New HVDC Transmission Link from Heritage to Mosby

General Information

Proposing entity name	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Does the entity who is submitting this proposal intend to be the Designated Entity for this proposed project?	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Company proposal ID	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
PJM Proposal ID	815
Project title	New HVDC Transmission Link from Heritage to Mosby
Project description	Construct a new bipolar ±525kV HVDC transmission link between the Heritage and Mosby Substations. This HVDC link will have a total transmission capacity of 6,000 MW, with 3,000 MW to be implemented in Phase 1, and an additional 3,000 MW planned for Phase 2. Construct two converter stations, one at each substation (Heritage and Mosby), each with a capacity of 3,000 MW. Install a bipolar HVDC transmission line, approximately 185 miles in length, fully routed underground between the two substations.
Email	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Project in-service date	06/2032
Tie-line impact	No
Interregional project	No
Is the proposer offering a binding cap on capital costs?	Yes
Additional benefits	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.

Project Components

1. New HVDC Line - Heritage to Mosby_Alt 1 (Primary Alternative)
2. New HVDC Line - Heritage to Mosby Phase 1_Alt 2
3. New HVDC Line - Heritage to Mosby Phase 2_Alt 2

4. Heritage Substation – HVDC Converter Station Scope

5. Mosby Substation - HVDC Converter Station Scope

Greenfield Transmission Line Component

Component title	New HVDC Line - Heritage to Mosby_Alt 1 (Primary Alternative)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Point A	Heritage
Point B	Mosby
Point C	

	Normal ratings	Emergency ratings
Summer (MVA)	3000.000000	3000.000000
Winter (MVA)	3000.000000	3000.000000

Conductor size and type	The preferred Dominion Energy cable system to be installed is an XLPE cable system, designed to AEIC CS9 standards. Each circuit will consist of schedule 40 PVC conduits encased in concrete.
Nominal voltage	DC
Nominal voltage	+- 525 kV HVDC
Line construction type	Underground
General route description	The HVDC link starts at Heritage Substation in Freeman, VA and travels north approximately 185 miles to Mosby Substation in Aldie, VA.
Terrain description	This project is approximately 185 miles through the piedmont region. The counties include Greensville, Dinwiddie, Chesterfield, Powhatan, Goochland, Hanover, Caroline, Spotsylvania, Stafford, Fauquier, Prince William, and Loudoun Counties. The areas range from rural, suburban to densely urban. There would be civil infrastructure, wetland and stream crossings to navigate.

Right-of-way width by segment	Existing Dominion ROW to be used for this project. A permanent easement, or Right-of-Way (ROW), is required for each duct bank post installation for operation and maintenance. This easement will primarily be used to limit vegetation, prevent external parties from digging into the duct bank, and to maintain or repair the lines. The physical footprint of the duct banks is assumed to be 8 feet wide. For typical operations and maintenance practice, 15-ft is added to each side of the duct banks. The total permanent new Right-of-Way necessary for the underground cable system would be 40-ft. For trenchless crossings, 150ft of ROW is needed for Horizontal Directional Drilling and 50ft of ROW is needed for Jack and Bore. At locations where splice vaults are required, the ROW will need to expand to 40-ft to accommodate the larger footprint of the system.
Electrical transmission infrastructure crossings	To be determined in detailed design
Civil infrastructure/major waterway facility crossing plan	Refer to the attached Real Estate and Permitting Summary
Environmental impacts	Refer to the attached Real Estate and Permitting Summary
Tower characteristics	Approx. Quantities for a Single Circuit, Two Cable Set Installation: o Length of Duct Bank: 976,800-ft o 525 kV Cable Length: 3,907,200-ft o 525 kV Open-Air Terminations: 8 o 525 kV Splice: 1,564 o 525 kV Manholes: 391 o Major Crossings (HDD): 14 o Minor Crossings (J&B): 16
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Component Cost Details - In Current Year $	
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$2,271,695,522.99

Component cost (in-service year)	$2,432,985,905.00

Greenfield Transmission Line Component

Component title	New HVDC Line - Heritage to Mosby Phase 1_Alt 2
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Point A	Heritage
Point B	Mosby
Point C	

	Normal ratings	Emergency ratings
Summer (MVA)	3000.000000	3000.000000
Winter (MVA)	3000.000000	3000.000000

Conductor size and type	The preferred Dominion Energy cable system to be installed is an XLPE cable system, designed to AEIC CS9 standards. Each circuit will consist of schedule 40 PVC conduits encased in concrete.
Nominal voltage	DC
Nominal voltage	+- 525 kV HVDC
Line construction type	Underground
General route description	The HVDC link starts at Heritage Substation in Freeman, VA and travels north approximately 185 miles to Mosby Substation in Aldie, VA.
Terrain description	This project is approximately 191 miles through the piedmont region. The counties include Greensville, Dinwiddie, Chesterfield, Powhatan, Goochland, Hanover, Caroline, Spotsylvania, Stafford, Fauquier, Prince William, and Loudoun Counties. The areas range from rural, suburban to densely urban. There would be civil infrastructure, wetland and stream crossings to navigate.

Right-of-way width by segment	Existing Dominion ROW to be used for this project. A permanent easement, or Right-of-Way (ROW), is required for each duct bank post installation for operation and maintenance. This easement will primarily be used to limit vegetation, prevent external parties from digging into the duct bank, and to maintain or repair the lines. The physical footprint of the duct banks is assumed to be 8 feet wide. For typical operations and maintenance practice, 15-ft is added to each side of the duct banks. The total permanent new Right-of-Way necessary for the underground cable system would be 40-ft. For trenchless crossings, 150ft of ROW is needed for Horizontal Directional Drilling and 50ft of ROW is needed for Jack and Bore. At locations where splice vaults are required, the ROW will need to expand to 40-ft to accommodate the larger footprint of the system.
Electrical transmission infrastructure crossings	To be determined in detailed design
Civil infrastructure/major waterway facility crossing plan	Refer to the attached Real Estate and Permitting Summary
Environmental impacts	Refer to the attached Real Estate and Permitting Summary
Tower characteristics	Approx. Quantities for a Single Circuit, Two Cable Set Installation: o Length of Duct Bank: 976,800-ft o 525 kV Cable Length: 3,907,200-ft o 525 kV Open-Air Terminations: 8 o 525 kV Splice: 1,564 o 525 kV Manholes: 391 o Major Crossings (HDD): 14 o Minor Crossings (J&B): 16
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Component Cost Details - In Current Year $	
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$.00

Component cost (in-service year)	$.00

Greenfield Transmission Line Component

Component title	New HVDC Line - Heritage to Mosby Phase 2_Alt 2
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Point A	Heritage
Point B	Mosby
Point C	

	Normal ratings	Emergency ratings
Summer (MVA)	3000.000000	3000.000000
Winter (MVA)	3000.000000	3000.000000

Conductor size and type	The preferred Dominion Energy cable system to be installed is an XLPE cable system, designed to AEIC CS9 standards. Each circuit will consist of schedule 40 PVC conduits encased in concrete.
Nominal voltage	DC
Nominal voltage	+- 525 kV HVDC
Line construction type	Underground
General route description	The HVDC link starts at Heritage Substation in Freeman, VA and travels north approximately 185 miles to Mosby Substation in Aldie, VA.
Terrain description	This project is approximately 185 miles through the piedmont region. The counties include Greensville, Dinwiddie, Chesterfield, Powhatan, Goochland, Hanover, Caroline, Spotsylvania, Stafford, Fauquier, Prince William, and Loudoun Counties. The areas range from rural, suburban to densely urban. There would be civil infrastructure, wetland and stream crossings to navigate.

Right-of-way width by segment	Existing Dominion ROW to be used for this project. A permanent easement, or Right-of-Way (ROW), is required for each duct bank post installation for operation and maintenance. This easement will primarily be used to limit vegetation, prevent external parties from digging into the duct bank, and to maintain or repair the lines. The physical footprint of the duct banks is assumed to be 8 feet wide. For typical operations and maintenance practice, 15-ft is added to each side of the duct banks. The total permanent new Right-of-Way necessary for the underground cable system would be 40-ft. For trenchless crossings, 150ft of ROW is needed for Horizontal Directional Drilling and 50ft of ROW is needed for Jack and Bore. At locations where splice vaults are required, the ROW will need to expand to 40-ft to accommodate the larger footprint of the system.
Electrical transmission infrastructure crossings	To be determined in detailed design
Civil infrastructure/major waterway facility crossing plan	Refer to the attached Real Estate and Permitting Summary
Environmental impacts	Refer to the attached Real Estate and Permitting Summary
Tower characteristics	Refer to Phase 1
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Component Cost Details - In Current Year $	
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$.00
Component cost (in-service year)	$.00

Substation Upgrade Component

Component title	Heritage Substation – HVDC Converter Station Scope
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Substation name	Heritage
Substation zone	345
Substation upgrade scope	Existing Substation: Purchase & Install Substation Material: 1. Eight (8), 500kV, 5000A, 63kA, Circuit Breakers 2. Sixteen (16), 500kV, 5000A, Double-End Break Switches 3. Twelve (12), 500kV, Relay Accuracy CCVTs 4. Eighteen (18), 396kV MO, 318kV MCOV, Lightning Arresters 5. Approximately 5000 feet of 6” Schedule 80 AL Bus, and associated connections. 6. Conductor, connectors, conduit, control cable, foundations, structures, steel, and grounding material as per engineering standards 7. Ground grid for the expanded substation as per Dominion Energy Standards 8. Site preparation, grading and stormwater management system for the Substation Purchase & Install Relay Material: 1. Eight (8), 4510 - SEL-2411 Equipment Annunciator 2. Eight (8), 1510 – Dual SEL-351 Transmission Breaker w/ Reclosing Panel 3. Eight (8), 4514 – Circuit Breaker C.T. Makeup Box 4. Eight (4), 4535 or 4536 – 500kV Circuit Breaker Condition Monitor 5. Two (2), 1340 – Dual SEL-411L DCB/Fiber, CD/Fiber Line Panel (500kV w/ 2 Fiber Cables) 6. Two (2), 1110 – Dual SEL-587Z/351A Bus Panel 7. Four (4), 4506 – 3Ø CCVT Potential Makeup Box 8. Eight (4), 4526_D – C.B. w/ BCM Fiber Optic Makeup Box + 525 kV HVDC Converter Station: • HVDC system and product engineering for a Bi-pole VSC HVDC links rated at 525kVdc and 3000MW • Project management of HVDC scope of work • Procurement and manufacturing of HVDC equipment • AC Yard Equipment from converter building to AC Breaker line side connection • Logistics, transportation, and delivery to site of all GEV's supplied equipment. • Unloading of in-scope equipment at site. • Erection and installation supervision of supplied equipment. • Provision of civil work guide drawings for Dominion to undertake construction and furnishing of the converter building. • Equipment and Sub-system testing. • Commissioning of HVDC system. • Mandatory spare parts for the performance period (3 years from the end of burn-in period). • Spare HVDC converter transformers • Ground grid for the entire substation as per Dominion Energy Standards • Site preparation, grading and stormwater management system for the Substatio

Transformer Information

None

New equipment description	1. Eight (8), 500kV, 5000A, 63kA, Circuit Breakers 2. Sixteen (16), 500kV, 5000A, Double-End Break Switches 3. Twelve (12), 500kV, Relay Accuracy CCVTs 4. Eighteen (18), 396kV MO, 318kV MCOV, Lightning Arresters 5. Eight (8), 4510 - SEL-2411 Equipment Annunciator 6. Eight (8), 1510 – Dual SEL-351 Transmission Breaker w/ Reclosing Panel 7. Eight (8), 4514 – Circuit Breaker C.T. Makeup Box 8. Eight (4), 4535 or 4536 – 500kV Circuit Breaker Condition Monitor 9. Two (2), 1340 – Dual SEL-411L DCB/Fiber, CD/Fiber Line Panel (500kV w/ 2 Fiber Cables) 10. Two (2), 1110 – Dual SEL-587Z/351A Bus Panel 11. Four (4), 4506 – 3Ø CCVT Potential Makeup Box 12. Eight (4), 4526_D – C.B. w/ BCM Fiber Optic Makeup Box
Substation assumptions	1. The scope of work depicted on the drawings assumes that there is no overlap with other designs and construction activities, except if mentioned in this Project Summary. 2. All connections must be updated to maintain 5000A. 3. Relay Settings and P&C design will be revised as part of the SPE Scope of Work.
Real-estate description	No new real estate required.
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Component Cost Details - In Current Year $	
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$773,733,113.02
Component cost (in-service year)	$828,668,164.00

Substation Upgrade Component

Component title	Mosby Substation - HVDC Converter Station Scope
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Substation name	Heritage
Substation zone	345
Substation upgrade scope	Existing Substation: Purchase & Install Substation Material: 1. Four (4), 500kV, 5000A, 63kA, Circuit Breakers 2. Eight (8), 500kV, 5000A, Double-End Break Switches 3. Six (6), 500kV, Relay Accuracy CCVTs 4. Six (6), 396kV MO, 318kV MCOV, Lightning Arresters 5. Approximately 3400 feet of Gas Insulated Bus (GIB), and associated connections. 6. Conductor, connectors, conduit, control cable, foundations, structures, steel, and grounding material as per engineering standards 7. Ground grid for the expnaded substation as per Dominion Energy Standards 8. Site preparation, grading and stormwater management system for the Substation Purchase & Install Relay Material: 1. Four (4), 4510 - SEL-2411 Equipment Annunciator 2. Four (4), 1510 – Dual SEL-351 Transmission Breaker w/ Reclosing Panel 3. Four (4), 4514 – Circuit Breaker C.T. Makeup Box 4. Four (4), 4535 or 4536 – 500kV Circuit Breaker Condition Monitor 5. Two (2), 1340 – Dual SEL-411L DCB/Fiber, CD/Fiber Line Panel (500kV w/ 2 Fiber Cables) 6. Two (2), 4506 – 3Ø CCVT Potential Makeup Box 7. Four (4), 4526_D – C.B. w/ BCM Fiber Optic Makeup Box + 525 kV HVDC Converter Station: • HVDC system and product engineering for a Bi-pole VSC HVDC links rated at 525kVdc and 3000MW • Project management of HVDC scope of work • Procurement and manufacturing of HVDC equipment • AC Yard Equipment from converter building to AC Breaker line side connection • Logistics, transportation, and delivery to site of all GEV's supplied equipment. • Unloading of in-scope equipment at site. • Erection and installation supervision of supplied equipment. • Provision of civil work guide drawings for Dominion to undertake construction and furnishing of the converter building. • Equipment and Sub-system testing. • Commissioning of HVDC system. • Mandatory spare parts for the performance period (3 years from the end of burn-in period). • Spare HVDC converter transformers • Ground grid for the entire substation as per Dominion Energy Standards • Site preparation, grading and stormwater management system for the Substation

Transformer Information

None

New equipment description	1. Four (4), 500kV, 5000A, 63kA, Circuit Breakers 2. Eight (8), 500kV, 5000A, Double-End Break Switches 3. Six (6), 500kV, Relay Accuracy CCVTs 4. Six (6), 396kV MO, 318kV MCOV, Lightning Arresters 5. Four (4), 4510 - SEL-2411 Equipment Annunciator 6. Four (4), 1510 – Dual SEL-351 Transmission Breaker w/ Reclosing Panel 7. Four (4), 4514 – Circuit Breaker C.T. Makeup Box 8. Four (4), 4535 or 4536 – 500kV Circuit Breaker Condition Monitor 9. Two (2), 1340 – Dual SEL-411L DCB/Fiber, CD/Fiber Line Panel (500kV w/ 2 Fiber Cables) 10. Two (2), 4506 – 3Ø CCVT Potential Makeup Box 11. Four (4), 4526_D – C.B. w/ BCM Fiber Optic Makeup Box
Substation assumptions	1. The scope of work depicted on the drawings assumes that there is no overlap with other designs and construction activities, except if mentioned in this Project Summary. 2. All connections must be updated to maintain 5000A. 3. Relay Settings and P&C design will be revised as part of the SPE Scope of Work.
Real-estate description	No new real estate required.
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Component Cost Details - In Current Year $	
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$745,422,435.02
Component cost (in-service year)	$798,347,428.00

Congestion Drivers

None

Existing Flowgates

None

New Flowgates

The redacted information is proprietary to the Company; therefore, it is privileged and confidential.

Financial Information

Capital spend start date	01/2026
Construction start date	06/2029
Project Duration (In Months)	77

Cost Containment Commitment

Cost cap (in current year)	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Cost cap (in-service year)	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.

Components covered by cost containment

1. New HVDC Line - Heritage to Mosby_Alt 1 (Primary Alternative) - Dominion
2. Heritage Substation – HVDC Converter Station Scope - Dominion
3. Mosby Substation - HVDC Converter Station Scope - Dominion

Cost elements covered by cost containment

Engineering & design	Yes
Permitting / routing / siting	No
ROW / land acquisition	No

Materials & equipment	No
Construction & commissioning	No
Construction management	No
Overheads & miscellaneous costs	No
Taxes	No
AFUDC	No
Escalation	No
Additional Information	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Is the proposer offering a binding cap on ROE?	Yes
Would this ROE cap apply to the determination of AFUDC?	Yes
Would the proposer seek to increase the proposed ROE if FERC finds that a higher ROE would not be unreasonable?	No
Is the proposer offering a Debt to Equity Ratio cap?	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.

Additional Comments

None