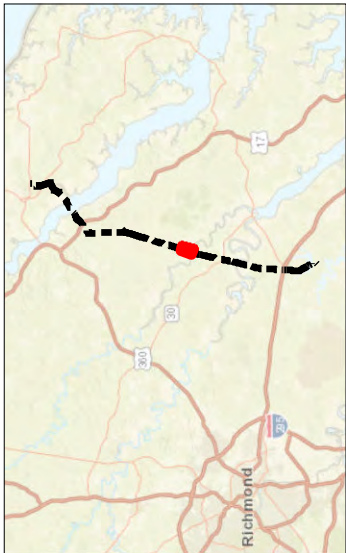
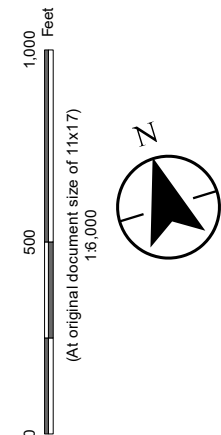


Table II.B.5

Existing Structure Number	224/180	224/179	224/178	224/177	224/176
Existing Structure Height (Feet)	66	70	70	61	70
Proposed Structure Number	224/180	224/179	224/178	224/177	224/176
Proposed Structure Height (Feet)	110	110	115	105	110



- Notes**
 1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
 2. Data Sources: Dominion Energy Virginia, Sancti, DCR, NHD
 3. Structure locations and heights provided by Dominion Energy Virginia and information contained herein is preliminary in nature and subject to final engineering. Structure heights do not include foundation reveal
 4. Base Map: © ESRI



Project Location
New Kent, King and Queen, King William,
Essex and Richmond Counties, Virginia

Client/Project
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208

Figure No. **II.B.5**

Prepared by LRS on 2020-03-31
TR by FPS on 2020-03-31
IR by CPQ on 2020-03-31

20230401404

Existing and Proposed Structures

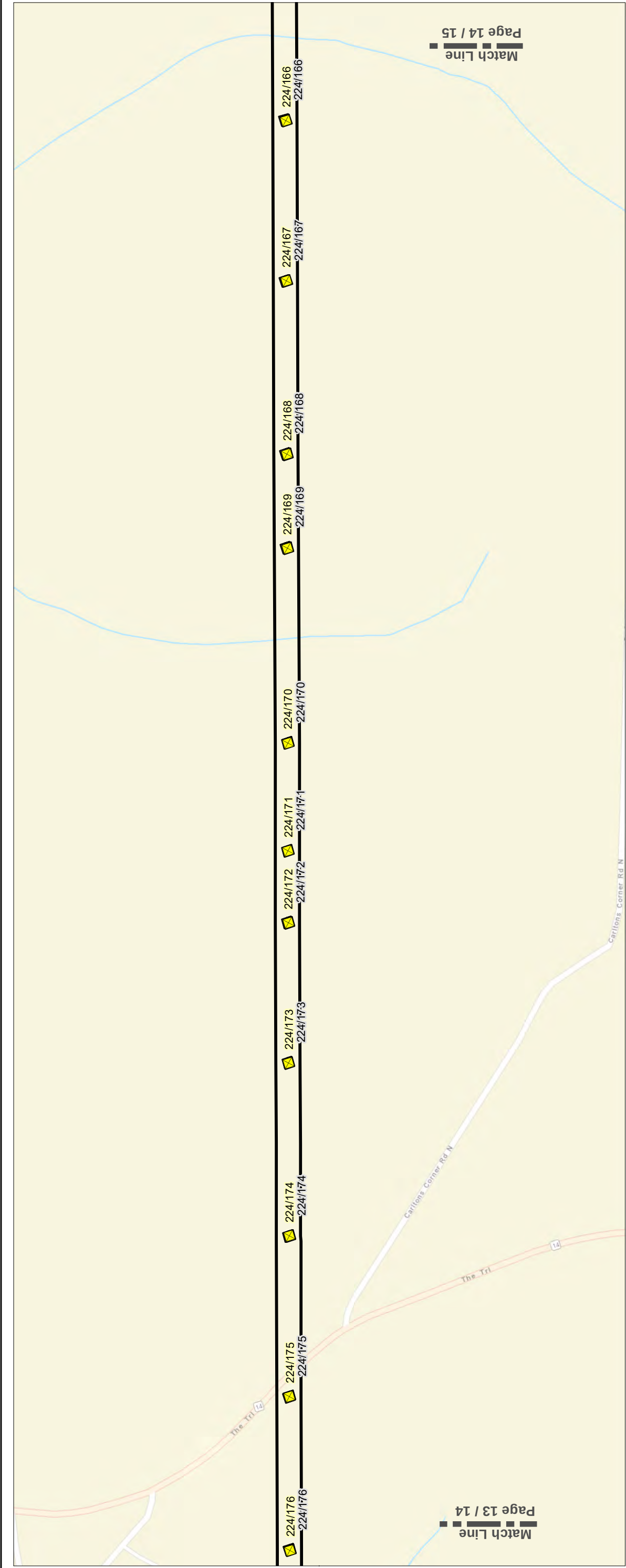
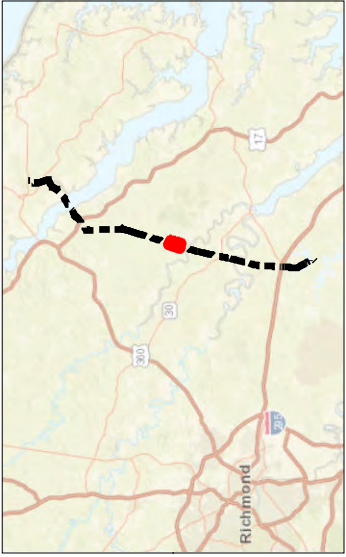


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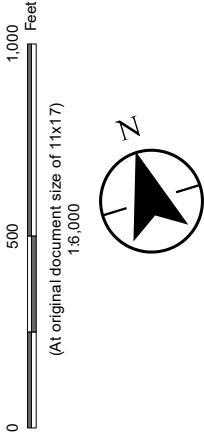
Existing Structure Number	224/176	224/175	224/174	224/173	224/172	224/171	224/170	224/169	224/168	224/167	224/166
Existing Structure Height (Feet)	70	72	75	70	52	52	61	61	61	70	70

Proposed Structure Number	224/176	224/175	224/174	224/173	224/172	224/171	224/170	224/169	224/168	224/167	224/166
Proposed Structure Height (Feet)	110	110	120	110	95	100	115	100	105	115	115



- Notes**
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- Legend**
- Substation
 - Proposed Structure
 - Existing Structure
 - Structures, Second Circuit Only



Project Location
New Kent, King and Queen, King William, Essex, and Richmond Counties, Virginia

Client/Project
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208

Figure No.
II.B.5

203401404

Prepared by: LJB on 2020-03-31
IR by: TPS on 2020-03-31
IR by: CPG on 2020-03-31

Existing and Proposed Structures

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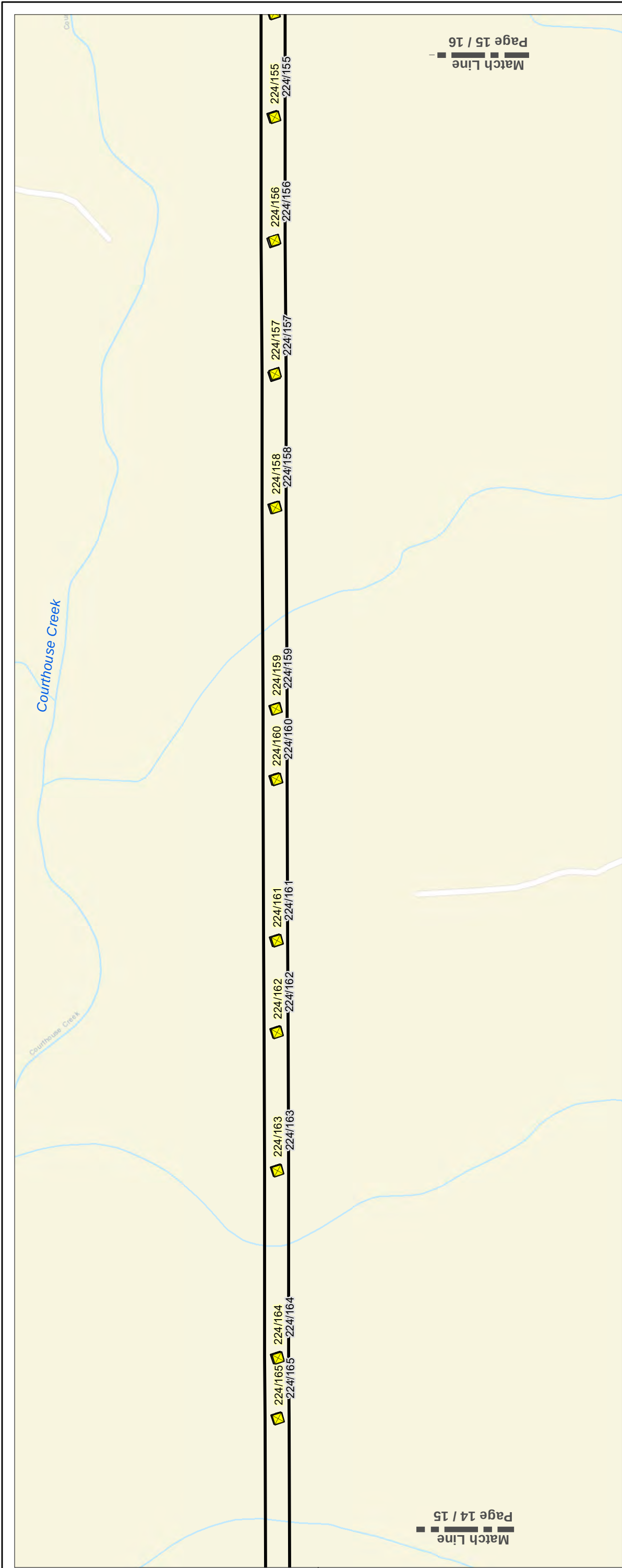
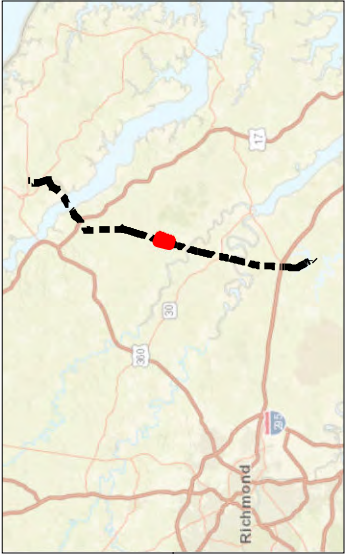


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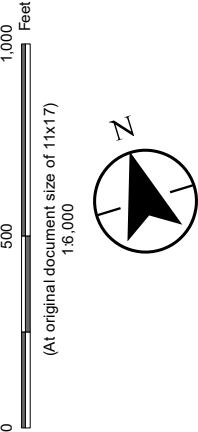
Existing Structure Number	224/165	224/164	224/163	224/162	224/161	224/160	224/159	224/158	224/157	224/156	224/155
Existing Structure Height (Feet)	57	59	66	66	52	59	55	61	66	52	52

Proposed Structure Number	224/165	224/164	224/163	224/162	224/161	224/160	224/159	224/158	224/157	224/156	224/155
Proposed Structure Height (Feet)	100	110	105	105	90	100	110	105	110	85	100



- Notes**
1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
 2. Data Sources: Dominion Energy Virginia, Stantec, DCR, NHD
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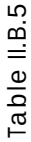
- Substation
- Proposed Structure
- Existing Structure
- Structures, Second Circuit Only



Project Location	Prepared by LJB on 2020-03-31
New Kent, King and Queen, King William, Essex, and Richmond Counties, Virginia	IR by TPS on 2020-03-31
Client/Project	IR by CPG on 2020-03-31
Dominion Energy Virginia	203401404
Lanexa-Northern Neck 230 kV Transmission Line #224	
Rebuild and New 230 kV Line #2208	
Figure No.	
11.B.5	

Existing and Proposed Structures

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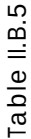
A map of the Richmond, Virginia area. A red dot marks the location of the study site. A dashed line indicates the study area. Major roads like I-64, I-95, and US-1 are shown. The city of Richmond is labeled at the bottom.

-  Substation
 Proposed Structure
 Existing Structure
 Structures, Second Circuit Only



II.B.5 Existing and Proposed Structures

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- Notes**
1. Coordinate System: NAD 1983 StatePlane, Virginia South FIPS 4502 Feet
 2. Data Sources: Dominion Energy Virginia, Stantec, DCR, NHD
 3. Structure locations and heights provided by Dominion Energy Virginia and information contained herein is preliminary in nature and subject to final engineering. Structure heights do not include foundation reveal
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	Project Location New Kent, King and Queen, King William, Essex, and Richmond Counties, Virginia	Prepared by LJB on 2020-03-31 TR by TFS on 2020-03-31 IR by CPG on 2020-03-31
	Client/Project Dominion Energy Virginia Lanexa-Northern Neck 230 kV Transmission Line #224 Rebuild and New 230 kV Line #2208	2034.01404
Figure No. II.B.5		Title Existing and Proposed Structures

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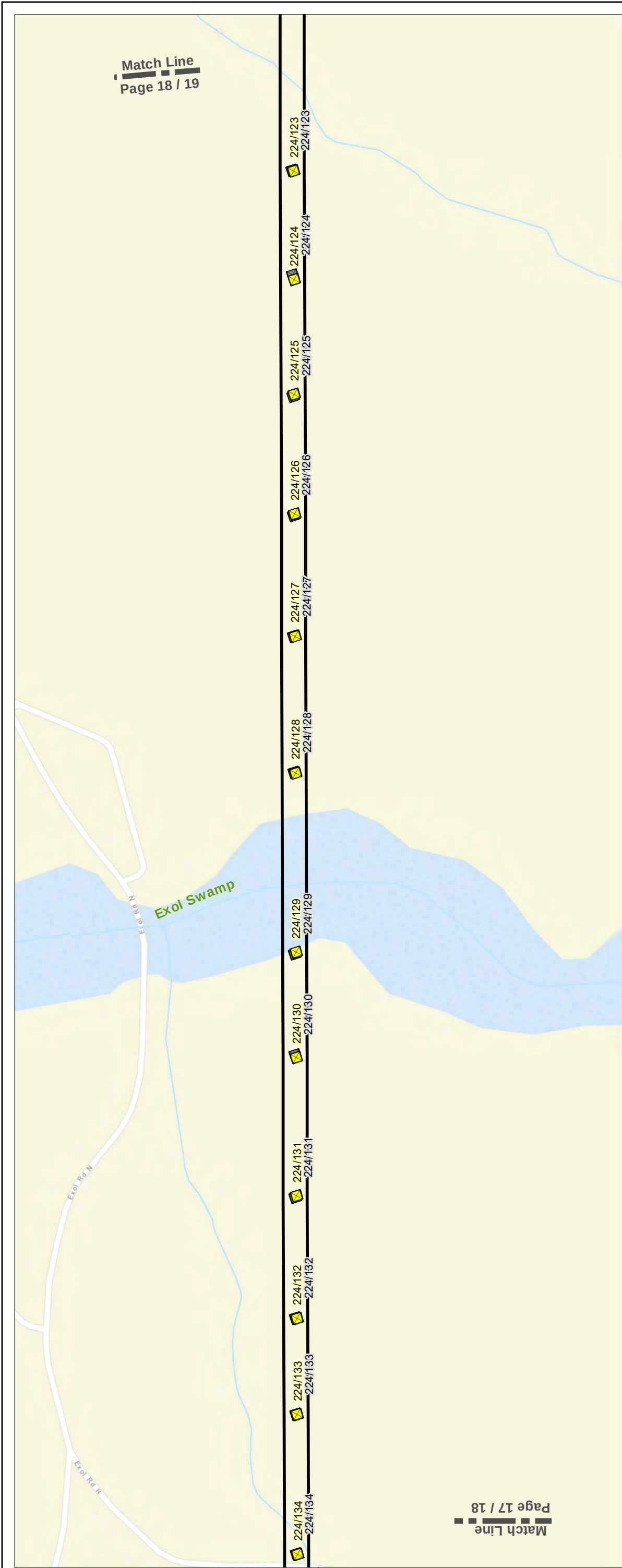
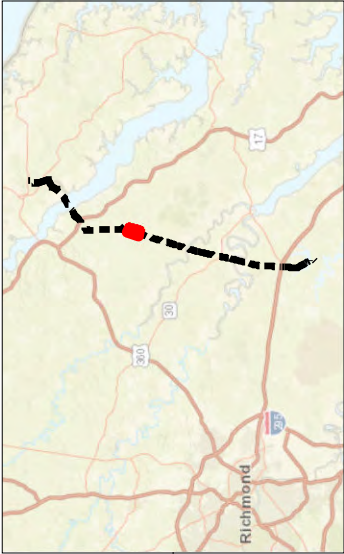


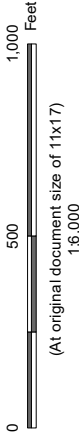
Table 11.B.5

Existing Structure Number	224/134	224/133	224/132	224/131	224/130	224/129	224/128	224/127	224/126	224/125	224/124	224/123
Existing Structure Height (Feet)	70	61	57	66	64	70	70	75	52	61	61	66
Proposed Structure Number	224/134	224/133	224/132	224/131	224/130	224/129	224/128	224/127	224/126	224/125	224/124	224/123
Proposed Structure Height (Feet)	105	105	95	115	105	120	115	115	100	100	105	105



- Notes**
1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
 2. Data Sources: Dominion Energy Virginia, Stantec, DCR, NHD
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 4. Base Map: © ESR

- Substation
- Proposed Structure
- Existing Structure
- Structures, Second Circuit Only



Project Location	Prepared by LJB on 2020-03-31
New Kent, King and Queen, King William, Essex, and Richmond Counties, Virginia	TR by TPS on 2020-03-31
Client/Project	IR by CPG on 2020-03-31
Dominion Energy Virginia	203401404
Lanexa-Northern Neck 230 kV Transmission Line #224	
Rebuild and New 230 kV Line #2208	
Figure No.	
11.B.5	

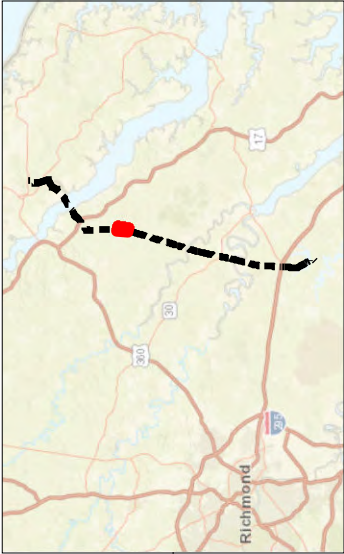
Existing and Proposed Structures

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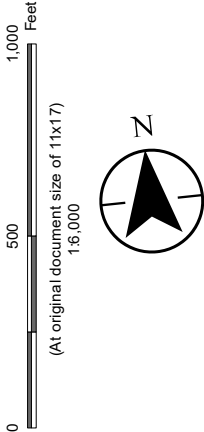


Table II.B.5

Existing Structure Number	224/122	224/121	224/120	224/119	224/118	224/117	224/116	224/115	224/114	224/113	224/112
Existing Structure Height (Feet)	52	61	70	70	70	66	70	66	61	70	70
Proposed Structure Number	224/122	224/121	224/120	224/119	224/118	224/117	224/116	224/115	224/114	224/113	224/112
Proposed Structure Height (Feet)	95	105	115	115	110	100	110	110	100	115	110



- Substation
- Proposed Structure
- Existing Structure
- Structures, Second Circuit Only



Project Location	Prepared by LJB on 2020-03-31
New Kent, King and Queen, King William, Essex, and Richmond Counties, Virginia	TR by TPS on 2020-03-31
Client/Project	IR by CPG on 2020-03-31
203401404	
Dominion Energy Virginia	
Lanexa-Northern Neck 230 kV Transmission Line #224	
Rebuild and New 230 kV Line #2208	
Figure No.	
II.B.5	

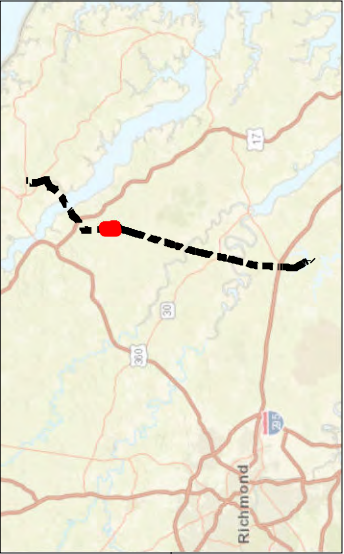
Existing and Proposed Structures

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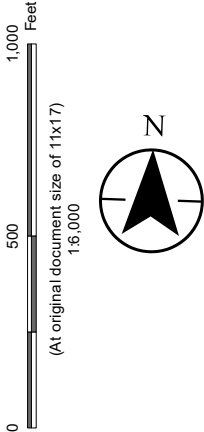


Table 11.B.5

Existing Structure Number	Existing Structure Height (Feet)	224/112	224/111	224/110	224/109	224/108	224/107	224/106	224/105	224/104	224/103
		70	66	66	61	70	61	61	52	57	66
Proposed Structure Number	Proposed Structure Height (Feet)	224/112	224/111	224/110	224/109	224/108	224/107	224/106	224/105	224/104	224/103
		110	115	110	105	115	110	100	100	105	105



- Substation
- Proposed Structure
- Existing Structure
- Structures, Second Circuit Only



Project Location

New Kent, King and Queen, King William, Essex, and Richmond Counties, Virginia

Client/Project

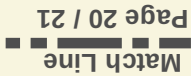
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208

Figure No.

203401404

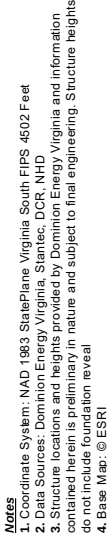
II.B.5

Existing and Proposed Structures



Existing Structure Number	224/102	224/101	224/100	224/99	224/98	224/97	224/96	224/95	224/94	224/93	224/92
Existing Structure Height (Feet)	66	70	66	61	66	66	52	61	66	61	61

Existing Structure Number	224/102	224/101	224/100	224/99	224/98	224/97	224/96	224/95	224/94	224/93	224/92
Existing Structure Height (Feet)	66	70	66	61	66	66	52	61	66	61	61



Page 21 of 30



Substation

Proposed Structure

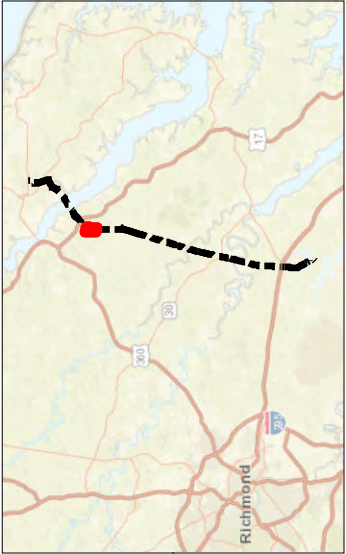
Existing Structure

 Structures, Second Circuit Only



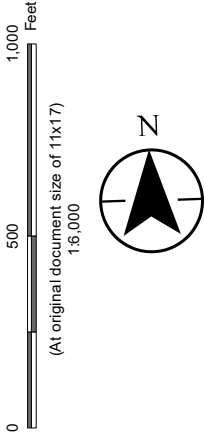
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Existing Structure Height (Feet)		61	52	70	70	70	66	61	57	61	48	66
Proposed Structure Number		224/92	224/91	224/89	224/88	224/87	224/86	224/85	224/84	224/83	224/82	224/81
Proposed Structure Height (Feet)		100	100	110	115	110	110	105	110	95	95	105



- Notes**
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 - 4. Base Map: © ESR

- Substation**
- Proposed Structure
 - Existing Structure
 - Structures, Second Circuit Only



Project Location	Prepared by LJB on 2020-03-31
New Kent, King and Queen, King William, Essex, and Richmond Counties, Virginia	TR by TPS on 2020-03-31
Client/Project	IR by CPG on 2020-03-31
203401404	
Dominion Energy Virginia	
Lanexa-Northern Neck 230 kV Transmission Line #224	
Rebuild and New 230 kV Line #2208	
Figure No.	
II.B.5	
Title	

Existing and Proposed Structures

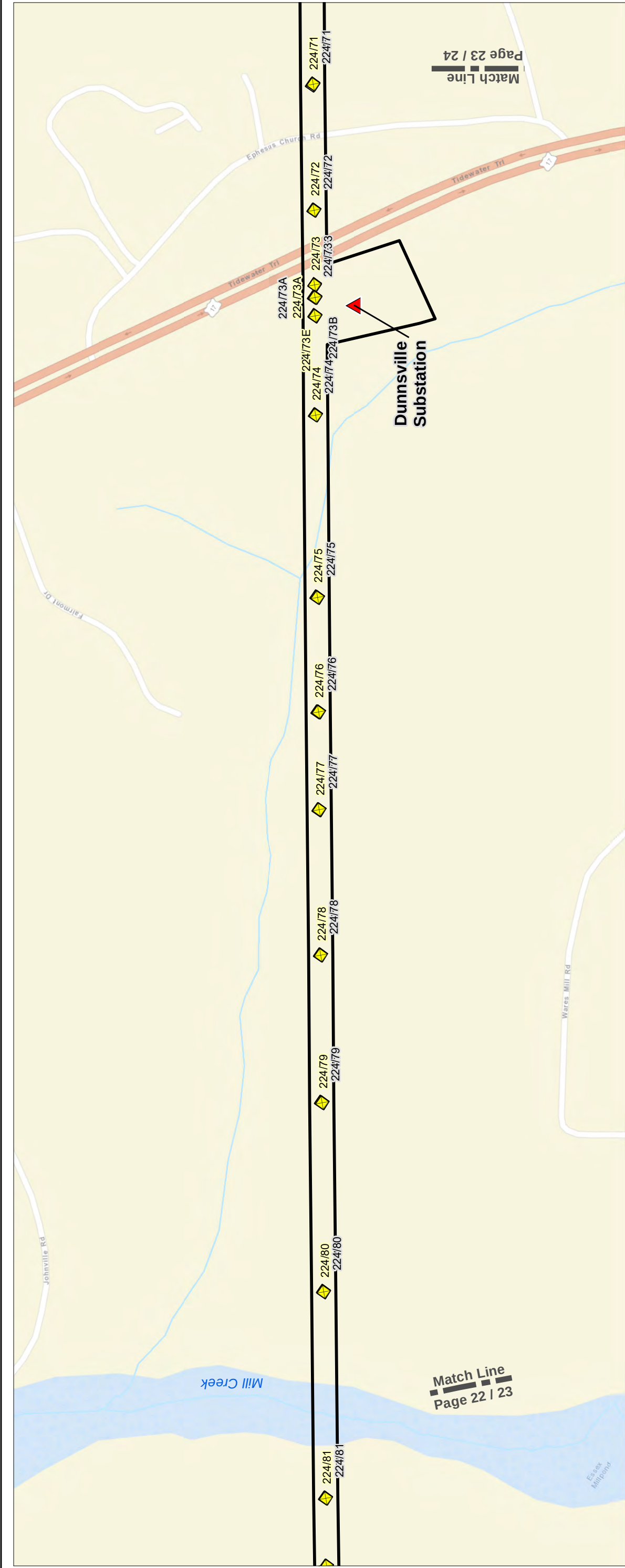
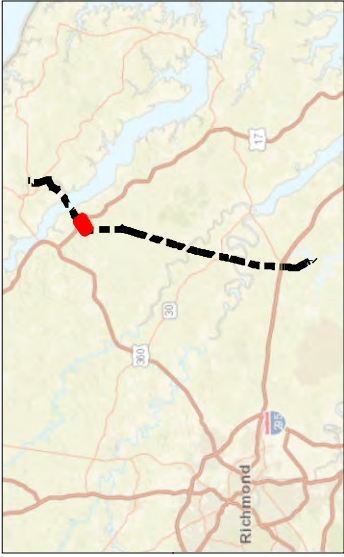


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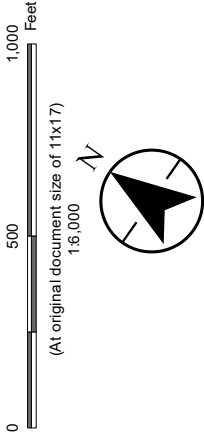
Existing Structure Number	224/81	224/80	224/79	224/78	224/77	224/76	224/75	224/74	224/73B	224/73A	224/73	224/72	224/71
Existing Structure Height (Feet)	66	61	70	66	52	57	70	70	75	75	70	70	70

Proposed Structure Number	224/81	224/80	224/79	224/78	224/77	224/76	224/75	224/74	224/73B	224/73A	224/73	224/72	224/71
Proposed Structure Height (Feet)	105	100	115	110	95	105	110	100	85	85	105	115	110



- Notes**
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203401404	
Dominion Energy Virginia	
Lanexa-Northern Neck 230 kV Transmission Line #224	
Rebuild and New 230 kV Line #2208	
Figure No.	
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Existing and Proposed Structures

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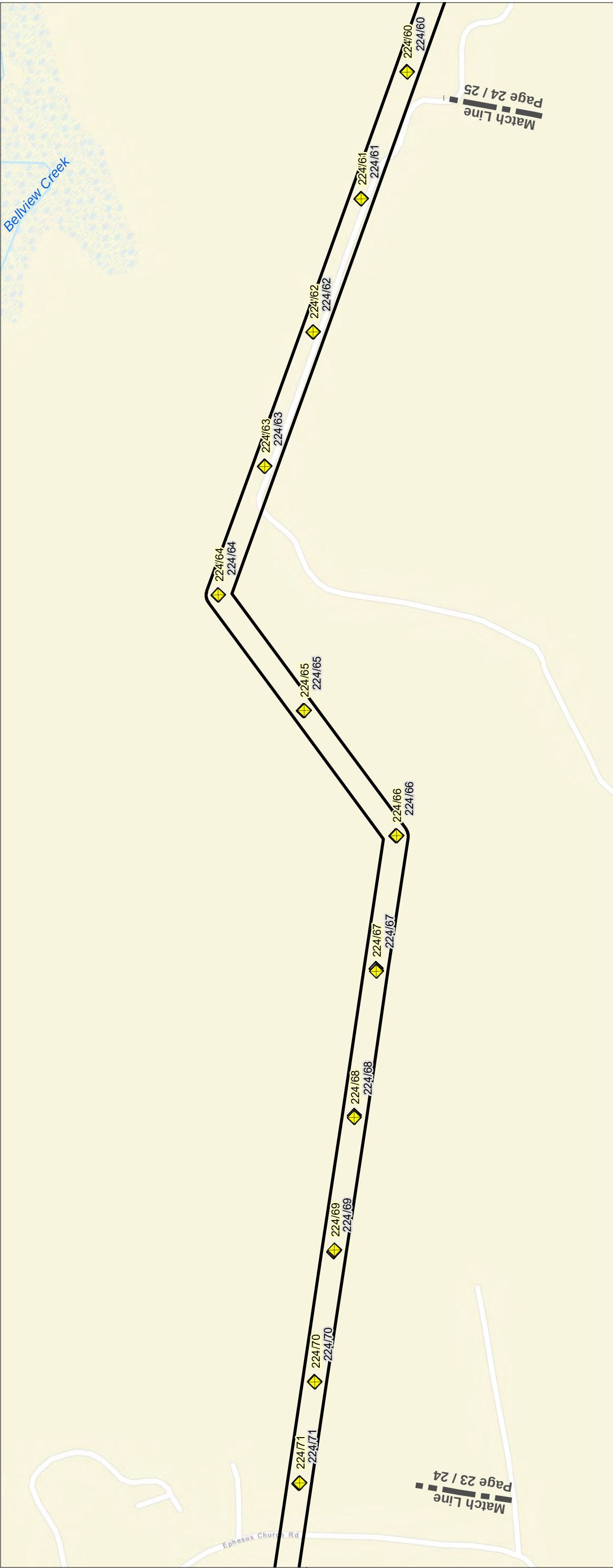
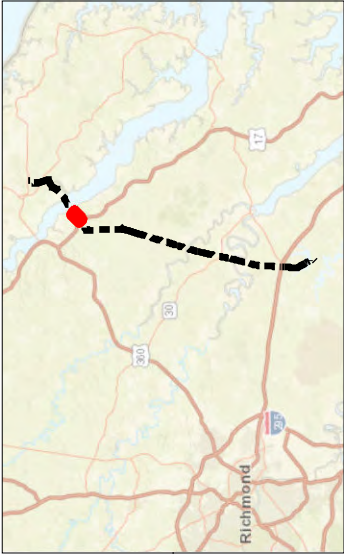


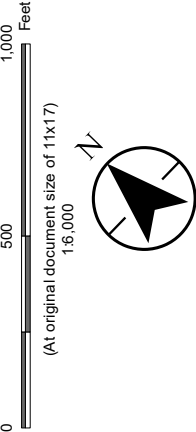
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Existing Structure Number		224/71	224/70	224/69	224/68	224/67	224/66	224/65	224/64	224/63	224/62	224/61	224/60
Existing Structure Height (Feet)		70	55	59	66	66	66	70	66	66	70	70	66
Proposed Structure Number		224/71	224/70	224/69	224/68	224/67	224/66	224/65	224/64	224/63	224/62	224/61	224/60
Proposed Structure Height (Feet)		110	105	105	110	110	105	110	100	110	115	110	100



- Notes**
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- Substation**
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New Kent, King and Queen, King William, Essex, and Richmond Counties, Virginia	TR by TPS on 2020-03-31
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Dominion Energy Virginia	203401404
Lanexa-Northern Neck 230 kV Transmission Line #224	
Rebuild and New 230 kV Line #2208	
Figure No.	
II.B.5	

Existing and Proposed Structures

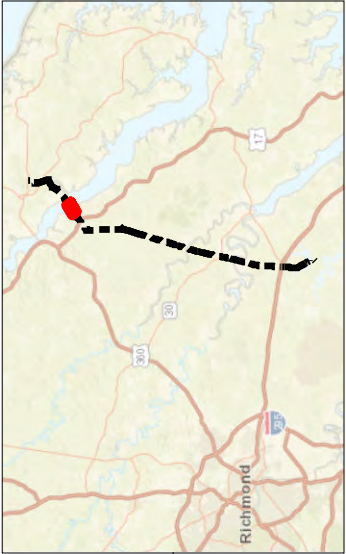
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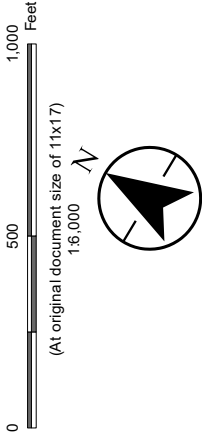
Existing Structure Number	224/60	224/59	224/58	224/57	224/56	224/55	224/54
Existing Structure Height (Feet)	66	156	159	190	190	191	191

Proposed Structure Number	224/60	224/59	224/58	224/57	224/56	224/55	224/54
Proposed Structure Height (Feet)	100	156	159	190	190	191	191



- Notes**
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- Legend**
- Substation
 - Proposed Structure
 - Existing Structure
 - Structures, Second Circuit Only



Project Location
New Kent, King and Queen, King William, Essex, and Richmond Counties, Virginia

Client/Project
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208

Figure No.
II.B.5

203401404

Existing and Proposed Structures

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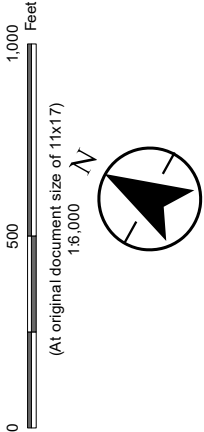
Table II.B.5

Existing Structure Number	Existing Structure Height (Feet)	224/54	224/53	224/52	224/51	224/50	224/49	224/48	224/47	224/46	224/45
Proposed Structure Number	Proposed Structure Height (Feet)	224/54	224/53	224/52	224/51	224/50	224/49	224/48	224/47	224/46	224/45
		191	181	147	66	61	57	61	61	66	66



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Project Location
New Kent, King and Queen, King William, Essex, and Richmond Counties, Virginia

Client/Project
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208

Figure No.
II.B.5

203401404

Existing and Proposed Structures

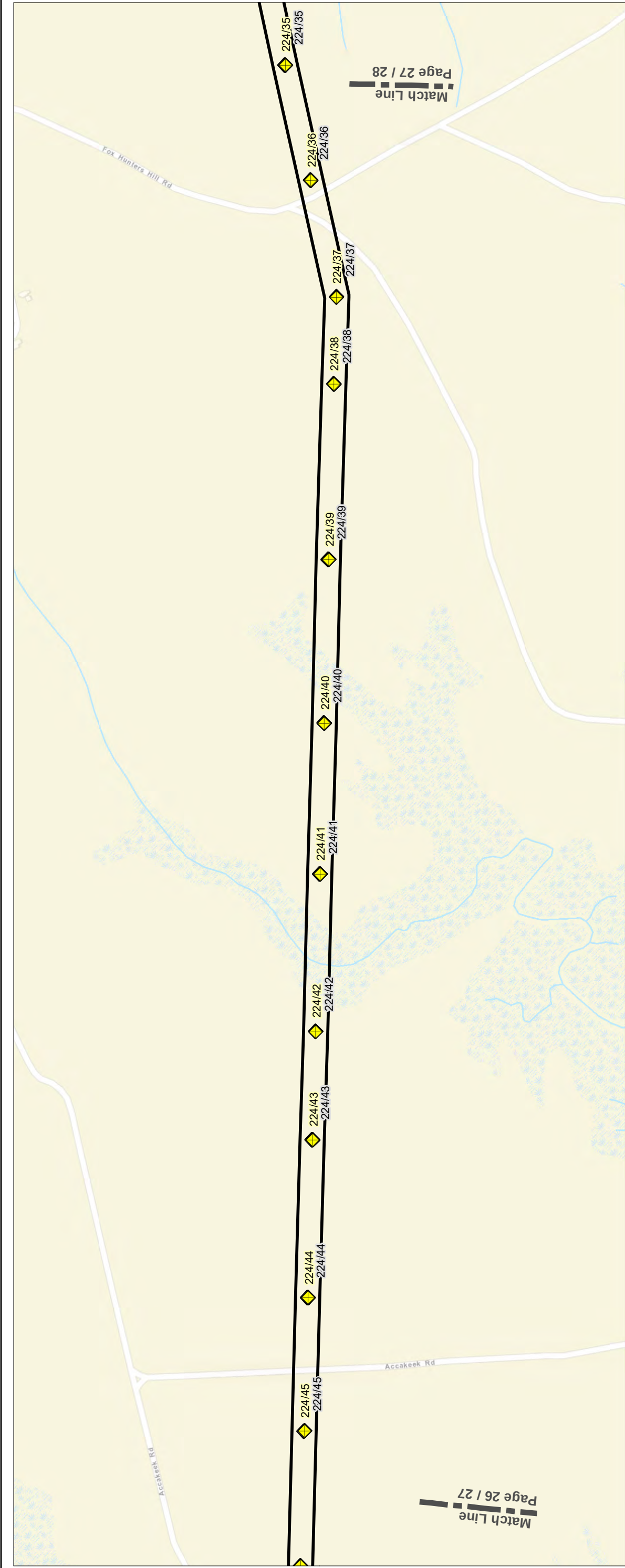
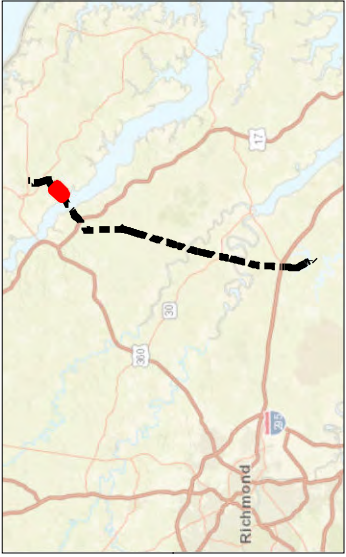


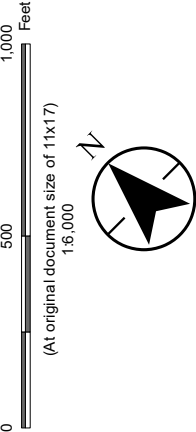
Table II.B.5

Existing Structure Number	224/45	224/44	224/43	224/42	224/41	224/40	224/39	224/38	224/37	224/36	224/35
Existing Structure Height (Feet)	66	66	66	57	70	75	70	70	52	70	57
Proposed Structure Number	224/45	224/44	224/43	224/42	224/41	224/40	224/39	224/38	224/37	224/36	224/35
Proposed Structure Height (Feet)	105	110	115	100	115	110	120	110	95	105	105



Notes
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Project Location
New Kent, King and Queen, King William, Essex, and Richmond Counties, Virginia

Client/Project
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208

Figure No.
II.B.5

203401404

Existing and Proposed Structures

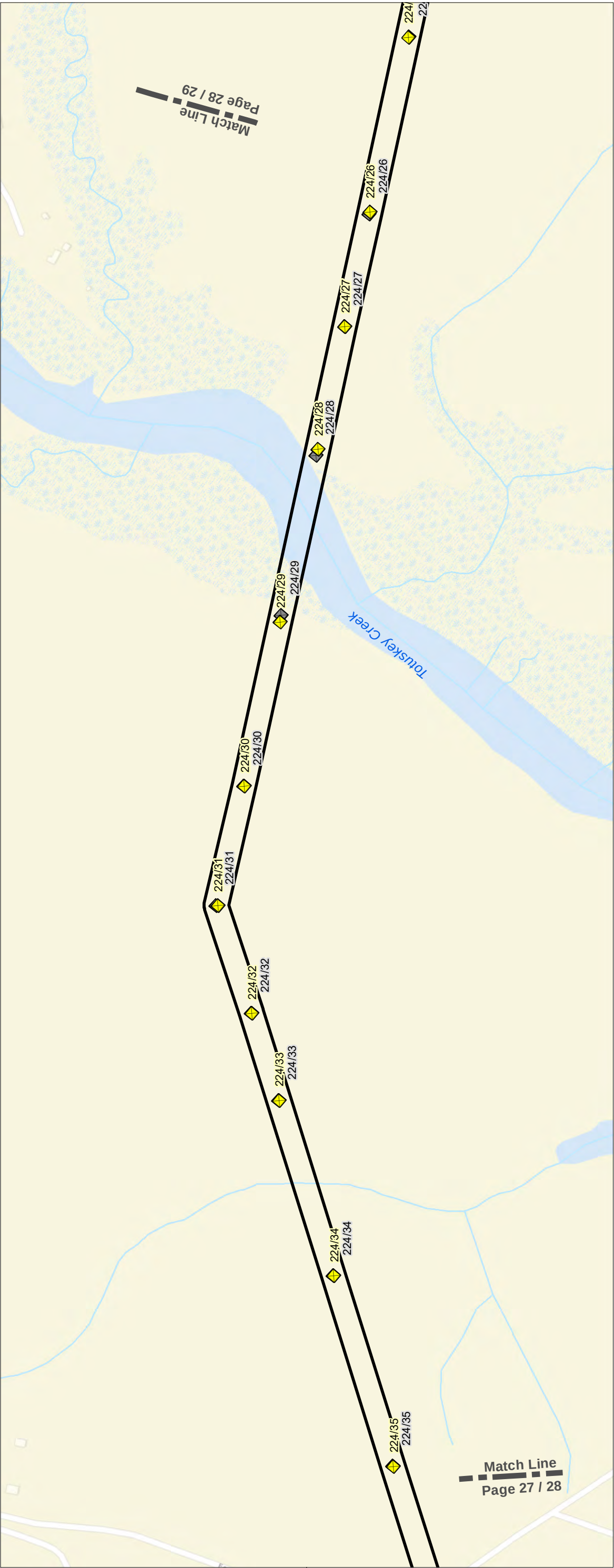
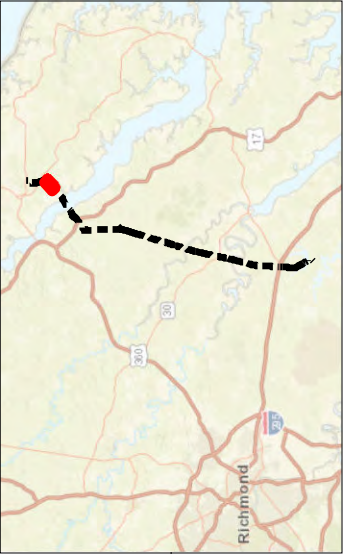


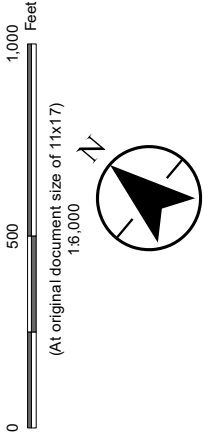
Table II.B.5

Existing Structure Number	Existing Structure Height (Feet)	224/35	224/34	224/33	224/32	224/31	224/30	224/29	224/28	224/27	224/26	224/25
		57	57	57	52	61	61	170	150	61	66	70
Proposed Structure Number	Proposed Structure Height (Feet)	224/35	224/34	224/33	224/32	224/31	224/30	224/29	224/28	224/27	224/26	224/25
		105	105	100	95	95	95	170	150	95	110	115



Notes
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- Substation**
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Project Location
New Kent, King and Queen, King William, Essex, and Richmond Counties, Virginia

Client/Project
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208

Figure No.
II.B.5

203401404

Existing and Proposed Structures

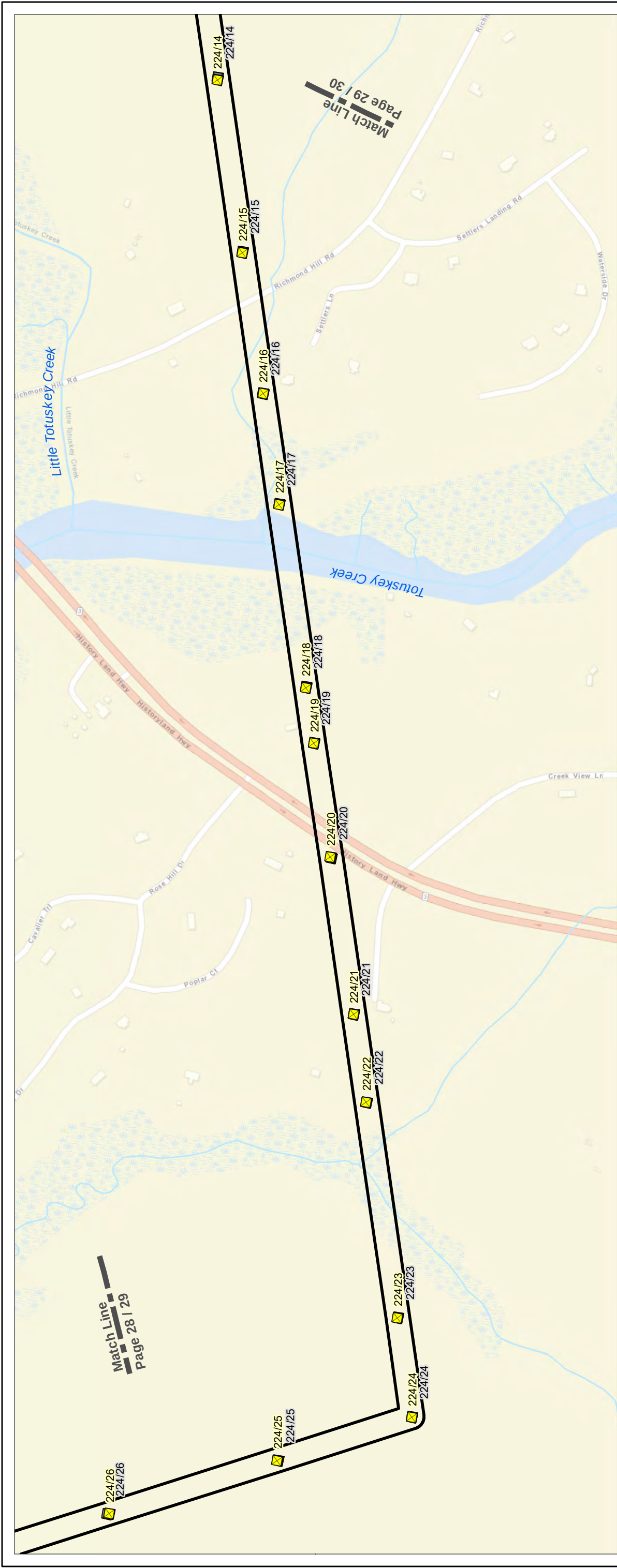
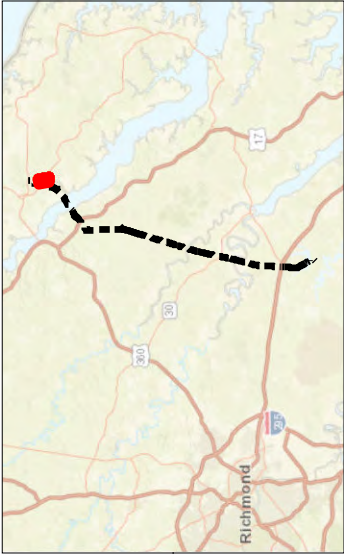


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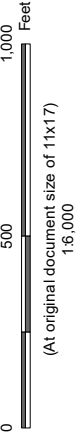
Existing Structure Number	Existing Structure Height (Feet)	224/26	224/25	224/24	224/23	224/22	224/21	224/20	224/19	224/18	224/17	224/16	224/15	224/14
		66	70	56	52	70	61	70	66	66	84	57	66	61

Proposed Structure Number	Proposed Structure Height (Feet)	224/26	224/25	224/24	224/23	224/22	224/21	224/20	224/19	224/18	224/17	224/16	224/15	224/14
		110	115	100	95	90	105	110	105	115	115	115	115	105



- Notes**
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Project Location	Prepared by LJB on 2020-03-31 New Kent, King and Queen, King William, Essex, and Richmond Counties, Virginia
Client/Project	IR by CPG on 2020-03-31 203401404
Dominion Energy Virginia	
Lanexa-Northern Neck 230 kV Transmission Line #224	
Rebuild and New 230 kV Line #2208	
Figure No.	
II.B.5	
Title	
Existing and Proposed Structures	

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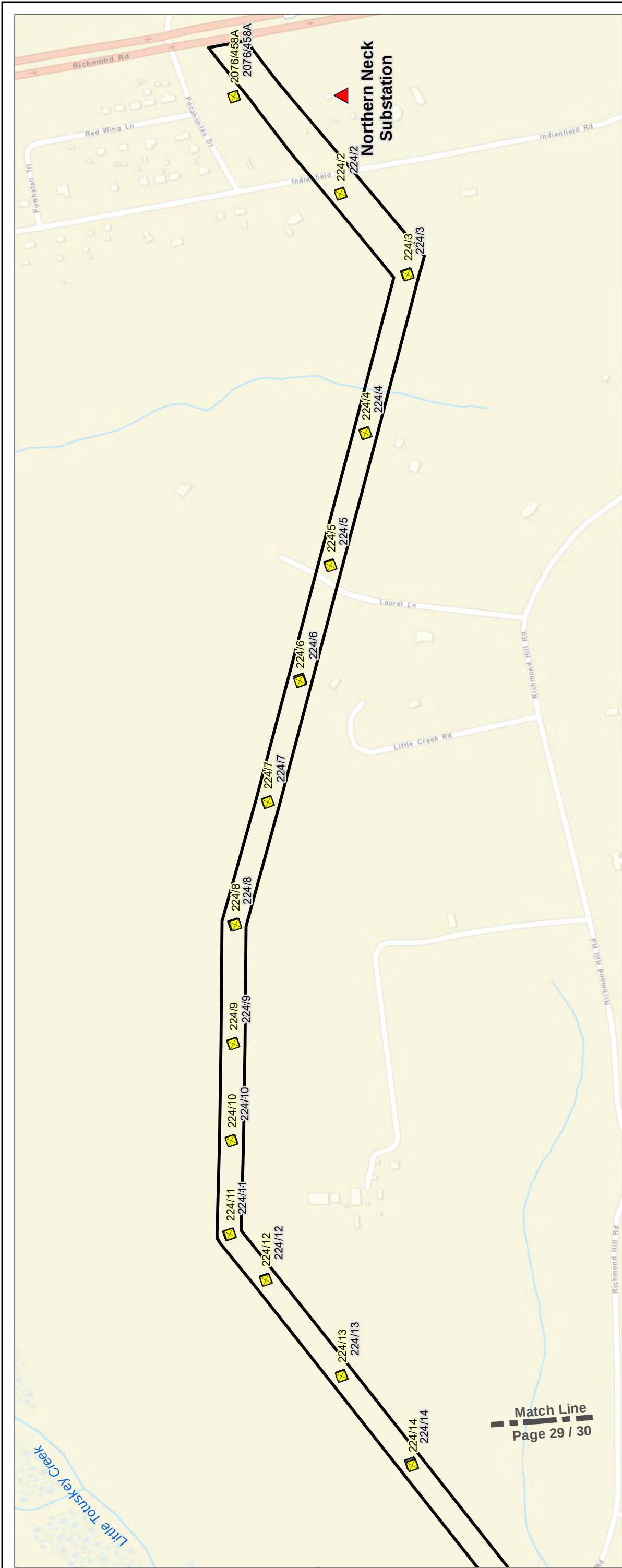
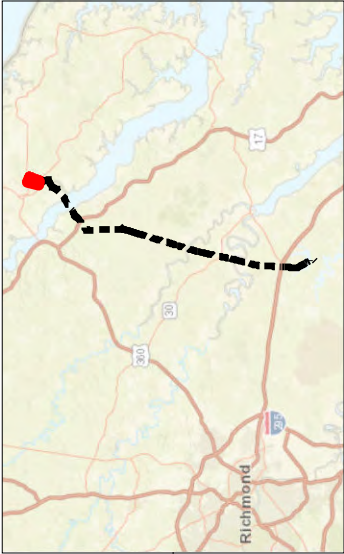


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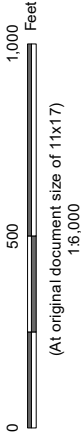
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Existing Structure Height (Feet)	61	52	52	57	61	66	66	52	61	57	61	66	66	N/A

Proposed Structure Number	224/14	224/13	224/12	224/11	224/10	224/9	224/8	224/7	224/6	224/5	224/4	224/3	224/2	2076/458A
Proposed Structure Height (Feet)	105	100	95	85	105	115	100	100	100	100	110	95	90	65-50-65



- Notes**
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- Legend**
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Project Location
New Kent, King and Queen, King William, Essex, and Richmond Counties, Virginia

Client/Project
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208

Figure No.
II.B.5

203401404

Existing and Proposed Structures

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II. DESCRIPTION OF THE PROPOSED PROJECT

B. Line Design and Operational Features

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

Response: [1] See Attachments II.B.6.a.i-xii for representative photographs of typical existing structures, including existing H-frame structures, angle structures, and other single circuit structures.

[2] The Project features a variety of proposed structures, including suspension structures and dead end structures. See Attachments II.B.6.b.i-v for representative photographs.

[3] Visual simulations showing the appearance of proposed transmission structures are provided for historic properties where the Project will be visible. Attachment II.B.6.c.i was created using GIS modeling to depict whether the existing and proposed structures are or will be visible from historic properties. Observation points (“OPs”) used for the simulations are indicated on the maps. Attachment II.B.6.c.ii provides existing photographs and simulations of the proposed structures from the selected OPs. The below table identifies historic properties evaluated.

Historic Property	OP	Comments
Rose Garden (VDHR #049-0064)	1	No visibility of existing or replacement structures
Mantapike Hill/Walkerton Battlefield (VDHR #049-5007)	2	Visibility of existing and replacement structures
King and Queen County Courthouse Green Historic District (VDHR #049-5001)	2, 3	Visibility of existing and replacement structures
King and Queen County Court House (VDHR #049-0036)	3	Modern infrastructure (street lights) dominates view in front of existing and replacement structures
Immanuel Chapel (VDHR #049-0035)	4	No visibility of existing or replacement structures
Ruffin’s Ferry/Windsor Shade (VDHR #050-0070)	5	Existing and replacement structures visible in background
Sweet Hall (VDHR #050-0067)	6	Visibility of existing and replacement structures

See Attachment III.B.4 for visual simulations of key locations evaluated.



Photograph provided by Dominion Energy

**Existing Suspension Structure Type:
Wooden H-Frame**

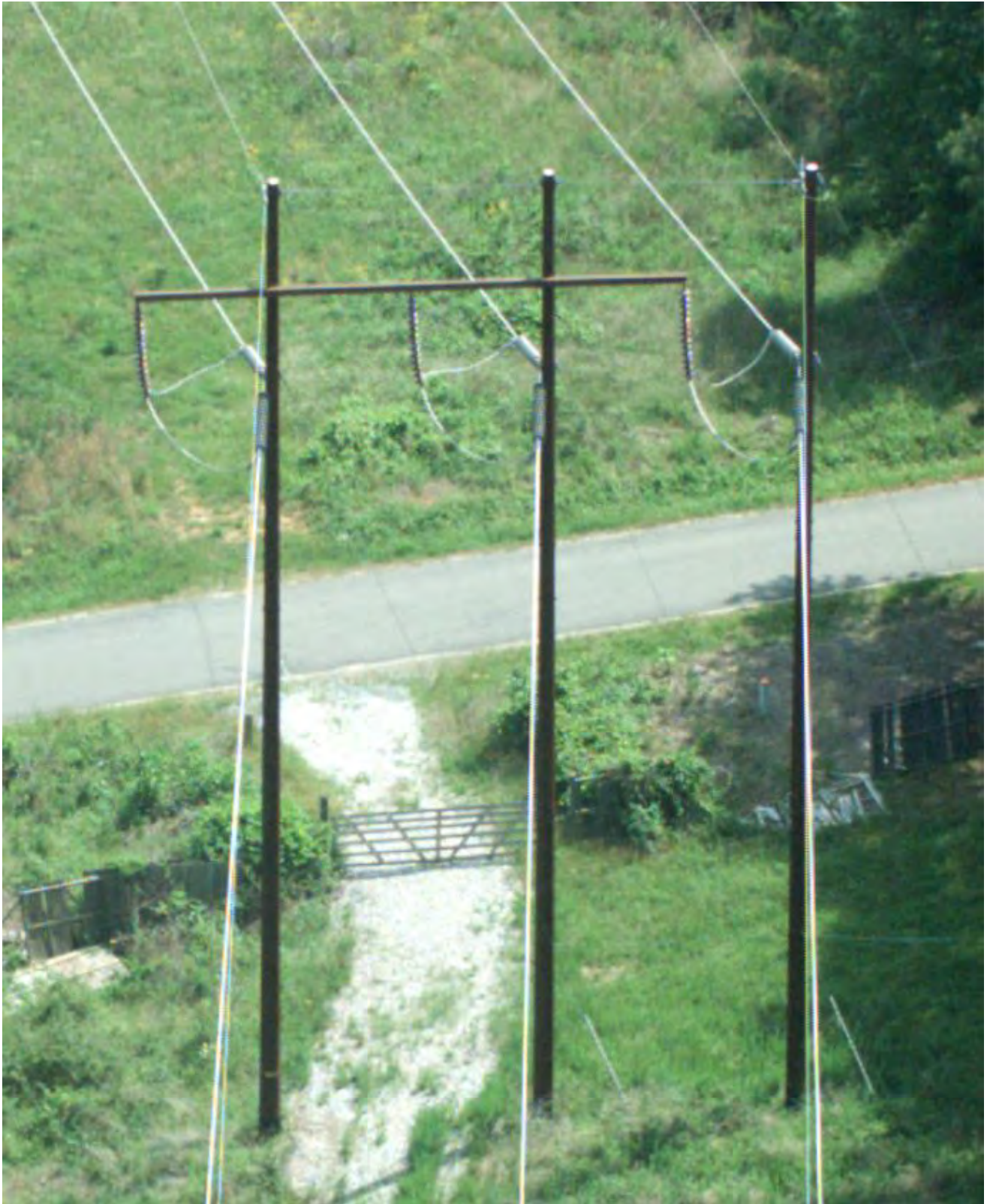
Attachment II.B.6.a.i





Photograph provided by Dominion Energy

**Existing Running Angle Structure Type:
Wooden 3-Pole**



Photograph provided by Dominion Energy

**Existing Dead End Angle Structure Type:
Weathering Steel 3-Pole**

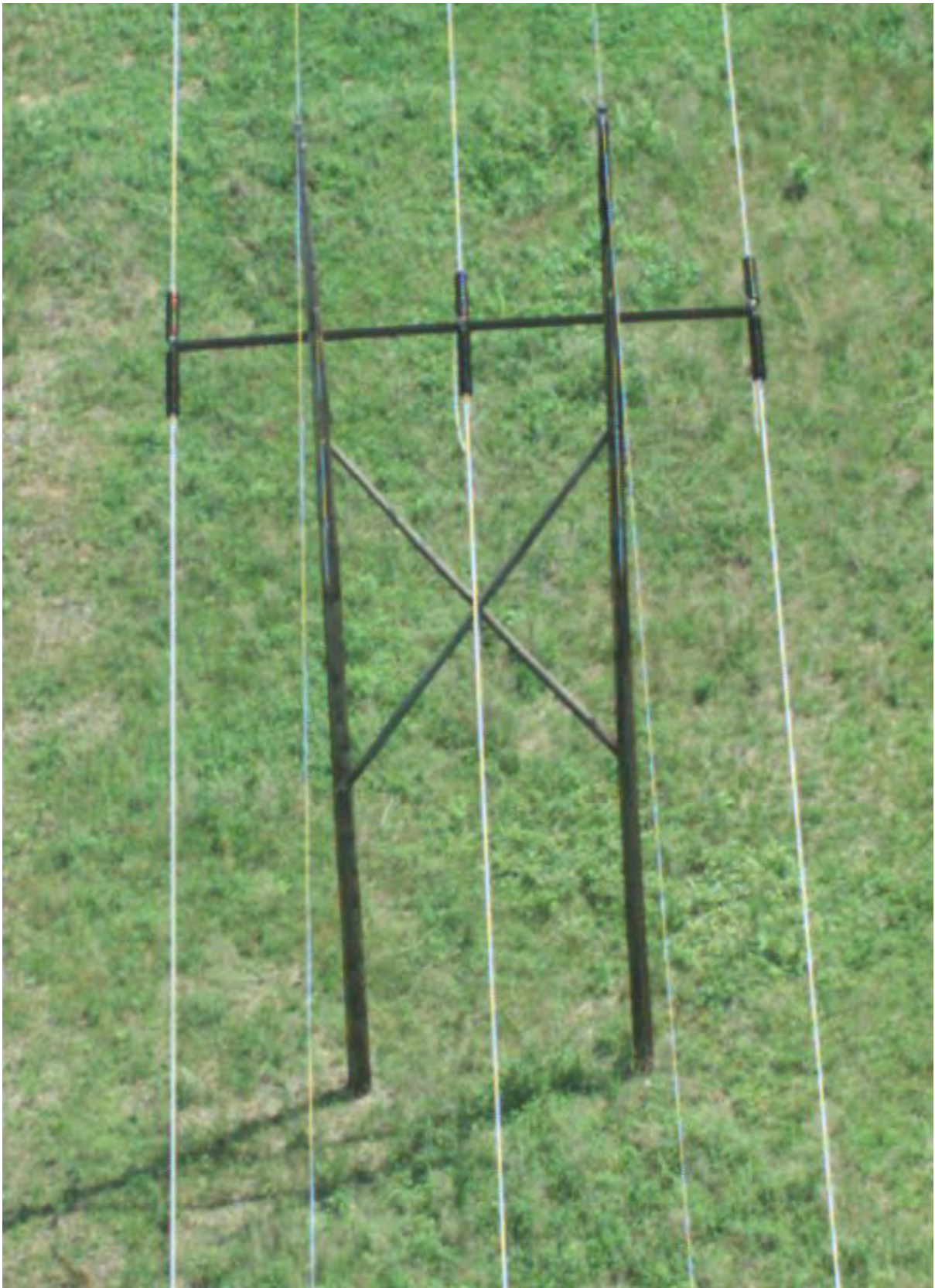
Attachment II.B.6.a.iii





Photograph provided by Dominion Energy

**Existing Dead End Structure Type:
Wooden H-Frame**



Photograph provided by Dominion Energy

**Existing Dead End Structure Type:
Wooden H-Frame with Floating Dead Ends**



Photograph provided by Dominion Energy

**Existing Suspension Structure Type:
Weathering Steel H-Frame**

Attachment II.B.6.a.vi



Photograph provided by Dominion Energy

**Existing Deadend Structure Type:
Weathering Steel H-Frame**



Photograph provided by Dominion Energy

**Existing Running Angle Structure Type:
Weathering Steel 3-Pole**



Photograph provided by Dominion Energy

**Existing Dead End Structure Type:
Wooden 3-Pole Angle**



Photograph provided by Dominion Energy

**Existing Dead End Structure Type:
Wooden Single-Pole**

Attachment II.B.6.a.x



Photograph provided by Dominion Energy

**Existing Suspension Structure Type:
Weathering Steel Lattice Structure**

*double circuit structure shown. Single circuit utilizes one side



Photograph Provided by Dominion Energy

**Existing Suspension Structure Type:
Galvanized Steel Lattice Structure**

*double circuit structure shown. Single circuit utilizes one side

Attachment II.B.6.a.xii



Photograph Provided by Dominion Energy

**Proposed Angle Structure Type:
Weathering Steel 2-Pole Double Deadend**

**Refer to Attachment II.b.3.vii for proposed orientation.*

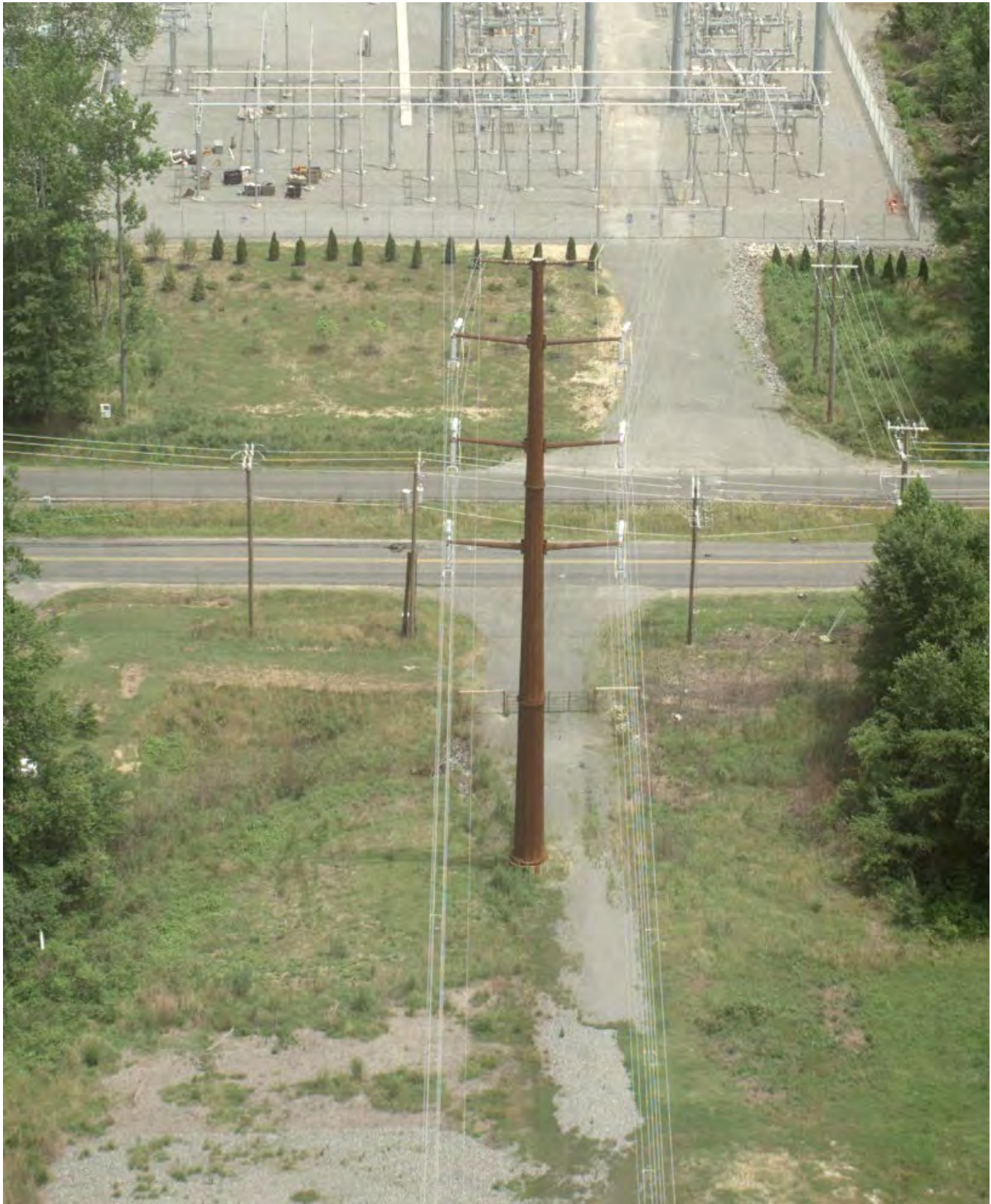


Attachment II.B.6.b.i



Photograph Provided by Dominion Energy

**Proposed Suspension Structure Type:
Weathering Steel Monopole Suspension Structure**



Photograph Provided by Dominion Energy

**Proposed Deadend Structure Type:
Weathering Steel Monopole Deadend Structure**



Photograph Provided by Dominion Energy

**Proposed Suspension Structure Type:
Galvanized Steel Lattice Structure**



Photograph Provided by Dominion Energy

**Proposed Deadend Structure Type: Weathering
Steel Double Deadend Monopole**



Attachment II.B.6.b.v

Figure No.

Attachment II.B.6.c.i

Title

Historic Property Simulation Map

Client/Project

203401404

Dominion Energy Virginia

Lanexa-Northern Neck 230 kV Transmission Line #224

Rebuild and New 230 kV Line #2208

Project Location

New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia

Prepared by MGS on 2020-07-27

TR by ECL on 2020-09-18

IR by CPG on 2020-10-02

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25,000

50,000

Feet

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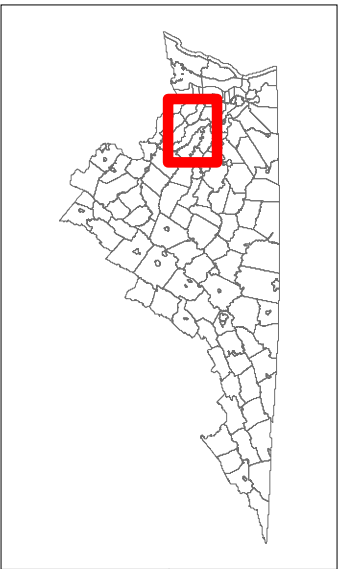
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Project Limits

Page Index

Viewshed Study Limits

Architectural Resource



- Notes**
1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
 2. Data Source: Virginia Department of Historic Resources, Virginia Cultural Resources Information System (VCRIS)
 3. Viewshed analysis produced from digital elevation model and digital surface model derived from VGIN LIDAR
 4. Only structures within 1-Mile from eligible architectural resources and within the project limits were considered in this analysis
 5. Orthomageary © Bing Maps
 6. Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation

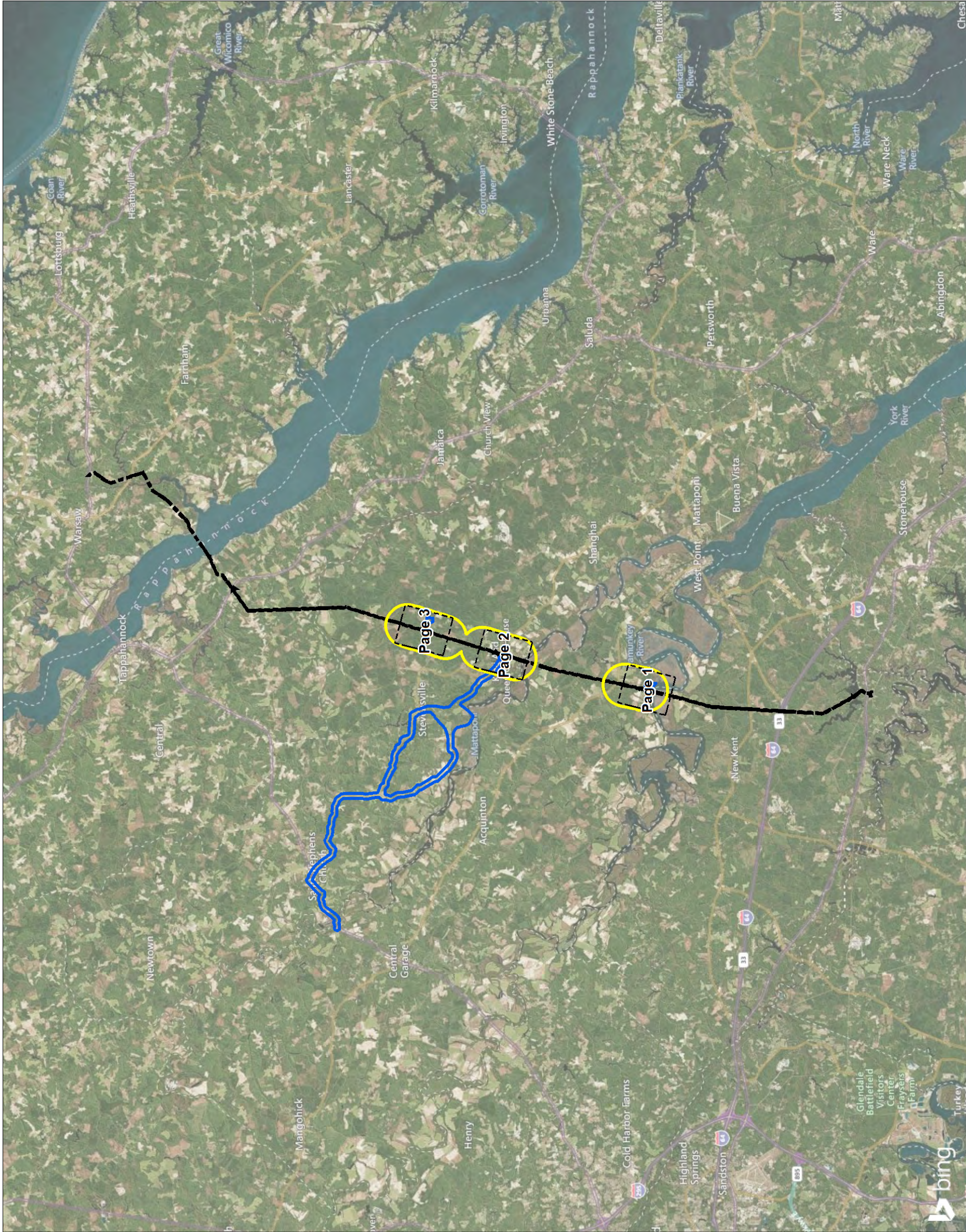
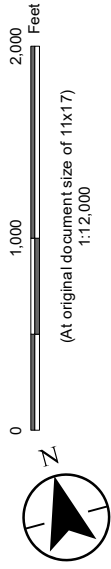
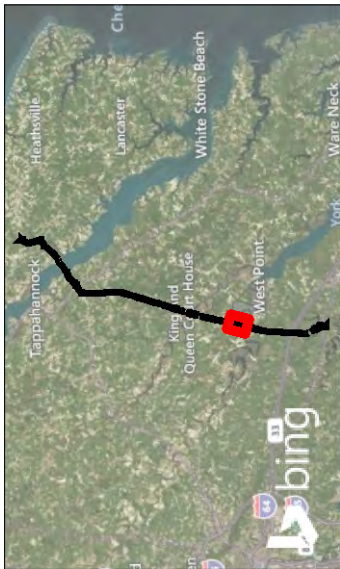


Figure No.
Attachment II.B.6.c.i
Title
Historic Property Simulation Map

Client/Project
203401404
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208
Project Location
New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia
Prepared by TPS on 2020-04-07
TR by ECL on 2020-09-18
IR by CPO on 2020-09-18



- Existing Structure
- Proposed Structure
- Structures, Second Circuit Only
- Observation Point
- Project Limits
- Architectural Resource
- Viewshed Study Limits
- Existing Visible, Proposed Not Visible
- Both Existing and Proposed Visible
- Existing Not Visible, Proposed Visible



Notes
1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
2. Data Sources: Dominion Energy Virginia, Stantec, VGIN, Historic resource data provided by VGIN, Department of Historic Resources, Virginia Cultural Resources Information System (VCRIS)
3. Viewshed analysis produced from digital elevation model and digital surface model derived from VGIN LIDAR
4. Only structures within 1-Mile from eligible architectural resources and within the project limits were considered in this analysis
5. Orthomageary © Bing Maps
6. Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation

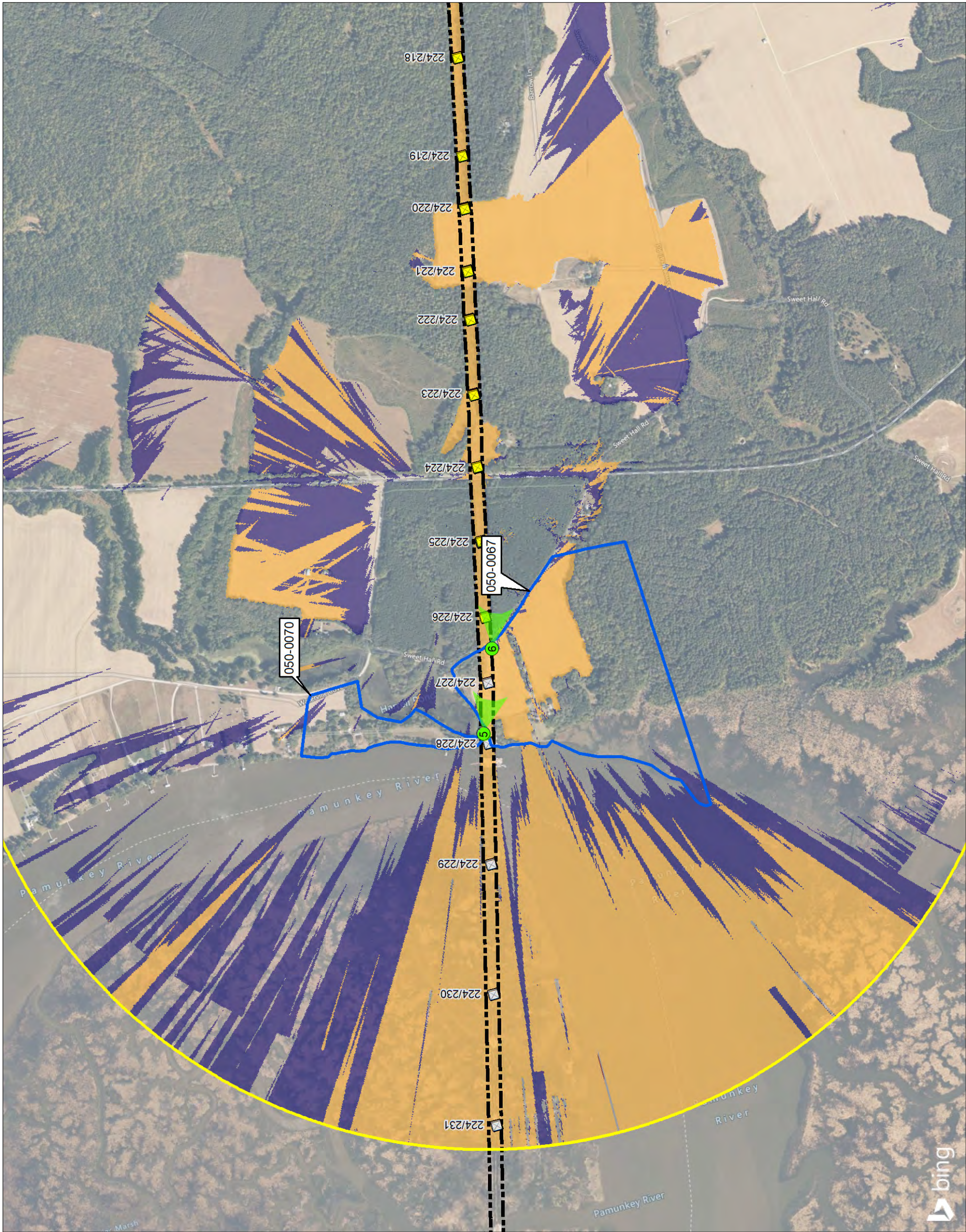
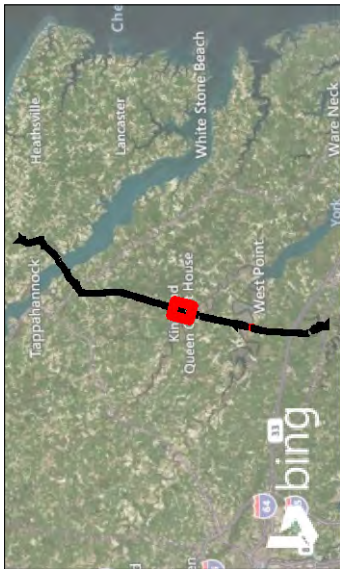
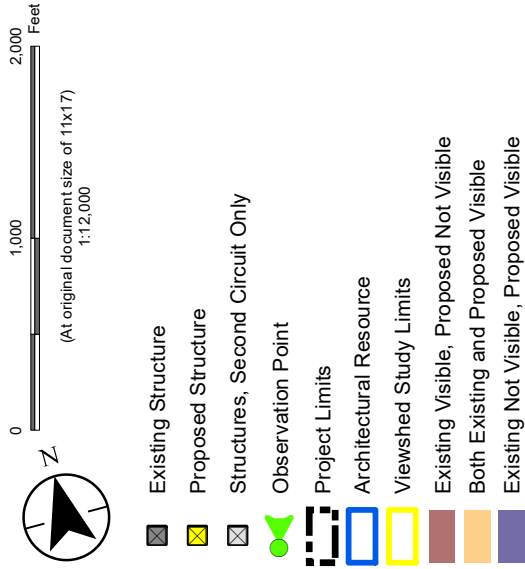
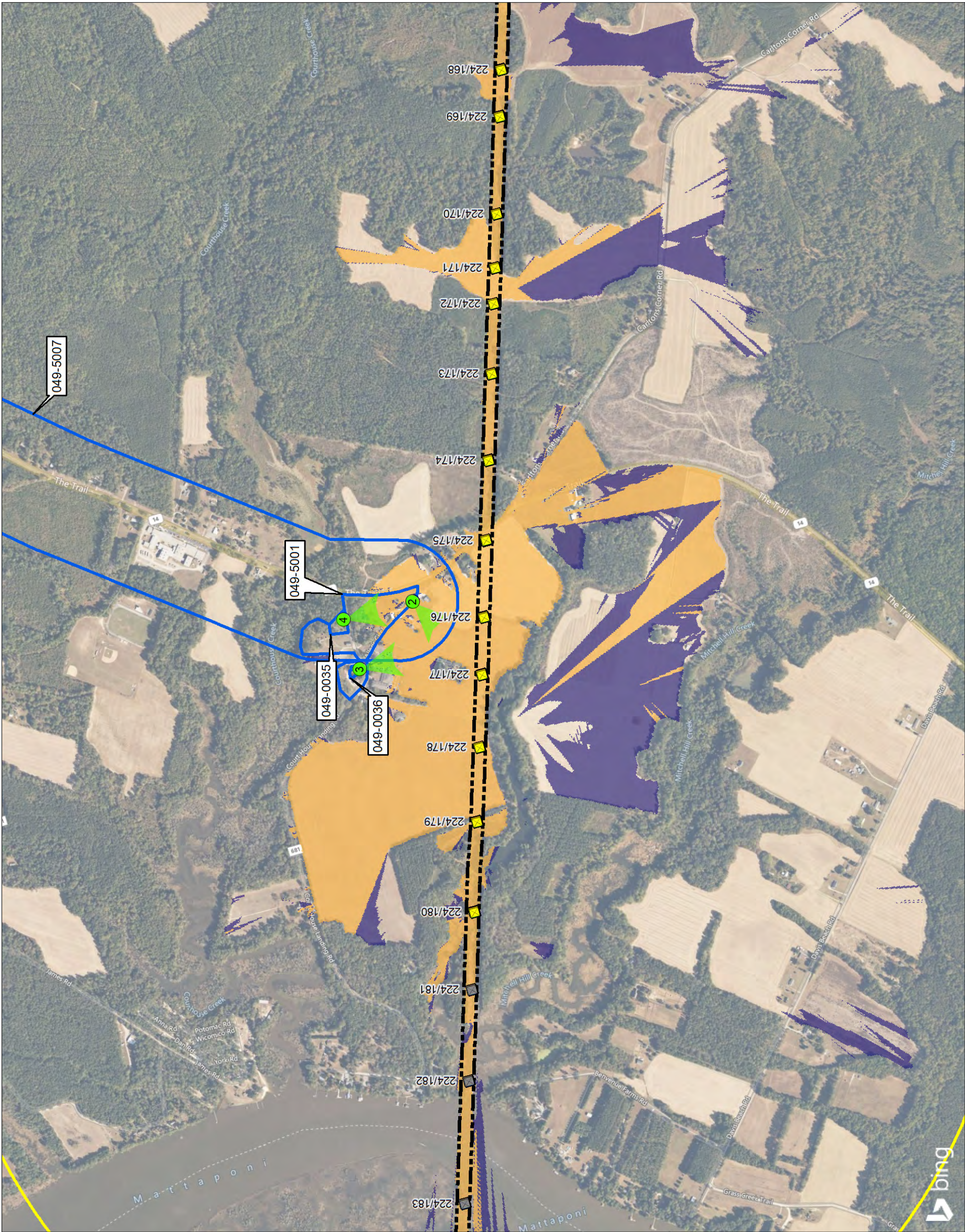


Figure No. **Attachment II.B.6.c.i**
Title **Historic Property Simulation Map**

Client/Project 203401404
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208
Project Location
New Kent, King William, King and Queen,
Essex, and Richmond Counties, Virginia
Prepared by TPS on 2020-04-07
TR by ECL on 2020-09-18
IR by CPG on 2020-09-18



Notes
1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
2. Data Sources: Dominion Energy Virginia, Stantec, VGIN, Historic resource data provided by VGIN, Department of Historic Resources, Virginia Cultural Resources Information System (VCRIS)
3. Viewshed analysis produced from digital elevation model and digital surface model derived from VGIN LIDAR
4. Only structures within 1-Mile from eligible architectural resources and within the project limits were considered in this analysis
5. Orthomageary © Bing Maps
6. Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation



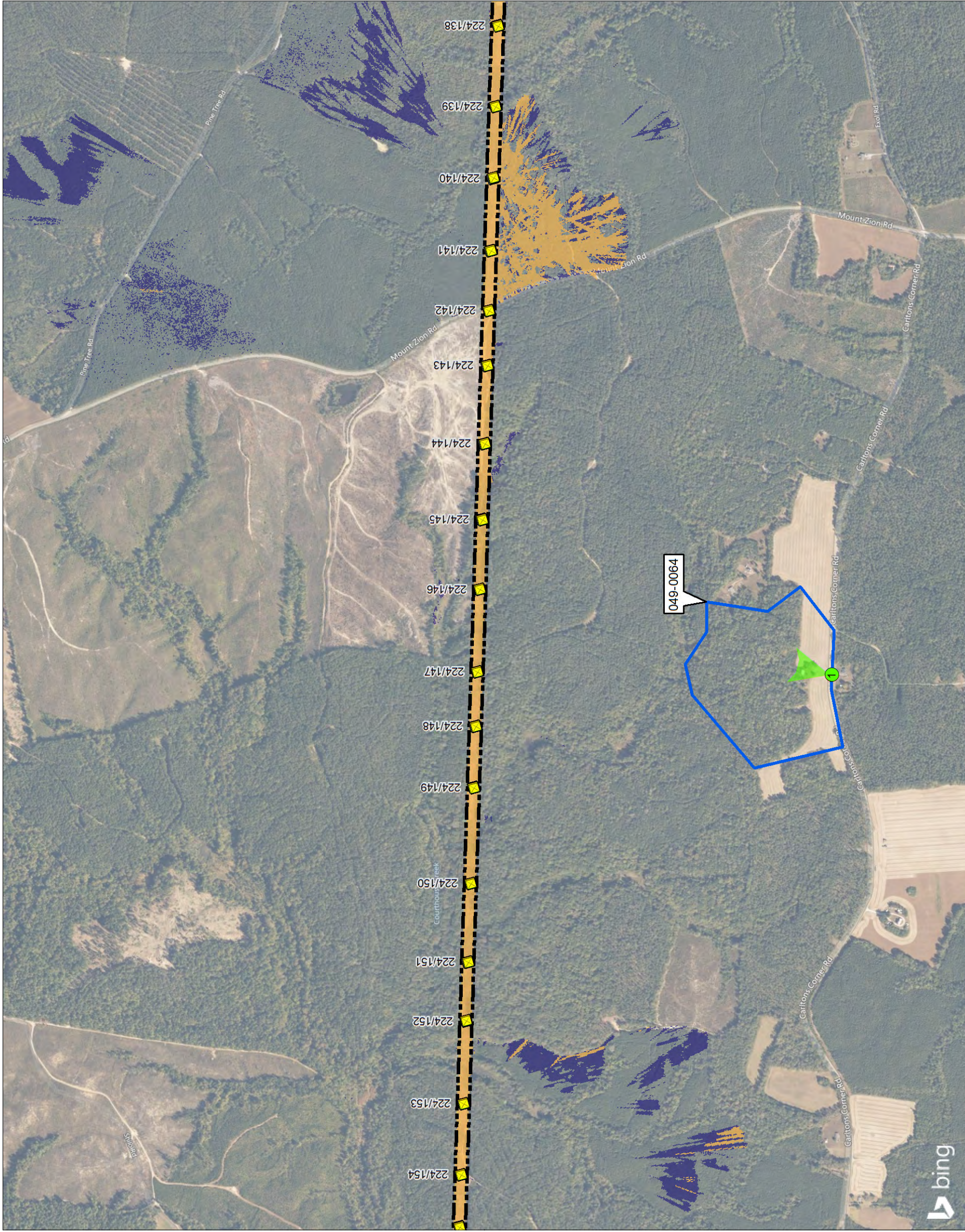
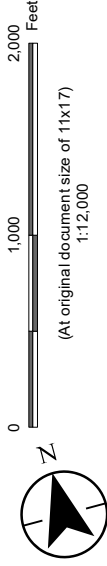
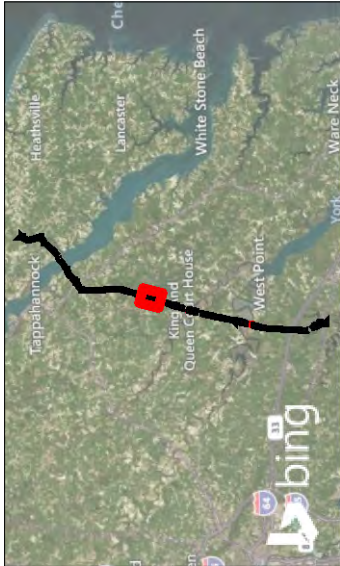


Figure No. **Attachment II.B.6.c.i**
Title **Historic Property Simulation Map**

Client/Project 203401404
Dominion Energy Virginia
Lanexa-Northern Neck 230 kV Transmission Line #224
Rebuild and New 230 kV Line #2208
Project Location Prepared by TPS on 2020-04-07
New Kent, King William, King and Queen, TR by ECL on 2020-09-18
Essex, and Richmond Counties, Virginia IR by CPG on 2020-09-18



- Existing Structure
- Proposed Structure
- Structures, Second Circuit Only
- Observation Point
- Project Limits
- Architectural Resource
- Viewshed Study Limits
- Existing Visible, Proposed Not Visible
- Both Existing and Proposed Visible
- Existing Not Visible, Proposed Visible



Notes
1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
2. Data Sources: Dominion Energy Virginia, Stantec, VGIN, Historic resource data provided by VGIN, Department of Historic Resources, Virginia Cultural Resources Information System
3. Viewshed analysis produced from digital elevation model and digital surface model derived from VGIN LIDAR
4. Only structures within 1-Mile from eligible architectural resources and within the project limits were considered in this analysis
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6. Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation





Photograph provided by Stantec

OP 1 Existing
Rose Garden (DHR #049-0064)





Photograph provided by Stantec

OP 2 Existing
Walkerton Battlefield (DHR #049-5007),
King & Queen Courthouse Historic District (DHR #049-5001)



Representation provided by Stantec

OP 2 Proposed
Walkerton Battlefield (DHR #049-5007),
King & Queen Courthouse Historic District (DHR #049-5001)



Photograph provided by Stantec

OP 3 Existing
 King and Queen County Court House (DHR #049-0036),
 King & Queen Courthouse Historic District (DHR #049-5001)



Representation provided by Stantec

OP 3 Proposed
King and Queen County Court House (DHR #049-0036),
King & Queen Courthouse Historic District (DHR #049-5001)



Photograph provided by Stantec

OP 4 Existing
King and Queen County Courthouse Green Historic District (DHR #049-5001),
Walkerton Battlefield (DHR #049-5007), Immanuel Chapel (DHR #049-0035)



Representation provided by Stantec

OP 4 Proposed (no visibility)

King and Queen County Courthouse Green Historic District (DHR #049-5001),
Walkerton Battlefield (DHR #049-5007), Immanuel Chapel (DHR #049-0035)



Photograph provided by Stantec

OP 5 Existing
Sweet Hall (DHR #050-0067)



Representation provided by Stantec

OP 5 Proposed
Sweet Hall (DHR #050-0067)





Photograph provided by Stantec

OP 6 Existing
Sweet Hall (DHR #050-0067)



Representation provided by Stantec

OP 6 Proposed
Sweet Hall (DHR #050-0067)

II. DESCRIPTION OF THE PROPOSED PROJECT

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

Response: Substation work associated with the Project is as follows:

At Lanexa Substation, the Project will require expanding the substation, expanding the control enclosure, the installation of three 230 kV circuit breakers and six 230 kV switches, as well as replacing three existing 230 kV switches to current substation standards.

At Dunnsville Substation, the Project will require replacing one existing 230 kV switch to current substation standards.

At Northern Neck Substation, the Project will require expanding the substation, expanding the control enclosure, and installing four 230 kV circuit breakers and eight 230 kV switches.

One-line diagram for the existing Lanexa Substation is provided as Attachment II.C.1. The proposed one-line diagram is provided as Attachment II.C.2. The proposed general arrangement is provided as Attachment II.C.3.

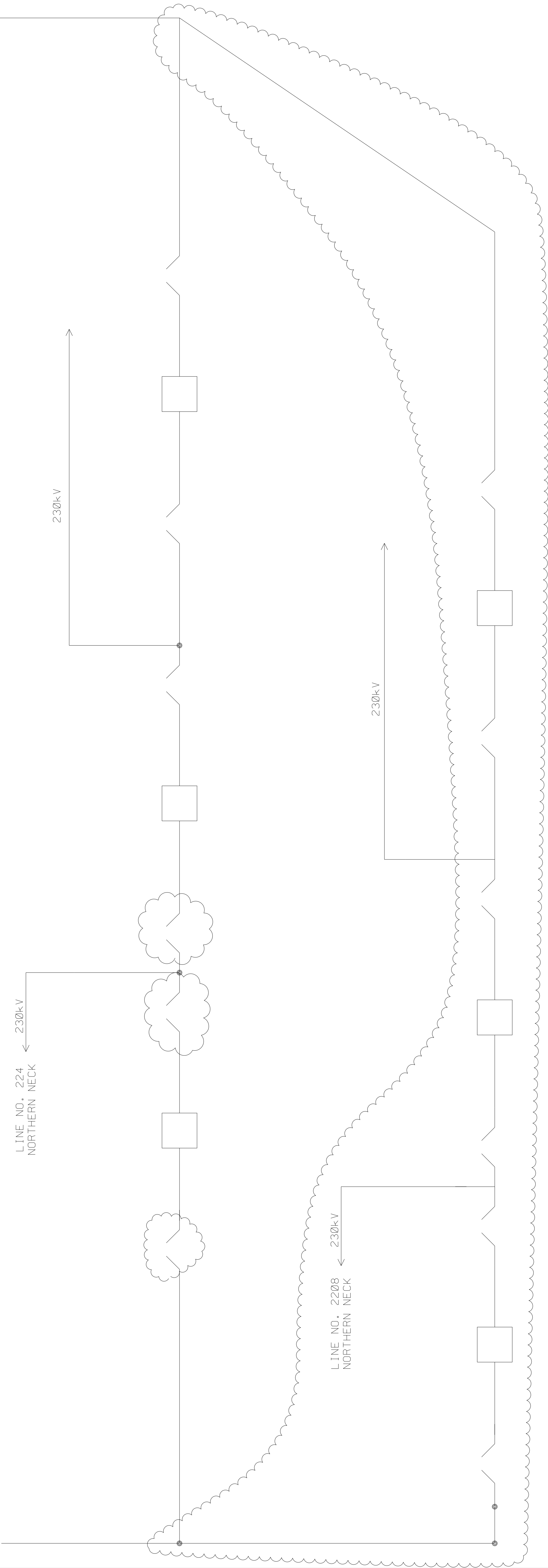
The proposed one-line diagram for the Dunnsville Substation is provided as Attachment II.C.4. Note that the existing and proposed one-line diagrams appear the same based on the work being performed; therefore, only the proposed diagram is provided. A proposed general arrangement drawing similarly would not reflect any physical changes at the substation based on the proposed work.

The one-line diagram for the existing Northern Neck substation is provided as Attachment II.C.5. The proposed one-line diagram is provided as Attachment II.C.6. The proposed general arrangement is provided as Attachment II.C.7.

			Substation LANEXA	Drawing No. II.C.1
	Drawn By:	Date		
	Approval	Date		

By:		Date:	Project No.	BM No.	Description

By:	Approval	Revisions			
	Date:	Project No.	BM No.	Description	





Dominion

Energy®

Substation

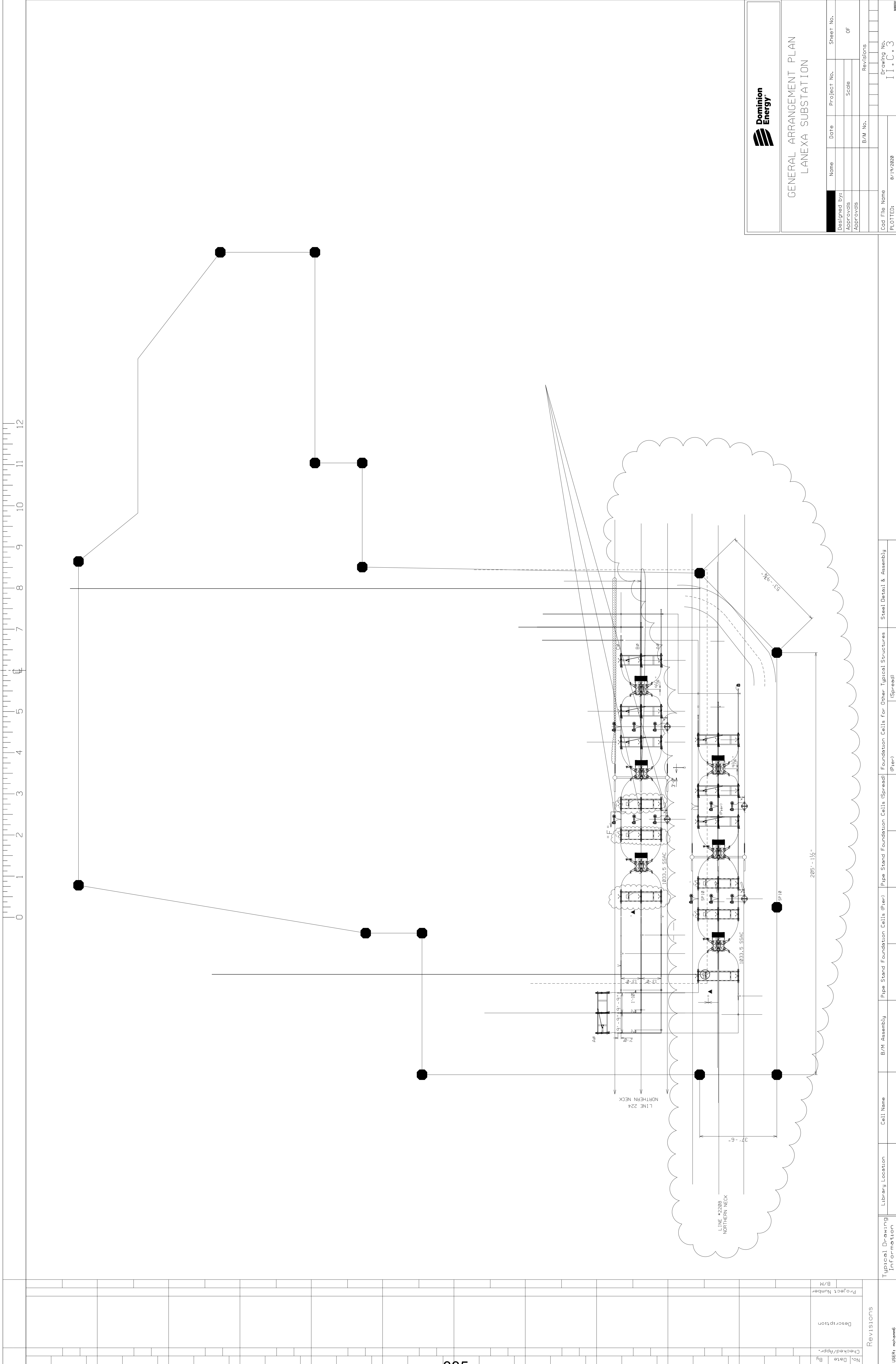
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Drawing No.

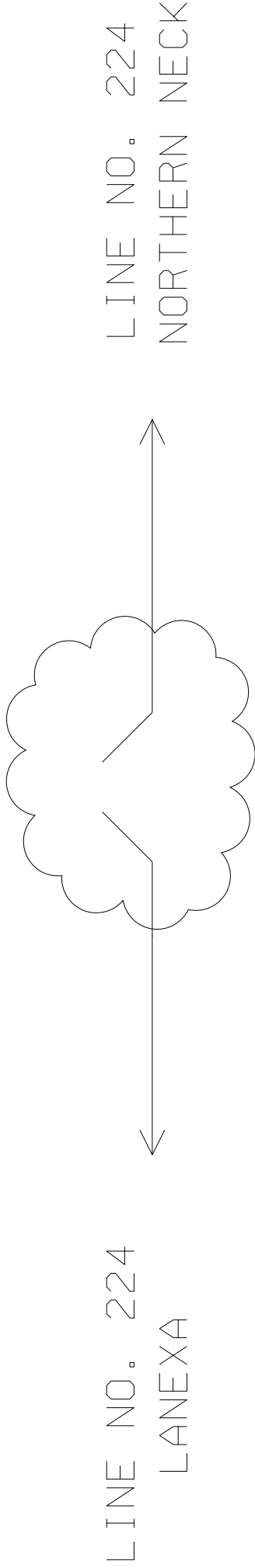
II.C.2

8/19/2020

Drawn By:	Date
Approval	Date



Revisions		By: Approval		Date: Approval		Project No.		BM No.		Description	





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Energy®**

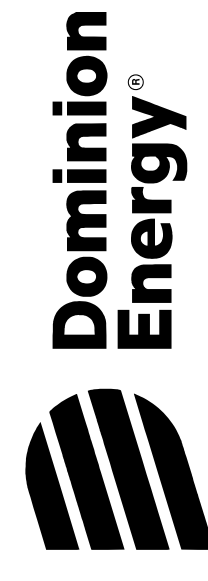
Drawn By:	Date	Substation DUNSVILLE
Approval	Date	Drawing No. II.C.4

8/19/2020

Revisions											
By:		Approval		Date:		Project No.		BM No.		Description	

Drawn By:	Date	Substation NORTHERN NECK
Approval	Date	Drawing No. II.C.5

USER: mohamm6



8/19/2020

Substation NORTHERN NECK

Drawing No. II.C.6

Drawn By: _____ Date _____

Approval	Date
----------	------

By: _____		Approval _____		Date: _____		Project No. _____		BM No. _____		Description _____	

Revisions

USER: mohamm6

