

# Occoquan 500-230kV Transformer (OX Transformer Overload)

## 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	637
Project title	Occoquan 500-230kV Transformer (OX Transformer Overload)
Project description	Proposal 99-2945-1 expands the existing Occoquan substation footprint via the installation of a 500 kV GIS ring bus, one(1) 1100 MVA 500-230 kV transformer and a 230 kV breaker-and-a-half bus configuration. 500 kV Line #571 (Ox – Possum Point) to be cut and looped into the proposed 500kV GIS ring bus. 230kV Line terminations 2001(Occoquan to Possum), 2013 (Occoquan to Ox) and Line 2042 (Ogden Martin to Ox) will be rearranged to terminate in the rebuilt Occoquan station. Line 215(Hayfield to Possum Point) will need to be rearranged to fly over Occoquan. The addition of the new 500-230kV transformer at Occoquan creates two generation deliverability flowgates that need to be addressed as part of this Proposal. Flowgate of Line 2036 (Glebe to Radnor Heights) requires the installation of a new breaker-and-a-half row at Ox Substation to allow for Line 237 (Braddock-Possum Point) to be cut and terminated at OX substation. Flowgate of Line 2013 (Ox to Occoquan) requires the uprate of the line to a summer rating of 1046 MVA by fully reconductoring the line and upgrading applicable line equipment (CTs and switches) Additionally, Ox Breaker (201342) is overdutied based on the previous work in this Proposal and will need to be upgraded to a 63kA breaker.
Email	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Project in-service date	06/2026
Tie-line impact	No
Interregional project	No
Is the proposer offering a binding cap on capital costs?	No
Additional benefits	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.

## Project Components

1. Occoquan Station Upgrade
2. OX Substation Expansion and 201342 breaker replacement
3. Braddock Relay Resets and Field Work
4. Possum Point 230kV Substation Relay Resets and Field Work
5. Possum Point 500kV Substation Relay Resets and Field Work
6. Loop Line 571 into Occoquan Substation
7. Loop Line 237 into Ox Substation
8. Line #2013 Reconductor between Occoquan and Ox

### Substation Upgrade Component

Component title	Occoquan Station Upgrade
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Substation name	Occoquan
Substation zone	351
Substation upgrade scope	See the Scope of Work document attached to this component. Proposal 99-2945-1 provides for the installation of a 500kV GIS ring bus, a new 500-230 kV Transformer Bank and a 230kV breaker and half bus configuration at Occoquan Substation. The substation will be expanded to install the proposed 230kV breakers to the east of existing Occoquan Substation and the 500kV GIS Building and Transformer Bank will located to the west. The existing distribution Transformers will be connected to the new 230 kV buses.

### Transformer Information

	Name	Capacity (MVA)	
Transformer	Occoquan TX#1	1100	
	<b>High Side</b>	<b>Low Side</b>	<b>Tertiary</b>
Voltage (kV)	500	230	

New equipment description	The major components being installed at Possum Point 230kV Substation include: 1. Four (4), 500-230kV, 280MVA single phase autotransformers 2. One (1), 500kV, 5000A, Double End Break, Motor Operated Disconnect Switch 3. Three (3), 500kV, 5000A, 63kA, GIS Circuit Breakers. 4. Seven (7), 500kV, 5000A GIS Switches 5. One (1), 500kV, 5000A wave trap 6. Seven (7), 230kV, 4000A, 63kAIC, SF-6 circuit breakers 7. Fifteen (15), 230 kV, 4000 A, double-end-break switches 8. Three (3), 230 kV, 4000 A wave traps The entire Scope of Work (SOW) is attached in the Substation Supporting Documents section with the Possum Point 500kV operating and 992945-3 proposal substation drawings.
Substation assumptions	Substation expansion will be contained within Dominion-owned property.
Real-estate description	The substation footprint will be expanded to accommodate the new equipment. See attached 992945-1 Real Estate and Permitting Summary.
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.
<b>Component Cost Details - In Current Year \$</b>	
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	\$59,438,805.00
Component cost (in-service year)	\$63,658,960.00
<b>Substation Upgrade Component</b>	
Component title	OX Substation Expansion and 201342 breaker replacement

Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Substation name	OX
Substation zone	351
Substation upgrade scope	See the Scope of Work document attached to this component. Proposal 99-2945-1 provides for Line 571 destination change from Possum Point 500kV Substation to Occoquan Substation. Replace the 571 Line Relays and remove the Wave Trap. One 230 kV Circuit Breaker (CB 201342) will be replaced with the 63 kA rated breaker. A new breaker-and-half row will be added with three 230 kV, 63 kA Circuit Breakers. Substation expansion will be required to accommodate new infrastructure. Level 1 fence will be expanded. Purchase and Install Substation material: 1. Four (4), 230 kV, 63 kA, 4000 A Circuit Breakers 2. Six (6), 230 kV, 4000 Amps double-end-break disconnect switches 3. Six (6), 230kV, CCVT's 4. Six (6), 180kV, 144kV MCOV Surge Arresters 5. One (1), 230 kV, 4000 Amps, Wave Trap 6. Approximately 750 FT of 5 IN Tubular Bus and Connectors 7. Approximately 475 FT of 20 FT tall, Level 1 Security fence along with security integrators 8. Site development and Ground Grid expansion as required 9. Install conductors, connectors, conduits, cables, grounding as per Dominion Engineering standards 10. Remove- Line 571 Wave Trap, one 230 kV Circuit Breaker, section of fence Purchase and Install Relay material: 1. Four (4), 4510 - SEL-2411 Breaker Annunciator 2. Three (3), 1510 – 24” Dual SEL-351 Transmission Breaker w/ Reclosing Panel 3. One (1), 1340 – 24” Dual SEL-411L CD/Fiber Line Panel 4. Two (2), 1340 – 24” Dual SEL-411L DCB/PLC Line Panel 5. Two (2), 4506 – 3Ø CCVT Potential M.U. Box 6. Four (4), 4526_A – Circuit Breaker Fiber Optic M.U. Box 7. Two (2), 4007 – 225A Outdoor Transmission Yard AC NQOD 8. Two (2), 4019 – 225A Three Phase Throwover Switch 9. One (1), Panel Retirement

## Transformer Information

None	
New equipment description	The major components being installed at Possum Point 230kV Substation include: 1. Four (4), 230 kV, 63 kA, 4000 A Circuit Breakers 2. Six (6), 230 kV, 4000 Amps double-end-break disconnect switches 3. One (1), 230 kV, 4000 Amps, Wave Trap
Substation assumptions	Substation expansion will be contained within Dominion-owned property.
Real-estate description	The substation footprint will be expanded to accommodate the new equipment. See attached 992945-1 Real Estate and Permitting Summary.
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	\$5,505,374.00
Component cost (in-service year)	\$5,896,256.00

### **Substation Upgrade Component**

Component title	Braddock Relay Resets and Field Work
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Substation name	Braddock
Substation zone	351
Substation upgrade scope	System Protection Engineering Coordination Study and System Protection Technician relay resets ONLY.

### **Transformer Information**

None	
New equipment description	No substation materials or relay materials are required for this proposal.
Substation assumptions	No additional relay equipment required for this proposal.

Real-estate description	The substation will not be expanded for this proposal.
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.
<b>Component Cost Details - In Current Year \$</b>	
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	\$33,637.00
Component cost (in-service year)	\$36,025.00
<b>Substation Upgrade Component</b>	
Component title	Possum Point 230kV Substation Relay Resets and Field Work
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Substation name	Possum Point 230kV
Substation zone	351
Substation upgrade scope	System Protection Engineering Coordination Study and System Protection Technician relay resets ONLY.

**Transformer Information**

None	
New equipment description	No substation materials or relay materials are required for this proposal.
Substation assumptions	No additional relay equipment required for this proposal.
Real-estate description	The substation will not be expanded for this proposal.
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	\$33,637.00
Component cost (in-service year)	\$36,025.00

**Substation Upgrade Component**

Component title	Possum Point 500kV Substation Relay Resets and Field Work
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Substation name	Possum Point 500kV
Substation zone	351

Substation upgrade scope

System Protection Engineering Coordination Study and System Protection Technician relay resets ONLY.

## Transformer Information

None

New equipment description

No substation materials or relay materials are required for this proposal.

Substation assumptions

No additional relay equipment required for this proposal.

Real-estate description

The substation will not be expanded for this proposal.

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

\$33,637.00

Component cost (in-service year)

\$36,025.00

## Transmission Line Upgrade Component

Component title

Loop Line 571 into Occoquan Substation



Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Impacted transmission line	571
Point A	Possum Point
Point B	Ox
Point C	
Terrain description	This work will occur at Occoquan substation.

**Existing Line Physical Characteristics**

Operating voltage	500
Conductor size and type	3-1534 ACAR (42/19) 90 Deg C MOT
Hardware plan description	Line hardware will not be affected by this work.
Tower line characteristics	The structures will not be affected by this work.

**Proposed Line Characteristics**

	<b>Designed</b>	<b>Operating</b>
	<b>Normal ratings</b>	<b>Emergency ratings</b>
Voltage (kV)	500.000000	500.000000
Summer (MVA)	3397.000000	3464.000000
Winter (MVA)	3984.000000	4018.000000
Conductor size and type	3-1534 ACAR (42/19) 90 Deg C MOT	
Shield wire size and type	Shield wire unchanged	
Rebuild line length	0	
Rebuild portion description	The line will not be rebuilt.	

Right of way	No additional right-of-way is needed for this project component.
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.
<b>Component Cost Details - In Current Year \$</b>	
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

**Transmission Line Upgrade Component**

Component title	Loop Line 237 into Ox Substation
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Impacted transmission line	237
Point A	Braddock
Point B	Possum Point
Point C	

Terrain description Ox Substation, located in Fairfax County, is surrounded by maintained right-of-way and a mix of residential properties and forested open space.

**Existing Line Physical Characteristics**

Operating voltage 230

Conductor size and type 1033.5 ACSS (45/7) 125°C, 2-721 ACAR (18/19) 90°C

Hardware plan description Existing Hardware will not be used for the affected portion of the Line 237 work.

Tower line characteristics Line 237 structures were installed as early as 1963. The age of the structures does not affect this project.

**Proposed Line Characteristics**

	<b>Designed</b>	<b>Operating</b>
Voltage (kV)	230.000000	230.000000
	<b>Normal ratings</b>	<b>Emergency ratings</b>
Summer (MVA)	605.000000	633.000000
Winter (MVA)	724.000000	724.000000
Conductor size and type	1033.5 ACSS (45/7) 125°C	
Shield wire size and type	7#7 alumoweld	
Rebuild line length	0	
Rebuild portion description	The line will not be rebuilt under this proposal.	
Right of way	Although the right-of-way will be expanded to accommodate the 237 cut-in, the expansion will be within Dominion-owned property.	
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	\$10,343,966.00
Component cost (in-service year)	\$11,078,388.00

**Transmission Line Upgrade Component**

Component title	Line #2013 Reconductor between Occoquan and Ox
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Impacted transmission line	2013
Point A	Occoquan
Point B	OX
Point C	
Terrain description	Ox Substation, located in Fairfax County, is surrounded by maintained right-of-way and a mix of residential properties and forested open space. As it leaves Ox Substation, the right-of-way travels across a couple of rolling hills for a short distance until it crosses Hampton Rd (Rt. 647) where the terrain gradually falls to lower points with a few small ponds and creeks near Lake Hill Drive. Then, the right-of-way rises up slightly until it terminates at Occoquan Substation which is bordered by thick woods and forested lands, with the exception of our cleared rights-of-way.

**Existing Line Physical Characteristics**

Operating voltage	230 kv
Conductor size and type	2500 ACAR (84/7) 90 Deg C MOT
Hardware plan description	Existing line hardware will not be reused.
Tower line characteristics	Structures 2013/81 and 82 were installed in 1968. Others are from 1975 and the 1990's. We have no records of structural deficiencies with these structures.

**Proposed Line Characteristics**

	<b>Designed</b>	<b>Operating</b>
Voltage (kV)	230.000000	230.000000
	<b>Normal ratings</b>	<b>Emergency ratings</b>
Summer (MVA)	1046.000000	1046.000000
Winter (MVA)	1095.000000	1095.000000
Conductor size and type	1233.6 ACSS/TW (HS-285)	
Shield wire size and type	DNO 11410 (48 fibers, 0.556" diameter)	
Rebuild line length	1.34 Miles	
Rebuild portion description	1. Remove approximately 1.44 miles of single circuit 3-phase 2500 ACAR conductor and one fiber optic shield wire from line number 2013 between Ox and Occoquan. 2. Install two DC Single Pole Suspension Structures on the 2013 and 248 Lines. One outside of Occoquan Sub and one outside of Ox Sub. 3. Install approximately 1.34 miles of 3-phase 1233.6 ACSS/TW (HS-285) conductor between Ox and Occoquan. This will include the installation of dampers. 4. Install approximately 1.34 miles of one OPGW shield wire between Ox and Hayfield. This will include the installation of dampers and splices. 5. Replace DDE Strain Conductor and Shield Wire Assemblies on seven (7) existing structures between Ox and Occoquan. 6. Replace Suspension Conductor and Shield Wire Assemblies on six (6) existing structures between Ox and Occoquan.	
Right of way	The right of way will not be expanded for this project.	
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

## Congestion Drivers

None

## Existing Flowgates

FG #	From Bus No.	From Bus Name	To Bus No.	To Bus Name	CKT	Voltage	TO Zone	Analysis type	Status
DOM-T3	314919	8OX	314068	6OX	1	500/230	345	FERC 715 Thermal	Included
DOM-T4	314919	8OX	314068	6OX	2	500/230	345	FERC 715 Thermal	Included

## New Flowgates

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

## Financial Information

Capital spend start date	01/2023
Construction start date	01/2025
Project Duration (In Months)	41

### **Additional Comments**

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