Virginia Area Seven Year Solution 1

General Information

Proposing entity name	Company confidential information
Does the entity who is submitting this proposal intend to be the Designated Entity for this proposed project?	Company confidential information
Company proposal ID	Company confidential information
PJM Proposal ID	331
Project title	Virginia Area Seven Year Solution 1
Project description	This solution addresses violations identified in PJM's 2032 model for the Virginia area: Construct Bagpipe 765 kV, Vontay 765, Durandal 765/500, Starfruit 765/230, Lodi 765/500, and Kaladin 500/230 substations. Construct Bagpipe - Vontay, Joshua Falls – Durandal 765kV, Durandal – Starfruit 765kV, Starfruit – Lodi 765kV, Lodi - Cunningham 500kV, Lodi – Kaladin 500kV, Kaladin - North Anna 500kV, and Kaladin – Morrisville 500kV lines.
Email	Company confidential information
Project in-service date	10/2032
Tie-line impact	Yes
Interregional project	No
Is the proposer offering a binding cap on capital costs?	Yes
Additional benefits	Company confidential information

Project Components

1. Joshua Falls - Durandal 765kV line
2. Durandal - Starfruit 765kV line
3. Starfruit - Lodi 765kV line

4. Kraken - Ladysmith 500kV rebuild
5. Yeat – Ox 500 kV Rebuild
6. Surry Station Upgrade
7. Joshua Falls 765 kV Station Expansion
8. Durandal Greenfield Station
9. Starfruit 765/230 kV Greenfield Station
10. Lodi 765/500 kV Greenfield Station
11. Kaladin 500/230 kV Greenfield Station
12. Cunningham Station Expansion
13. North Anna 500 kV Station Expansion
14. Morrisville 500 kV Station Upgrades
15. Cunningham - Lodi 500 kV
16. Kaladin - Lodi 500 kV
17. Kaladin - North Anna 500 kV Greenfield
18. Kaladin - Morrisville 500 kV Greenfield
19. Farmville Station Upgrade
20. Durandal 500kV cut-ins
21. Gordonsville Station upgrade
22. Kaladin - Gordonsville 230kV cut-in
23. Bagpipe 765/500 kV Greenfield Station
24. Vontay 765/500kV Greenfield Station
25. Heritage 500 kV Station Upgrade
26. Bagpipe - Vontay 765 kV Greenfield
27. Starfruit – Farmville 230 kV Cut In
28. Bagpipe - Heritage 500 kV Cut In
29. Vontay - North Anna 500kV rebuild

Greenfield Transmission Line Component

Component title	Joshua Falls - Durandal 765kV line

Project description	Company confidential information	
Point A	Joshua Falls 765 kV	
Point B	Durandal 765 kV	
Point C		
	Normal ratings	Emergency ratings
Summer (MVA)	6625.000000	6625.000000
Winter (MVA)	6625.000000	6625.000000
Conductor size and type	6 Bundled – 795 kcmil (45/7 Strand) ACSR “Tern” conductor	
Nominal voltage	AC	
Nominal voltage	765	
Line construction type	Overhead	
General route description	The Proposing Entity assessed environmental and land use constraints and opportunities within an area that included the existing Joshua Falls substation and the greenfield Durandal substation as the two endpoints. The evaluation resulted in the Bid Route of approximately 55.6 miles of greenfield line through four counties (Campbell, Appomattox, Prince Edward, and Charlotte) in Virginia. The 765kV line exits the existing Joshua Falls Substation from the south, then travels in a predominantly southeast direction until it reaches the greenfield Durandal substation from the west, paralleling 40.0 miles of existing transmission line. No habitable structures are present within the proposed ROW. Overall, the Route selected is the most direct route between the two existing substations and has the least overall impact on land use and environmental resources based on the Proposing Entity’s qualitative review. The Route significantly reduces the number of new access roads, reducing overall constructability impacts.	
Terrain description	The topography along the Joshua Falls–Durandal 765kV line is relatively hilly. Land use in the area encompasses mostly agricultural and residential parcels in rural Virginia. The line crosses low density developed areas, a significant amount of highly vegetated (wooded) rural land, state/county highways, railroads, streams, and existing utilities.	
Right-of-way width by segment	The Joshua Falls–Durandal 765kV greenfield route ROW will be 180 feet in width and will parallel/cross existing rights-of-way to include interstates, roads, railroads, existing transmission lines/utilities, existing pipelines and best minimizes potential impacts to the natural and human environments.	

Electrical transmission infrastructure crossings	36.995, -78.5721, 37.2316, -78.7487, 37.3816, -78.9648, In addition to these crossings, it is assumed there are additional, and smaller kV lines, being crossed along areas such as major roadways.
Civil infrastructure/major waterway facility crossing plan	The greenfield Joshua Falls-Durandal 765kV line greenfield route crosses & runs parallel with multiple railroads, numerous water features, and large underground pipelines. The route does not cross any notable waterways; however, the southern terminus is located approximately 0.6 mile east of the Roanoke River, and the northern terminus is located approximately 0.4 mile southeast of the James River. The four Norfolk Southern railroad crossings are located at latitude/longitude 37.1187, -78.6238; 37.2031, -78.6612; 37.228, -78.6864; and 37.3579, -78.8991. The transmission line runs parallel with one pipeline for a short distance in Charlotte County and crosses over several pipelines.
Environmental impacts	Land use along the Bid Route corridor is a predominantly rural agricultural landscape with pockets of residential development. The route intersects FEMA-mapped floodplains and/or floodways, and NWI-mapped wetlands primarily adjacent to streams and low-lying areas. The route also crosses named and unnamed streams in various locations. Based on existing aerial photography, the proposed route likely has unmapped wetland or drainage features. The timing of construction will be executed in accordance with state and federal agency criteria as needed. Desktop studies and record reviews for the station parcel and line route will be conducted for wetlands and streams, hazardous materials, and cultural resources. Following field studies, data will be digitized and provided to engineering so that pole locations and the station is sited to maximize avoidance of sensitive resources. For example, poles will be placed outside of or span wetlands, streams, and floodplains to the greatest extent possible. Existing access and roads will be utilized to access pole locations. If necessary, temporary access roads to pole locations will be identified and field surveyed for environmental and cultural resources and will be adjusted to avoid or minimize impacts.
Tower characteristics	This 765kV single circuit line utilizes a mixture of guyed-V and self-supporting steel lattice tower construction with the phases arranged in a horizontal configuration. The predominant structure types will be a mixture of guyed-V and self-supporting suspension towers (169), with the balance of the line being self-supporting running angle (24) and tension towers (55). Self-supporting towers will be supported by a mixture of drilled concrete pier foundations and grillage foundations. Self-supporting structures will be used selectively in an effort to keep electrical infrastructure compatible with agricultural land use that is interspersed throughout the project area. Guyed-V structures will be used in areas with challenging access and topography.
Construction responsibility	Company confidential information
Benefits/Comments	Company confidential information
Component Cost Details - In Current Year $	
Engineering & design	Company confidential information

Permitting / routing / siting	Company confidential information
ROW / land acquisition	Company confidential information
Materials & equipment	Company confidential information
Construction & commissioning	Company confidential information
Construction management	Company confidential information
Overheads & miscellaneous costs	Company confidential information
Contingency	Company confidential information
Total component cost	$297,690,508.20
Component cost (in-service year)	$323,495,286.00

Greenfield Transmission Line Component

Component title	Durandal - Starfruit 765kV line
Project description	Company confidential information
Point A	Durandal
Point B	Starfruit
Point C	

	Normal ratings	Emergency ratings
Summer (MVA)	6625.000000	6625.000000
Winter (MVA)	6625.000000	6625.000000

Conductor size and type	6-bundle 795 kcmil ACSR Tern
Nominal voltage	AC
Nominal voltage	765

Line construction type	Overhead
General route description	The Proposing Entity assessed environmental and land use constraints and opportunities within an area that included the greenfield Joshua Falls substation and the greenfield Starfruit substation as the two endpoints. The evaluation resulted in the Bid Route of approximately 40.2 miles of greenfield line through four counties (Prince Edward, Lunenburg, Mecklenburg, and Charlotte) in Virginia. The 765kV line exits the greenfield Durandal Substation from the south, then travels in a predominantly southeast direction until it crosses over Fort Mitchell Road. Here, the Bid Route turns north to parallel an existing transmission line upon entering the greenfield Starfruit Substation. No habitable structures are present within the proposed ROW. Overall, the Route selected is the most direct route between the two existing substations and has the least overall impact on land use and environmental resources based on the Proposing Entity's qualitative review. The Route significantly reduces the number of new access roads, reducing overall constructability impacts.
Terrain description	The topography along the Bid Route is relatively hilly. Land use in the area encompasses mostly agricultural and residential parcels in rural Virginia. The line crosses low density developed areas, a significant amount of highly vegetated (wooded) rural land, state/county highways, railroads, streams, and existing utilities.
Right-of-way width by segment	The Starfruit-Durandal 765kV greenfield route ROW will be 200 feet in width and will parallel/cross existing rights-of-way to include interstates, roads, railroads, existing transmission lines/utilities, existing pipelines and best minimizes potential impacts to the natural and human environments.
Electrical transmission infrastructure crossings	115kV: 36.8603, -78.5099, 115kV: 37.2853, -78.3498, 115kV: 37.308, -78.3934, 230kV: 37.2852, -78.3499, 230kV: 37.308, -78.3935
Civil infrastructure/major waterway facility crossing plan	Rivers 36.8699 -78.4303 South Meherrin River 36.9318 -78.4232 Middle Meherrin River 37.0562 -78.429 North Meherrin River 37.1272 -78.4194 Bush River 37.2405 -78.379 Bush River 37.2611 -78.366 Bush River 37.3092 -78.394 Appomattox River Railroads 37.0794, -78.4277 BB 37.084, -78.4272 NS Pipelines 36.8659, -78.5224 36.9278, -78.4225

Environmental impacts	Land use along the Bid Route corridor is a predominantly rural agricultural landscape with pockets of residential development. The route intersects FEMA-mapped floodplains and/or floodways, and NWI-mapped wetlands primarily adjacent to streams and low-lying areas. The route also crosses named and unnamed streams in various locations. Based on existing aerial photography, the proposed route likely has unmapped wetland or drainage features. The timing of construction will be executed in accordance with state and federal agency criteria as needed. Desktop studies and record reviews for the station parcel and line route will be conducted for wetlands and streams, hazardous materials, and cultural resources. Following field studies, data will be digitized and provided to engineering so that pole locations and the station is sited to maximize avoidance of sensitive resources. For example, poles will be placed outside of or span wetlands, streams, and floodplains to the greatest extent possible. Existing access and roads will be utilized to access pole locations. If necessary, temporary access roads to pole locations will be identified and field surveyed for environmental and cultural resources and will be adjusted to avoid or minimize impacts.
Tower characteristics	This 765kV single circuit line utilizes a mixture of guyed-V and self-supporting steel lattice tower construction with the phases arranged in a horizontal configuration. The predominant structure types will be a mixture of guyed-V and self-supporting suspension towers (141), with the balance of the line being self-supporting running angle (10) and tension towers (32). Self-supporting towers will be supported by a mixture of drilled concrete pier foundations and grillage foundations. Self-supporting structures will be used selectively in an effort to keep electrical infrastructure compatible with agricultural land use that is interspersed throughout the project area. Guyed-V structures will be used in areas with challenging access and topography.
Construction responsibility	Company confidential information
Benefits/Comments	Company confidential information
Component Cost Details - In Current Year $	
Engineering & design	Company confidential information
Permitting / routing / siting	Company confidential information
ROW / land acquisition	Company confidential information
Materials & equipment	Company confidential information
Construction & commissioning	Company confidential information
Construction management	Company confidential information
Overheads & miscellaneous costs	Company confidential information

Contingency	Company confidential information
Total component cost	$194,640,849.00
Component cost (in-service year)	$225,120,055.00

Greenfield Transmission Line Component

Component title	Starfruit - Lodi 765kV line
Project description	Company confidential information
Point A	Starfruit
Point B	Lodi
Point C	

	Normal ratings	Emergency ratings
Summer (MVA)	6625.000000	6625.000000
Winter (MVA)	6625.000000	6625.000000

Conductor size and type	6 Bundle – 795 kcmil (45/7 Strand) ACSR Tern
Nominal voltage	AC
Nominal voltage	765
Line construction type	Overhead
General route description	The Proposing Entity assessed environmental and land use constraints and opportunities within an area that included the greenfield Starfruit substation and the existing Lodi substation as the two endpoints. The evaluation resulted in the Bid Route of approximately 41.8 miles of greenfield line through four counties (Fluvanna, Buckingham, Cumberland and Prince Edward) in Virginia. The 765kV line exits the greenfield Starfruit Substation traveling north to parallel an existing transmission line upon entering the existing Lodi Substation. No habitable structures are present within the proposed ROW. Overall, the Route selected is the most direct route between the two existing substations and has the least overall impact on land use and environmental resources based on the Proposing Entity’s qualitative review. The Route significantly reduces the number of new access roads, reducing overall constructability impacts.

Terrain description	The topography along the Bid Route is relatively hilly. Land use in the area encompasses mostly agricultural and residential parcels in rural Virginia. The line crosses low density developed areas, a significant amount of highly vegetated (wooded) rural land, state/county highways, railroads, streams, and existing utilities.
Right-of-way width by segment	The Starfruit–Lido 765kV greenfield route ROW will be 180 feet in width and will parallel/cross existing rights-of-way to include interstates, roads, railroads, existing transmission lines/utilities, existing pipelines and best minimizes potential impacts to the natural and human environments.
Electrical transmission infrastructure crossings	115kV: 37.3111, -78.3939, 115kV: 37.7481, -78.298, Unknown voltage: 37.4923, -78.3514, Unknown voltage: 37.71, -78.2909
Civil infrastructure/major waterway facility crossing plan	Rivers 37.7085 -78.2913 James River Railroads 37.7095, -78.2911 CSXT Pipelines 37.3653, -78.3907 37.5748, -78.3301 37.6364, -78.3117 37.6974, -78.2934
Environmental impacts	Land use along the Bid Route corridor is a predominantly rural agricultural landscape with pockets of residential development. The route intersects FEMA-mapped floodplains and/or floodways, and NWI-mapped wetlands primarily adjacent to streams and low-lying areas. The route also crosses named and unnamed streams in various locations. Based on existing aerial photography, the proposed route likely has unmapped wetland or drainage features.
Tower characteristics	This 765kV single circuit line utilizes a mixture of guyed-V and self-supporting steel lattice tower construction with the phases arranged in a horizontal configuration. The predominant structure types will be a mixture of guyed-V and self-supporting suspension towers (121), with the balance of the line being self-supporting running angle (19) and tension towers (40). Self-supporting towers will be supported by a mixture of drilled concrete pier foundations and grillage foundations. Self-supporting structures will be used selectively in an effort to keep electrical infrastructure compatible with agricultural land use that is interspersed throughout the project area. Guyed-V structures will be used in areas with challenging access and topography.
Construction responsibility	Company confidential information
Benefits/Comments	Company confidential information
Component Cost Details - In Current Year $	
Engineering & design	Company confidential information
Permitting / routing / siting	Company confidential information
ROW / land acquisition	Company confidential information
Materials & equipment	Company confidential information

Construction & commissioning	Company confidential information
Construction management	Company confidential information
Overheads & miscellaneous costs	Company confidential information
Contingency	Company confidential information
Total component cost	$224,678,107.88
Component cost (in-service year)	$259,860,908.00

Transmission Line Upgrade Component

Component title	Kraken - Ladysmith 500kV rebuild
Project description	Company confidential information
Impacted transmission line	Kraken - Ladysmith 500kV
Point A	Kraken 500 kV
Point B	Ladysmith 500 kV
Point C	
Terrain description	The topography along the Bid Route is relatively hilly. Land use in the area encompasses mostly agricultural and residential parcels in rural Virginia. The line crosses low density developed areas, a significant amount of highly vegetated (wooded) rural land, state/county highways, railroads, streams, and existing utilities.
Existing Line Physical Characteristics	
Operating voltage	500
Conductor size and type	The conductor size for the existing line is unknown, but it does not meet the required line loading specified in the Proposed Line Characteristics Section below.
Hardware plan description	The age and condition of the existing line hardware is not known. The existing line hardware will be removed, and new line hardware will be installed.
Tower line characteristics	The age and condition of the existing structures is not known. The existing structures will be removed, and new structures will be installed.

Proposed Line Characteristics

	Designed	Operating
Voltage (kV)	500.000000	500.000000
	Normal ratings	Emergency ratings
Summer (MVA)	3814.000000	5149.000000
Winter (MVA)	4852.000000	5848.000000
Conductor size and type	3-Bundled – 1,590 kcmil (54/19 Strand) ACSR “Falcon” conductor.	
Shield wire size and type	(2) 0.646’ Optical Ground Wires	
Rebuild line length	7.6 miles	
Rebuild portion description	It is assumed that this 7.6-mile long 500kV single circuit line rebuild will utilize a mixture of guyed-V and self-supporting steel lattice tower construction with the phases arranged in a horizontal configuration. Self-supporting structures will be used selectively in an effort to keep electrical infrastructure compatible with agricultural land use that is interspersed throughout the project area. Guyed-V structures will be used in areas with challenging access and topography.	
Right of way	The existing ROW will be used.	
Construction responsibility	Company confidential information	
Benefits/Comments	Company confidential information	
Component Cost Details - In Current Year $		
Engineering & design	Company confidential information	
Permitting / routing / siting	Company confidential information	
ROW / land acquisition	Company confidential information	
Materials & equipment	Company confidential information	
Construction & commissioning	Company confidential information	

Construction management	Company confidential information
Overheads & miscellaneous costs	Company confidential information
Contingency	Company confidential information
Total component cost	$33,000,000.00
Component cost (in-service year)	$38,167,537.00

Transmission Line Upgrade Component

Component title	Yeat – Ox 500 kV Rebuild
Project description	Company confidential information
Impacted transmission line	Yeat – Ox 500kV
Point A	Yeat 500kV
Point B	Ox 500kV
Point C	
Terrain description	The topography along the Bid Route is relatively hilly. Land use in the area encompasses mostly agricultural and residential parcels in rural Virginia. The line crosses low density developed areas, a significant amount of highly vegetated (wooded) rural land, state/county highways, railroads, streams, and existing utilities.
Existing Line Physical Characteristics	
Operating voltage	500kV
Conductor size and type	The conductor size for the existing line is unknown, but it does not meet the required line loading specified in the Proposed Line Characteristics Section below.
Hardware plan description	The age and condition of the existing line hardware is not known. The existing line hardware will be removed, and new line hardware will be installed.
Tower line characteristics	The age and condition of the existing structures is not known. The existing structures will be removed, and new structures will be installed.

Proposed Line Characteristics

	Designed	Operating
Voltage (kV)	500.000000	500.000000
	Normal ratings	Emergency ratings
Summer (MVA)	3814.000000	4852.000000
Winter (MVA)	5149.000000	5848.000000
Conductor size and type	3-Bundled – 1,590 kcmil (54/19 Strand) ACSR “Falcon” conductor	
Shield wire size and type	(2) 0.646’ Optical Ground Wires	
Rebuild line length	21 miles	
Rebuild portion description	It is assumed that this 21-mile long 500kV single circuit line rebuild will utilize a mixture of guyed-V and self-supporting steel lattice tower construction with the phases arranged in a horizontal configuration. Self-supporting structures will be used selectively in an effort to keep electrical infrastructure compatible with agricultural land use that is interspersed throughout the project area. Guyed-V structures will be used in areas with challenging access and topography.	
Right of way	The existing ROW will be used.	
Construction responsibility	Company confidential information	
Benefits/Comments	Company confidential information	
Component Cost Details - In Current Year $		
Engineering & design	Company confidential information	
Permitting / routing / siting	Company confidential information	
ROW / land acquisition	Company confidential information	
Materials & equipment	Company confidential information	
Construction & commissioning	Company confidential information	

Construction management	Company confidential information
Overheads & miscellaneous costs	Company confidential information
Contingency	Company confidential information
Total component cost	$87,000,000.00
Component cost (in-service year)	$100,623,506.00

Substation Upgrade Component

Component title	Surry Station Upgrade
Project description	Company confidential information
Substation name	Surry 500kV
Substation zone	DOM
Substation upgrade scope	Replace existing 500kV circuit breakers at Surry station with (4) 5000A spec circuit breakers.

Transformer Information

None

New equipment description	Replace (4) 500kV circuit breakers at Surry station with 5000A spec circuit breakers.
Substation assumptions	It is assumed that all necessary outages will be available, the existing AC, DC, & telecom. systems will accommodate the new equipment, ground grid resistivity test data are available, ground grid upgrades will not be needed, the existing cable trench has space for the new control cables, soil boring logs and geotechnical report are available, additional station stone will not be needed, and space will be available to install the equipment outlined in this description.
Real-estate description	The acquisition of additional fee lands is not required for the Surry Substation located in Surry County, Virginia.
Construction responsibility	Company confidential information
Benefits/Comments	Company confidential information

Component Cost Details - In Current Year $

Engineering & design	Company confidential information
Permitting / routing / siting	Company confidential information
ROW / land acquisition	Company confidential information
Materials & equipment	Company confidential information
Construction & commissioning	Company confidential information
Construction management	Company confidential information
Overheads & miscellaneous costs	Company confidential information
Contingency	Company confidential information
Total component cost	$14,000,000.00
Component cost (in-service year)	$16,192,288.00

Substation Upgrade Component

Component title	Joshua Falls 765 kV Station Expansion
Project description	Company confidential information
Substation name	Joshua Falls 765kV
Substation zone	AEP
Substation upgrade scope	Expand the existing Joshua Falls 765 kV Station by installing a 5000A 765kV line breaker, a 765kV line reactor, and (3) 765 kV breakers for the greenfield 765kV Joshua Falls-Durandal line.

Transformer Information

None

New equipment description	Install a 5000A 765 kV line breaker, a 765 kV line reactor, and (3) 765 kV circuit breakers for the greenfield Joshua Falls – Durandal line.

Substation assumptions	It is assumed that all necessary outages will be available, the existing AC, DC, & telecom. systems will accommodate the new equipment, ground grid resistivity test data are available, ground grid upgrades will not be needed, the existing cable trench has space for the new control cables, soil boring logs and geotechnical report are available, additional station stone will not be needed, and space will be available to install the equipment outlined in this description.
Real-estate description	The acquisition of additional fee lands is not required for the Joshua Falls Substation located in Campbell County, Virginia.
Construction responsibility	Company confidential information
Benefits/Comments	Company confidential information
Component Cost Details - In Current Year $	
Engineering & design	Company confidential information
Permitting / routing / siting	Company confidential information
ROW / land acquisition	Company confidential information
Materials & equipment	Company confidential information
Construction & commissioning	Company confidential information
Construction management	Company confidential information
Overheads & miscellaneous costs	Company confidential information
Contingency	Company confidential information
Total component cost	$25,254,255.00
Component cost (in-service year)	$29,208,870.00

Greenfield Substation Component

Component title	Durandal Greenfield Station
Project description	Company confidential information
Substation name	Durandal 765/500 kV Station

Substation description	Construct a new 765/500 kV Durandal station with a 765 kV yard and a 500 kV yard. The 765kV and 500kV yards will be a double breaker double bus configuration connected by one 765/500 kV transformer. Install one 765 line reactor and 765kV reactor breaker.
Nominal voltage	AC
Nominal voltage	765/500

Transformer Information

	Name	Capacity (MVA)
Transformer	Transformer Bank 1	2280 / 2620 / 2647 / 2920 MVA (SN/SE/WN/WE)

	High Side	Low Side	Tertiary
Voltage (kV)	765	500	

Major equipment description	Install (1) 765/500kV transformer Install (6) 765kV 4000A circuit breakers in a double-bus-double-breaker configuration (2 terminations) Install (6) 500kV 5000A circuit breakers in a ring bus configuration Install (1) 765kV line reactor and (1) 765kV reactor breaker

	Normal ratings	Emergency ratings
Summer (MVA)	2280.000000	2620.000000
Winter (MVA)	2647.000000	2920.000000

Environmental assessment	Land use for the new Durandal substation is flat rural landscape in the vicinity of the existing Clover Power Station. The substation will lie adjacent and outside FEMA-mapped floodplains and/or floodways, and NWI-mapped wetlands primarily adjacent to streams and low-lying areas. Based on existing aerial photography, the proposed greenfield Durandal substation likely has unmapped wetland or drainage features. The timing of construction will be executed in accordance with state and federal agencies' criteria as needed. Desktop studies and record reviews for the station and line route will be conducted for wetlands and streams, hazardous materials, and cultural resources. Following field studies, data will be digitized and provided to engineering so that pole locations and the station is sited to maximize avoidance of sensitive resources. For example, poles will be placed outside of or span wetlands, streams, and floodplains to the greatest extent possible. Existing access and roads will be utilized to access pole locations. If necessary, temporary access roads to pole locations will be identified and field surveyed for environmental and cultural resources and will be adjusted to avoid or minimize impacts.

Outreach plan	Public outreach is a critical component to the Proposing Entity’s siting process, so efforts will include properly informing the public; federal, state, and local agencies; local governments; and other key stakeholders on the need for, and benefits of, this Project. The Proposing Entity’s approach to public outreach is to be always candid and transparent, and to offer a variety of tools and means for directly impacted parties to engage with our staff. The Proposing Entity will provide development updates to local government officials, key stakeholders, and impacted parties as the Project progresses. Public outreach also will involve collecting information about landowner properties and communicating with directly affected landowners during the final siting process.
Land acquisition plan	The proposed Durandal substation will be 63 acres in size and located on undeveloped agricultural land in rural Charlotte County, Virginia. The proposed station will be purchased in fee.
Construction responsibility	Company confidential information
Benefits/Comments	Company confidential information
Component Cost Details - In Current Year $	
Engineering & design	Company confidential information
Permitting / routing / siting	Company confidential information
ROW / land acquisition	Company confidential information
Materials & equipment	Company confidential information
Construction & commissioning	Company confidential information
Construction management	Company confidential information
Overheads & miscellaneous costs	Company confidential information
Contingency	Company confidential information
Total component cost	$165,102,025.89
Component cost (in-service year)	$190,955,687.00

Greenfield Substation Component

Component title	Starfruit 765/230 kV Greenfield Station
Project description	Company confidential information

Substation name	Starfruit Station
Substation description	Construct a new 765/230 kV double breaker, double bus, station with four 765 kV breakers and one 765/230 kV transformer to interconnect with the proposed Durandal Station and the existing Farmville Station.
Nominal voltage	AC
Nominal voltage	765/230

Transformer Information

	Name	Capacity (MVA)
Transformer	Transformer Bank 1	2240 / 2524 / 2566 / 2665 MVA (SN/SE/WN/WE)

	High Side	Low Side	Tertiary
Voltage (kV)	765	230	

Major equipment description	Install Four 765 kV 4000A circuit breakers Install One 765/230 kV transformer

	Normal ratings	Emergency ratings
Summer (MVA)	2240.000000	2524.000000
Winter (MVA)	2566.000000	2665.000000

Environmental assessment	Land use for the new Starfruit substation is a gently rolling forested landscape in the vicinity of the existing Farmville substation and the town of Farmville. The substation will lie adjacent and outside FEMA-mapped floodplains and/or floodways, and NWI-mapped wetlands primarily adjacent to streams and low-lying areas. Based on existing aerial photography, the proposed greenfield Starfruit substation likely has unmapped wetland or drainage features. The timing of construction will be executed in accordance with state and federal agencies' criteria as needed. Desktop studies and record reviews for the station and line route will be conducted for wetlands and streams, hazardous materials, and cultural resources. Following field studies, data will be digitized and provided to engineering so that pole locations and the station is sited to maximize avoidance of sensitive resources. For example, poles will be placed outside of or span wetlands, streams, and floodplains to the greatest extent possible. Existing access and roads will be utilized to access pole locations. If necessary, temporary access roads to pole locations will be identified and field surveyed for environmental and cultural resources and will be adjusted to avoid or minimize impacts.
Outreach plan	Public outreach is a critical component to the Proposing Entity’s siting process, so efforts will include properly informing the public; federal, state, and local agencies; local governments; and other key stakeholders on the need for, and benefits of, this Project. The Proposing Entity’s approach to public outreach is to be always candid and transparent, and to offer a variety of tools and means for directly impacted parties to engage with our staff. The Proposing Entity will provide development updates to local government officials, key stakeholders, and impacted parties as the Project progresses. Public outreach also will involve collecting information about landowner properties and communicating with directly affected landowners during the final siting process.
Land acquisition plan	The proposed Starfruit substation will be 60 acres in size and located on agricultural/forested land in rural Cumberland County, Virginia. The proposed station will be purchased in fee.
Construction responsibility	Company confidential information
Benefits/Comments	Company confidential information
Component Cost Details - In Current Year $	
Engineering & design	Company confidential information
Permitting / routing / siting	Company confidential information
ROW / land acquisition	Company confidential information
Materials & equipment	Company confidential information
Construction & commissioning	Company confidential information

Construction management	Company confidential information
Overheads & miscellaneous costs	Company confidential information
Contingency	Company confidential information
Total component cost	$140,102,025.89
Component cost (in-service year)	$162,040,886.00

Greenfield Substation Component

Component title	Lodi 765/500 kV Greenfield Station
Project description	Company confidential information
Substation name	Lodi Station
Substation description	Construct a 765/500 kV greenfield station to interconnect with the existing Cunningham 500 kV and proposed Starfruit stations. Install 5 500 kV breakers in a two breaker-and-a-half configuration, one 765/500 kV transformer, and a 765 kV line breaker.
Nominal voltage	AC
Nominal voltage	765/500kV

Transformer Information

	Name	Capacity (MVA)
Transformer	Transformer Bank 1	2280 / 2620 / 2647 / 2920 MVA (SN/SE/WN/WE)

	High Side	Low Side	Tertiary
Voltage (kV)	765	500	

Major equipment description	Install (1) 765/500kV transformer Install (1) 765kV 4000A circuit breaker Install (5) 500kV 5000A circuit breakers

	Normal ratings	Emergency ratings

Summer (MVA)	2280.000000	2647.000000
Winter (MVA)	2620.000000	2920.000000
Environmental assessment	Land use for the new Lodi substation is flat rural landscape. The substation will lie adjacent and outside FEMA-mapped floodplains and/or floodways, and NWI-mapped wetlands primarily adjacent to streams and low-lying areas. Based on existing aerial photography, the proposed greenfield Lodi substation possibly contains unmapped wetland or drainage features. The timing of construction will be executed in accordance with state and federal agencies' criteria as needed. Desktop studies and record reviews for the station and line route will be conducted for wetlands and streams, hazardous materials, and cultural resources. Following field studies, data will be digitized and provided to engineering so that pole locations and the station is sited to maximize avoidance of sensitive resources. For example, poles will be placed outside of or span wetlands, streams, and floodplains to the greatest extent possible. Existing access and roads will be utilized to access pole locations. If necessary, temporary access roads to pole locations will be identified and field surveyed for environmental and cultural resources and will be adjusted to avoid or minimize impacts	
Outreach plan	Public outreach is a critical component to the Proposing Entity’s siting process, so efforts will include properly informing the public; federal, state, and local agencies; local governments; and other key stakeholders on the need for, and benefits of, this Project. The Proposing Entity’s approach to public outreach is to be always candid and transparent, and to offer a variety of tools and means for directly impacted parties to engage with our staff. The Proposing Entity will provide development updates to local government officials, key stakeholders, and impacted parties as the Project progresses. Public outreach also will involve collecting information about landowner properties and communicating with directly affected landowners during the final siting process.	
Land acquisition plan	The proposed Lodi substation will be 50 acres in size and located on agricultural/forested land in rural Fluvanna County, Virginia. The proposed station will be purchased in fee.	
Construction responsibility	Company confidential information	
Benefits/Comments	Company confidential information	
Component Cost Details - In Current Year $		
Engineering & design	Company confidential information	
Permitting / routing / siting	Company confidential information	
ROW / land acquisition	Company confidential information	
Materials & equipment	Company confidential information	

Construction & commissioning	Company confidential information
Construction management	Company confidential information
Overheads & miscellaneous costs	Company confidential information
Contingency	Company confidential information
Total component cost	$130,102,025.89
Component cost (in-service year)	$150,474,966.00

Greenfield Substation Component

Component title	Kaladin 500/230 kV Greenfield Station
Project description	Company confidential information
Substation name	Kaladin Station
Substation description	Construct a new 500/230 kV substation to interconnect to the existing North Anna 500 kV and Gordonsville 230 kV substations. Install (4) 500 kV breakers in a two breaker-and-a-half configuration and (1) 500/230 kV transformer.
Nominal voltage	AC
Nominal voltage	500/230

Transformer Information

	Name	Capacity (MVA)
Transformer	Transformer Bank 1	1440 / 1440 / 1440 / 1440 MVA (SN/SE/WN/WE)

	High Side	Low Side	Tertiary
Voltage (kV)	500	230	

Major equipment description	Install (1) 500/230kV transformer Install (4) 500kV 5000A circuit breakers in a (2) breaker-and-a-half configuration

	Normal ratings	Emergency ratings
Summer (MVA)	1440.000000	1440.000000
Winter (MVA)	1440.000000	1440.000000
Environmental assessment	Land use for the new Kaladin substation is flat rural landscape. The substation will lie adjacent and outside FEMA-mapped floodplains and/or floodways, and NWI-mapped wetlands primarily adjacent to streams and low-lying areas. Based on existing aerial photography, the proposed greenfield Kaladin substation possibly contains unmapped wetland or drainage features. The timing of construction will be executed in accordance with state and federal agencies' criteria as needed. Desktop studies and record reviews for the station and line route will be conducted for wetlands and streams, hazardous materials, and cultural resources. Following field studies, data will be digitized and provided to engineering so that pole locations and the station is sited to maximize avoidance of sensitive resources. For example, poles will be placed outside of or span wetlands, streams, and floodplains to the greatest extent possible. Existing access and roads will be utilized to access pole locations. If necessary, temporary access roads to pole locations will be identified and field surveyed for environmental and cultural resources and will be adjusted to avoid or minimize impacts.	
Outreach plan	Public outreach is a critical component to the Proposing Entity’s siting process, so efforts will include properly informing the public; federal, state, and local agencies; local governments; and other key stakeholders on the need for, and benefits of, this Project. The Proposing Entity’s approach to public outreach is to be always candid and transparent, and to offer a variety of tools and means for directly impacted parties to engage with our staff. The Proposing Entity will provide development updates to local government officials, key stakeholders, and impacted parties as the Project progresses. Public outreach also will involve collecting information about landowner properties and communicating with directly affected landowners during the final siting process.	
Land acquisition plan	The proposed Kaladin substation will be 50 acres in size and located on agricultural/forested land in rural Albemarle County, Virginia. The proposed station will be purchased in fee.	
Construction responsibility	Company confidential information	
Benefits/Comments	Company confidential information	
Component Cost Details - In Current Year $		
Engineering & design	Company confidential information	
Permitting / routing / siting	Company confidential information	
ROW / land acquisition	Company confidential information	

Materials & equipment	Company confidential information
Construction & commissioning	Company confidential information
Construction management	Company confidential information
Overheads & miscellaneous costs	Company confidential information
Contingency	Company confidential information
Total component cost	$98,176,909.95
Component cost (in-service year)	$113,550,631.00

Substation Upgrade Component

Component title	Cunningham Station Expansion
Project description	Company confidential information
Substation name	Cunningham 500kV Station
Substation zone	DOM
Substation upgrade scope	Expand the existing Cunningham (Dominion) substation by adding one additional 500 kV breaker to interconnect the existing Cunningham and proposed Lodi station.

Transformer Information

None

New equipment description	Install (1) 500kV 5000A breaker
Substation assumptions	It is assumed that all necessary outages will be available, the existing AC, DC, & telecom. systems will accommodate the new equipment, the existing 345KV control house has space for new relay equipment, ground grid resistivity test data are available, ground grid upgrades will not be needed, the existing cable trench has space for the new control cables, and soil boring logs and geotechnical report are available.
Real-estate description	The acquisition of additional fee lands is not required for the Cunningham Substation located in Fluvanna County, Virginia.
Construction responsibility	Company confidential information

Benefits/Comments	Company confidential information
Component Cost Details - In Current Year $	
Engineering & design	Company confidential information
Permitting / routing / siting	Company confidential information
ROW / land acquisition	Company confidential information
Materials & equipment	Company confidential information
Construction & commissioning	Company confidential information
Construction management	Company confidential information
Overheads & miscellaneous costs	Company confidential information
Contingency	Company confidential information
Total component cost	$15,000,000.00
Component cost (in-service year)	$17,348,880.00

Substation Upgrade Component

Component title	North Anna 500 kV Station Expansion
Project description	Company confidential information
Substation name	North Anna Station
Substation zone	DOM
Substation upgrade scope	Expand the existing North Anna 500 kV Station (Dominion) by adding one 500 kV breaker to interconnect with the proposed Kaladin Station.

Transformer Information

None

New equipment description	Install (1) 500kV 5000A breaker

Substation assumptions	It is assumed that all necessary outages will be available, the existing AC, DC, & telecom. systems will accommodate the new equipment, ground grid resistivity test data are available, ground grid upgrades will not be needed, the existing cable trench has space for the new control cables, soil boring logs and geotechnical report are available, additional station stone will not be needed, and space will be available to install the equipment outlined in this description.
Real-estate description	The acquisition of additional fee lands is not required for the North Anna Substation located in Louisa County, Virginia.
Construction responsibility	Company confidential information
Benefits/Comments	Company confidential information
Component Cost Details - In Current Year $	
Engineering & design	Company confidential information
Permitting / routing / siting	Company confidential information
ROW / land acquisition	Company confidential information
Materials & equipment	Company confidential information
Construction & commissioning	Company confidential information
Construction management	Company confidential information
Overheads & miscellaneous costs	Company confidential information
Contingency	Company confidential information
Total component cost	$3,500,000.00
Component cost (in-service year)	$4,048,072.00

Greenfield Transmission Line Component

Component title	Cunningham - Lodi 500 kV
Project description	Company confidential information
Point A	Cunningham 500kV

Point B	Lodi 500kV	
Point C		
	Normal ratings	Emergency ratings
Summer (MVA)	3814.000000	5149.000000
Winter (MVA)	4825.000000	5848.000000
Conductor size and type	3 Bundled – 1,351 kcmil (45/7 Strand) ACSR “Dipper” conductor	
Nominal voltage	AC	
Nominal voltage	500	
Line construction type	Overhead	
General route description	The Proposing Entity assessed environmental and land use constraints and opportunities within an area that included the existing Cunningham substation and the greenfield Lodi substation as the two endpoints. The evaluation resulted in the Bid Route of approximately 0.9-mile of greenfield line through Fluvanna County in Virginia. The 500kV line exits the existing Cunningham Substation traveling northeast generally paralleling existing transmission lines to the existing Lodi Substation. No habitable structures are present within the proposed ROW. Overall, the Route selected is the most direct route between the two existing substations and has the least overall impact on land use and environmental resources based on the Proposing Entity’s qualitative review. The Route significantly reduces the number of new access roads, reducing overall constructability impacts.	
Terrain description	The topography along the Bid Route is relatively hilly. Land use in the area encompasses mostly agricultural and residential parcels in rural Virginia. The line crosses low density developed areas, a significant amount of highly vegetated (wooded) rural land, state/county highways, railroads, streams, and existing utilities.	
Right-of-way width by segment	The Cunningham-Lodi 500kV greenfield route ROW will be 175 feet in width and will parallel/cross existing rights-of-way to include interstates, roads, railroads, existing transmission lines/utilities, existing pipelines and best minimizes potential impacts to the natural and human environments.	
Electrical transmission infrastructure crossings	37.874, -78.365	
Civil infrastructure/major waterway facility crossing plan	No major waterways, railways, or other infrastructure are crossed by the proposed Bid Route.	

Environmental impacts	Land use along the Bid Route corridor is a predominantly rural agricultural landscape with pockets of residential development. The route intersects FEMA-mapped floodplains and/or floodways, and NWI-mapped wetlands primarily adjacent to streams and low-lying areas. The route also crosses named and unnamed streams in various locations. Based on existing aerial photography, the proposed route likely has unmapped wetland or drainage features. The timing of construction will be executed in accordance with state and federal agency criteria as needed. Desktop studies and record reviews for the station parcel and line route will be conducted for wetlands and streams, hazardous materials, and cultural resources. Following field studies, data will be digitized and provided to engineering so that pole locations and the station is sited to maximize avoidance of sensitive resources. For example, poles will be placed outside of or span wetlands, streams, and floodplains to the greatest extent possible. Existing access and roads will be utilized to access pole locations. If necessary, temporary access roads to pole locations will be identified and field surveyed for environmental and cultural resources and will be adjusted to avoid or minimize impacts.
Tower characteristics	This 500kV single circuit line utilizes self-supporting steel lattice tower construction with the phases arranged in a horizontal configuration. The predominant structure types will be self-supporting suspension towers (10), with the balance of the line being self-supporting tension towers (4). Self-supporting towers will be supported by a mixture of drilled concrete pier foundations and grillage foundations. Self-supporting structures will be used selectively in an effort to keep electrical infrastructure compatible with agricultural land use that is interspersed throughout the project area.
Construction responsibility	Company confidential information
Benefits/Comments	Company confidential information
Component Cost Details - In Current Year $	
Engineering & design	Company confidential information
Permitting / routing / siting	Company confidential information
ROW / land acquisition	Company confidential information
Materials & equipment	Company confidential information
Construction & commissioning	Company confidential information
Construction management	Company confidential information
Overheads & miscellaneous costs	Company confidential information
Contingency	Company confidential information

Total component cost	$10,800,000.00
Component cost (in-service year)	$12,491,194.00

Substation Upgrade Component

Component title	Morrisville 500 kV Station Upgrades
Project description	Company confidential information
Substation name	Morrisville 500 kV Station
Substation zone	DOM
Substation upgrade scope	Expand the existing Morrisville 500 kV station (Dominion) by adding an additional 500 kV breaker to interconnect to the proposed Kaladin Station.

Transformer Information

None

New equipment description	Install (1) 500kV 5000A breaker.
Substation assumptions	It is assumed that all necessary outages will be available, the existing AC, DC, & telecom. systems will accommodate the new equipment, the existing 345KV control house has space for new relay equipment, ground grid resistivity test data are available, ground grid upgrades will not be needed, the existing cable trench has space for the new control cables, and soil boring logs and geotechnical report are available.
Real-estate description	The acquisition of additional fee lands is not required for the Morrisville Substation located in Fauquier County, Virginia.
Construction responsibility	Company confidential information
Benefits/Comments	Company confidential information

Component Cost Details - In Current Year $

Engineering & design	Company confidential information
Permitting / routing / siting	Company confidential information
ROW / land acquisition	Company confidential information

Materials & equipment	Company confidential information
Construction & commissioning	Company confidential information
Construction management	Company confidential information
Overheads & miscellaneous costs	Company confidential information
Contingency	Company confidential information
Total component cost	$3,500,000.00
Component cost (in-service year)	$4,048,072.00

Greenfield Transmission Line Component

Component title	Kaladin - Lodi 500 kV
Project description	Company confidential information
Point A	Kaladin 500kV
Point B	Lodi 500kV
Point C	

	Normal ratings	Emergency ratings
Summer (MVA)	3814.000000	5149.000000
Winter (MVA)	4825.000000	5848.000000

Conductor size and type	3 Bundled – 1,351 kcmil (45/7 Strand) ACSR “Dipper” conductor.
Nominal voltage	AC
Nominal voltage	500
Line construction type	Overhead

General route description	The Proposing Entity assessed environmental and land use constraints and opportunities within an area that included the existing Kaladin substation and the existing Lodi substation as the two endpoints. The evaluation resulted in the Bid Route of approximately 24.5 miles of greenfield line through Albemarle and Buckingham counties in Virginia. The 500kV line exits the existing Cunningham Substation traveling northeast generally paralleling existing transmission lines to the existing Lodi Substation. No habitable structures are present within the proposed ROW. Overall, the Route selected is the most direct route between the two existing substations and has the least overall impact on land use and environmental resources based on the Proposing Entity's qualitative review. The Route significantly reduces the number of new access roads, reducing overall constructability impacts.
Terrain description	The topography along the Bid Route is relatively hilly. Land use in the area encompasses mostly agricultural and residential parcels in rural Virginia. The line crosses low density developed areas, a significant amount of highly vegetated (wooded) rural land, state/county highways, railroads, streams, and existing utilities.
Right-of-way width by segment	The Kaladin-Lodi 500kV greenfield route ROW will be 175 feet in width and will parallel/cross existing rights-of-way to include interstates, roads, railroads, existing transmission lines/utilities, existing pipelines and best minimizes potential impacts to the natural and human environments.
Electrical transmission infrastructure crossings	115kV: 38.1267, -78.2215, 115kV: 38.1269, -78.2218, 230kV: 37.8855, -78.36, 230kV: 38.0255, -78.386, 230kV: 38.0655, -78.3257, 230kV: 38.0774, -78.2989, 230kV: 38.0867, -78.2855, 500kV: 37.8687, -78.374, 500kV: 37.8742, -78.3649
Civil infrastructure/major waterway facility crossing plan	Rivers 38.0097 -78.401 Rivanna River Rail 38.0123, -78.399 Pipelines 37.8972, -78.3653 38.115, -78.2464
Environmental impacts	Land use along the Bid Route corridor is a predominantly rural agricultural landscape with pockets of residential development. The route intersects FEMA-mapped floodplains and/or floodways, and NWI-mapped wetlands primarily adjacent to streams and low-lying areas. The route also crosses named and unnamed streams in various locations. Based on existing aerial photography, the proposed route likely has unmapped wetland or drainage features. The timing of construction will be executed in accordance with state and federal agency criteria as needed. Desktop studies and record reviews for the station parcel and line route will be conducted for wetlands and streams, hazardous materials, and cultural resources. Following field studies, data will be digitized and provided to engineering so that pole locations and the station is sited to maximize avoidance of sensitive resources. For example, poles will be placed outside of or span wetlands, streams, and floodplains to the greatest extent possible. Existing access and roads will be utilized to access pole locations. If necessary, temporary access roads to pole locations will be identified and field surveyed for environmental and cultural resources and will be adjusted to avoid or minimize impacts.

Tower characteristics	This 500kV single circuit line utilizes a mixture of guyed-V and self-supporting steel lattice tower construction with the phases arranged in a horizontal configuration. The predominant structure types will be a mixture of guyed-V and self-supporting suspension towers (69), with the balance of the line being self-supporting running angle (14) and tension towers (28). Self-supporting towers will be supported by a mixture of drilled concrete pier foundations and grillage foundations. Self-supporting structures will be used selectively in an effort to keep electrical infrastructure compatible with agricultural land use that is interspersed throughout the project area. Guyed-V structures will be used in areas with challenging access and topography.
Construction responsibility	Company confidential information
Benefits/Comments	Company confidential information
Component Cost Details - In Current Year $	
Engineering & design	Company confidential information
Permitting / routing / siting	Company confidential information
ROW / land acquisition	Company confidential information
Materials & equipment	Company confidential information
Construction & commissioning	Company confidential information
Construction management	Company confidential information
Overheads & miscellaneous costs	Company confidential information
Contingency	Company confidential information
Total component cost	$129,600,000.00
Component cost (in-service year)	$149,894,327.00

Greenfield Transmission Line Component

Component title	Kaladin - North Anna 500 kV Greenfield
Project description	Company confidential information
Point A	Kaladin 500kV

Point B	North Anna 500kV	
Point C		
	Normal ratings	Emergency ratings
Summer (MVA)	3814.000000	5149.000000
Winter (MVA)	4825.000000	5848.000000
Conductor size and type	3 Bundled – 1,351 kcmil (45/7 Strand) ACSR “Dipper” conductor	
Nominal voltage	AC	
Nominal voltage	500	
Line construction type	Overhead	
General route description	The Proposing Entity assessed environmental and land use constraints and opportunities within an area that included the existing Kaladin substation and the greenfield North Anna substation as the two endpoints. The evaluation resulted in the Bid Route of approximately 32.5 miles of greenfield line through Spotsylvania County in Virginia. The 500kV line exits the existing Kaladin Substation traveling east/north to the greenfield North Anna Substation. No habitable structures are present within the proposed ROW. Overall, the Route selected is the most direct route between the two existing substations and has the least overall impact on land use and environmental resources based on the Proposing Entity’s qualitative review. The Route significantly reduces the number of new access roads, reducing overall constructability impacts.	
Terrain description	The topography along the Bid Route is relatively hilly. Land use in the area encompasses mostly agricultural and residential parcels in rural Virginia. The line crosses low density developed areas, a significant amount of highly vegetated (wooded) rural land, state/county highways, railroads, streams, and existing utilities.	
Right-of-way width by segment	The Kaladin-North Anna 500kV greenfield route ROW will be 175 feet in width and will parallel/cross existing rights-of-way to include interstates, roads, railroads, existing transmission lines/utilities, existing pipelines and best minimizes potential impacts to the natural and human environments.	
Electrical transmission infrastructure crossings	230kV: 37.9933, -77.9766, 230kV: 38.0189, -77.9278, 230kV: 38.1183, -78.2118	
Civil infrastructure/major waterway facility crossing plan	Rivers 38.0976 -78.1909 South Anna River Railroads 38.0231, -77.9265 BB 38.1181, -78.2115 BB Pipelines 38.0113, -78.0283 38.0971, -78.1789	

Environmental impacts	Land use along the Bid Route corridor is a predominantly rural agricultural landscape with pockets of residential development. The route intersects FEMA-mapped floodplains and/or floodways, and NWI-mapped wetlands primarily adjacent to streams and low-lying areas. The route also crosses named and unnamed streams in various locations. Based on existing aerial photography, the proposed route likely has unmapped wetland or drainage features. The timing of construction will be executed in accordance with state and federal agency criteria as needed. Desktop studies and record reviews for the station parcel and line route will be conducted for wetlands and streams, hazardous materials, and cultural resources. Following field studies, data will be digitized and provided to engineering so that pole locations and the station is sited to maximize avoidance of sensitive resources. For example, poles will be placed outside of or span wetlands, streams, and floodplains to the greatest extent possible. Existing access and roads will be utilized to access pole locations. If necessary, temporary access roads to pole locations will be identified and field surveyed for environmental and cultural resources and will be adjusted to avoid or minimize impacts.
Tower characteristics	This 500kV single circuit line utilizes a mixture of guyed-V and self-supporting steel lattice tower construction with the phases arranged in a horizontal configuration. The predominant structure types will be a mixture of guyed-V and self-supporting suspension towers (73), with the balance of the line being self-supporting running angle (26) and tension towers (48). Self-supporting towers will be supported by a mixture of drilled concrete pier foundations and grillage foundations. Self-supporting structures will be used selectively in an effort to keep electrical infrastructure compatible with agricultural land use that is interspersed throughout the project area. Guyed-V structures will be used in areas with challenging access and topography.
Construction responsibility	Company confidential information
Benefits/Comments	Company confidential information
Component Cost Details - In Current Year $	
Engineering & design	Company confidential information
Permitting / routing / siting	Company confidential information
ROW / land acquisition	Company confidential information
Materials & equipment	Company confidential information
Construction & commissioning	Company confidential information
Construction management	Company confidential information
Overheads & miscellaneous costs	Company confidential information

Contingency	Company confidential information
Total component cost	$151,200,000.00
Component cost (in-service year)	$174,876,715.00

Greenfield Transmission Line Component

Component title	Kaladin - Morrisville 500 kV Greenfield
Project description	Company confidential information
Point A	Kaladin 500kV
Point B	Morrisville 500kV
Point C	

	Normal ratings	Emergency ratings
Summer (MVA)	3814.000000	5149.000000
Winter (MVA)	4825.000000	5848.000000

Conductor size and type	3 Bundled – 1,351 kcmil (45/7 Strand) ACSR “Dipper” conductor.
Nominal voltage	AC
Nominal voltage	500
Line construction type	Overhead
General route description	The Proposing Entity assessed environmental and land use constraints and opportunities within an area that included the existing Kaladin substation and the existing Morrisville Substation as the two endpoints. The evaluation resulted in the Bid Route of approximately 43 miles of greenfield line through Spotsylvania and Fauquier counties in Virginia. The 500kV line exits the existing Kaladin Substation traveling northeast to the existing Morrisville Substation. No habitable structures are present within the proposed ROW. Overall, the Route selected is the most direct route between the two existing substations and has the least overall impact on land use and environmental resources based on the Proposing Entity’s qualitative review. The Route significantly reduces the number of new access roads, reducing overall constructability impacts.

Terrain description	The topography along the Bid Route is relatively hilly. Land use in the area encompasses mostly agricultural and residential parcels in rural Virginia. The line crosses low density developed areas, a significant amount of highly vegetated (wooded) rural land, state/county highways, railroads, streams, and existing utilities.
Right-of-way width by segment	The Kaladin-Morrisville 500kV greenfield route ROW will be 175 feet in width and will parallel/cross existing rights-of-way to include interstates, roads, railroads, existing transmission lines/utilities, existing pipelines and best minimizes potential impacts to the natural and human environments.
Electrical transmission infrastructure crossings	115kV: 38.1267, -78.2214, 115kV: 38.1272, -78.2215, 115kV: 38.1281, -78.2209, 115kV: 38.1901, -78.1434, 115kV: 38.3583, -77.9787, 115kV: 38.4419, -77.8927, 115kV: 38.5189, -77.8161
Civil infrastructure/major waterway facility crossing plan	Rivers 38.1346 -78.2084 South Anna River 38.3482 -77.988 Rapidan River 38.5198 -77.8076 Rappahannock River Railroads 38.1876, -78.1311 BB Pipelines 38.5106, -77.7342 38.5217, -77.7611 38.5233, -77.765
Environmental impacts	Land use along the Bid Route corridor is a predominantly rural agricultural landscape with pockets of residential development. The route intersects FEMA-mapped floodplains and/or floodways, and NWI-mapped wetlands primarily adjacent to streams and low-lying areas. The route also crosses named and unnamed streams in various locations. Based on existing aerial photography, the proposed route likely has unmapped wetland or drainage features. The timing of construction will be executed in accordance with state and federal agency criteria as needed. Desktop studies and record reviews for the station parcel and line route will be conducted for wetlands and streams, hazardous materials, and cultural resources. Following field studies, data will be digitized and provided to engineering so that pole locations and the station is sited to maximize avoidance of sensitive resources. For example, poles will be placed outside of or span wetlands, streams, and floodplains to the greatest extent possible. Existing access and roads will be utilized to access pole locations. If necessary, temporary access roads to pole locations will be identified and field surveyed for environmental and cultural resources and will be adjusted to avoid or minimize impacts.
Tower characteristics	This 500kV single circuit line utilizes a mixture of guyed-V and self-supporting steel lattice tower construction with the phases arranged in a horizontal configuration. The predominant structure types will be a mixture of guyed-V and self-supporting suspension towers (147), with the balance of the line being self-supporting running angle (21) and tension towers (27). Self-supporting towers will be supported by a mixture of drilled concrete pier foundations and grillage foundations. Self-supporting structures will be used selectively in an effort to keep electrical infrastructure compatible with agricultural land use that is interspersed throughout the project area. Guyed-V structures will be used in areas with challenging access and topography.
Construction responsibility	Company confidential information
Benefits/Comments	Company confidential information

Component Cost Details - In Current Year $

Engineering & design	Company confidential information
Permitting / routing / siting	Company confidential information
ROW / land acquisition	Company confidential information
Materials & equipment	Company confidential information
Construction & commissioning	Company confidential information
Construction management	Company confidential information
Overheads & miscellaneous costs	Company confidential information
Contingency	Company confidential information
Total component cost	$226,800,000.00
Component cost (in-service year)	$262,315,072.00

Substation Upgrade Component

Component title	Farmville Station Upgrade
Project description	Company confidential information
Substation name	Farmville 230 kV Station
Substation zone	DOM
Substation upgrade scope	Install two (2) new 230 kV circuit breakers at Farmville station to tie in the Starfruit – Farmville line.

Transformer Information

None

New equipment description	Install two (2) new 230 kV 5000A circuit breakers at Farmville station to tie in the Starfruit – Farmville line.

Substation assumptions	It is assumed that all necessary outages will be available, the existing AC, DC, & telecom. systems will accommodate the new equipment, ground grid resistivity test data are available, ground grid upgrades will not be needed, the existing cable trench has space for the new control cables, soil boring logs and geotechnical report are available, additional station stone will not be needed, and space will be available to install the equipment outlined in this description.
Real-estate description	No additional property is required for the Farmville upgrades.
Construction responsibility	Company confidential information
Benefits/Comments	Company confidential information
Component Cost Details - In Current Year $	
Engineering & design	Company confidential information
Permitting / routing / siting	Company confidential information
ROW / land acquisition	Company confidential information
Materials & equipment	Company confidential information
Construction & commissioning	Company confidential information
Construction management	Company confidential information
Overheads & miscellaneous costs	Company confidential information
Contingency	Company confidential information
Total component cost	$1,500,000.00
Component cost (in-service year)	$1,734,888.00

Greenfield Transmission Line Component

Component title	Durandal 500kV cut-ins
Project description	Company confidential information
Point A	Clover
Point B	Rawlings

Point C

	Normal ratings	Emergency ratings
Summer (MVA)	4357.000000	4357.000000
Winter (MVA)	5155.000000	5155.000000
Conductor size and type	The new cut-ins will be constructed using a conductor bundle to meet/exceed the SN/SE/WN/WE ratings stated above.	
Nominal voltage	AC	
Nominal voltage	500	
Line construction type	Overhead	
General route description	The 500 kV extension will be approximately 0.35 miles in length between the proposed Durandal Substation in Charlotte County, Virginia to Dominion’s existing Clover - Rawlings 500kV line.	
Terrain description	The topography for the 500 kV extension is rolling hills through rural forested land in Charlotte County, Virginia.	
Right-of-way width by segment	The ROW for the 500kV cut-ins will be 175 feet in width.	
Electrical transmission infrastructure crossings	N/A	
Civil infrastructure/major waterway facility crossing plan	The transmission line will not cross or impact civil infrastructure/major waterway crossings.	
Environmental impacts	The tie-ins lines have undergone a robust siting analysis and the proposed cost includes costs for Environmental studies and permits.	
Tower characteristics	The new 500kV cut-ins for Durandal will be constructed using a mixture of galvanized steel 3-pole deadend structures and galvanized tubular steel H-Frame structures. All structures will be supported by concrete pier foundations.	
Construction responsibility	Company confidential information	
Benefits/Comments	Company confidential information	
Component Cost Details - In Current Year $		
Engineering & design	Company confidential information	

Permitting / routing / siting	Company confidential information
ROW / land acquisition	Company confidential information
Materials & equipment	Company confidential information
Construction & commissioning	Company confidential information
Construction management	Company confidential information
Overheads & miscellaneous costs	Company confidential information
Contingency	Company confidential information
Total component cost	$4,300,000.00
Component cost (in-service year)	$4,839,688.00

Greenfield Transmission Line Component

Component title	Kaladin - Gordonsville 230kV cut-in
Project description	Company confidential information
Point A	Kaladin
Point B	Gordonsville
Point C	

	Normal ratings	Emergency ratings
Summer (MVA)	1463.000000	1573.000000
Winter (MVA)	1463.000000	1573.000000

Conductor size and type	2 Bundle – 1,033 kcmil (54/7 Strand) ACSS Curlew
Nominal voltage	AC
Nominal voltage	230

Line construction type	Overhead
General route description	The Proposing Entity assessed environmental and land use constraints and opportunities within an area that included the existing Gordonsville substation and the greenfield Kaladin substation as the two endpoints. The evaluation resulted in the Bid Route of approximately 0.2-mile of greenfield line through Albemarle County in Virginia. The 500kV line exits the existing Gordonsville Substation traveling northeast generally paralleling existing transmission lines to the greenfield Kaladin Substation. No habitable structures are present within the proposed ROW. Overall, the Route selected is the most direct route between the two existing substations and has the least overall impact on land use and environmental resources based on the Proposing Entity's qualitative review. The Route significantly reduces the number of new access roads, reducing overall constructability impacts.
Terrain description	The topography along the Bid Route is relatively hilly. Land use in the area encompasses mostly agricultural and residential parcels in rural Virginia. The line crosses low density developed areas, a significant amount of highly vegetated (wooded) rural land, state/county highways, railroads, streams, and existing utilities.
Right-of-way width by segment	The Kaladin - Gordonsville 230kV cut-in route tie line ROW will be 130 feet in width.
Electrical transmission infrastructure crossings	No existing transmission facilities will be crossed by the proposed Bid Route.
Civil infrastructure/major waterway facility crossing plan	No major waterways, existing utilities, or railways will be crossed by the proposed Bid Route.
Environmental impacts	Land use along the Bid Route corridor is a predominantly rural agricultural landscape with pockets of residential development. The route intersects FEMA-mapped floodplains and/or floodways, and NWI-mapped wetlands primarily adjacent to streams and low-lying areas. The route also crosses named and unnamed streams in various locations. Based on existing aerial photography, the proposed route likely has unmapped wetland or drainage features.
Tower characteristics	This 230kV single circuit line utilizes steel H-frame construction with the phases arranged in a horizontal configuration. The line will require one H-frame suspension structure and one 3-pole tension structure. Both structures will be supported by drilled concrete pier foundations.
Construction responsibility	Company confidential information
Benefits/Comments	Company confidential information
Component Cost Details - In Current Year $	
Engineering & design	Company confidential information
Permitting / routing / siting	Company confidential information

ROW / land acquisition	Company confidential information
Materials & equipment	Company confidential information
Construction & commissioning	Company confidential information
Construction management	Company confidential information
Overheads & miscellaneous costs	Company confidential information
Contingency	Company confidential information
Total component cost	$1,500,000.00
Component cost (in-service year)	$1,734,888.00

Substation Upgrade Component

Component title	Gordonsville Station upgrade
Project description	Company confidential information
Substation name	Gordonsville Station
Substation zone	DOM
Substation upgrade scope	Install new terminal and relaying equipment at Gordonsville 230kV Station to interconnect new cut-in to greenfield Kaladin Station.

Transformer Information

None

New equipment description	New equipment will include a 230kV circuit breaker (and associated structure, foundation, and wiring/cabling), 230kV disconnect switches, 230kV CCVTs, 230kV insulators, and support structures. New line relaying equipment will be required in the Gordonsville control house.
Substation assumptions	All outages are available to complete the work, the existing control house has sufficient space to add the new line relaying equipment, and the existing AC and DC station service is equipped to accommodate the new terminal equipment.
Real-estate description	No additional real estate will be required for this upgrade.

Construction responsibility	Company confidential information
Benefits/Comments	Company confidential information
Component Cost Details - In Current Year $	
Engineering & design	Company confidential information
Permitting / routing / siting	Company confidential information
ROW / land acquisition	Company confidential information
Materials & equipment	Company confidential information
Construction & commissioning	Company confidential information
Construction management	Company confidential information
Overheads & miscellaneous costs	Company confidential information
Contingency	Company confidential information
Total component cost	$2,000,000.00
Component cost (in-service year)	$2,313,184.00

Greenfield Substation Component

Component title	Bagpipe 765/500 kV Greenfield Station
Project description	Company confidential information
Substation name	Bagpipe Station
Substation description	Construct a 765 kV greenfield station in a double-breaker, double-bus configuration, with six 765 kV breakers and two 765/500 kV transformers to interconnect the proposed Bagpipe station with the existing Heritage station and the proposed Vontay station.
Nominal voltage	AC
Nominal voltage	765/500

Transformer Information

	Name		Capacity (MVA)
Transformer	Transformer Bank 1		2280 / 2620 / 2647 / 2920 MVA (SN/SE/WN/WE)
	High Side	Low Side	Tertiary
Voltage (kV)	765	500	

	Name		Capacity (MVA)
Transformer	Transformer Bank 2		2280 / 2620 / 2647 / 2920 MVA (SN/SE/WN/WE)
	High Side	Low Side	Tertiary
Voltage (kV)	765	500	

Major equipment description	Install (2) 765/500kV transformers Install (6) 765kV 4000A circuit breakers

	Normal ratings	Emergency ratings
Summer (MVA)	2280.000000	2620.000000
Winter (MVA)	2647.000000	2920.000000

Environmental assessment	Land use for the new Bagpipe substation is a relatively flat rural landscape in the vicinity of the existing Brunswick County Power Station. The substation will lie adjacent and outside FEMA-mapped floodplains and/or floodways, and NWI-mapped wetlands primarily adjacent to streams and low-lying areas. Based on existing aerial photography, the proposed greenfield Bagpipe substation likely has unmapped wetland or drainage features. The timing of construction will be executed in accordance with state and federal agencies' criteria as needed. Desktop studies and record reviews for the station will be conducted for wetlands and streams, hazardous materials, and cultural resources prior to onsite investigations. Following field studies, data will be digitized and provided to engineering so that the station is sited to maximize avoidance of sensitive resources.

Outreach plan	Public outreach is a critical component to the Proposing Entity’s siting process, so efforts will include properly informing the public; federal, state, and local agencies; local governments; and other key stakeholders on the need for, and benefits of, this Project. The Proposing Entity’s approach to public outreach is to be always candid and transparent, and to offer a variety of tools and means for directly impacted parties to engage with our staff. The Proposing Entity will provide development updates to local government officials, key stakeholders, and impacted parties as the Project progresses. Public outreach also will involve collecting information about landowner properties and communicating with directly affected landowners during the final siting process.
Land acquisition plan	The proposed Bagpipe substation will be 80 acres in size and located on agricultural/forested lands in rural Brunswick County, Virginia. The proposed station will be purchased in fee.
Construction responsibility	Company confidential information
Benefits/Comments	Company confidential information
Component Cost Details - In Current Year $	
Engineering & design	Company confidential information
Permitting / routing / siting	Company confidential information
ROW / land acquisition	Company confidential information
Materials & equipment	Company confidential information
Construction & commissioning	Company confidential information
Construction management	Company confidential information
Overheads & miscellaneous costs	Company confidential information
Contingency	Company confidential information
Total component cost	$184,533,201.61
Component cost (in-service year)	$213,429,630.00

Greenfield Substation Component

Component title	Vontay 765/500kV Greenfield Station
Project description	Company confidential information

Substation name	Vontay Station
Substation description	Construct a new 765/500 kV greenfield station with a 765 kv and 500 kV yard, connected with two 765/500 kV transformers. The 765 kV yard will consist of 10 breakers in a double-bus-double-breaker configuration and the 500 kV yard will consist of 12 breakers in a double-bus-double breaker configuration.
Nominal voltage	AC
Nominal voltage	765/500kV

Transformer Information

	Name	Capacity (MVA)
Transformer	Transformer Bank 1	2280/2620/2647/2920 (SN/SE/WN/WE)

	High Side	Low Side	Tertiary
Voltage (kV)	765	500	

	Name	Capacity (MVA)
Transformer	Transformer Bank 2	2280/2620/2647/2920 (SN/SE/WN/WE)

	High Side	Low Side	Tertiary
Voltage (kV)	765	500	

Major equipment description	Install (2) 765/500kV transformers Install (10) 765kV 4000A circuit breakers in double-bus-double-breaker configuration Install (12) 500kV 5000A circuit breakers in a double bus-double breaker configuration

	Normal ratings	Emergency ratings
Summer (MVA)	2280.000000	2620.000000
Winter (MVA)	2647.000000	2920.000000

Environmental assessment	Land use for the new Vontay substation is flat rural landscape. The substation will lie adjacent and outside FEMA-mapped floodplains and/or floodways, and NWI-mapped wetlands primarily adjacent to streams and low-lying areas. Based on existing aerial photography, the proposed greenfield Vontay substation possibly contains unmapped wetland or drainage features. The timing of construction will be executed in accordance with state and federal agencies' criteria as needed. Desktop studies and record reviews for the station and line route will be conducted for wetlands and streams, hazardous materials, and cultural resources. Following field studies, data will be digitized and provided to engineering so that pole locations and the station is sited to maximize avoidance of sensitive resources. For example, poles will be placed outside of or span wetlands, streams, and floodplains to the greatest extent possible. Existing access and roads will be utilized to access pole locations. If necessary, temporary access roads to pole locations will be identified and field surveyed for environmental and cultural resources and will be adjusted to avoid or minimize impacts.
Outreach plan	Public outreach is a critical component to the Proposing Entity’s siting process, so efforts will include properly informing the public; federal, state, and local agencies; local governments; and other key stakeholders on the need for, and benefits of, this Project. The Proposing Entity’s approach to public outreach is to be always candid and transparent, and to offer a variety of tools and means for directly impacted parties to engage with our staff. The Proposing Entity will provide development updates to local government officials, key stakeholders, and impacted parties as the Project progresses. Public outreach also will involve collecting information about landowner properties and communicating with directly affected landowners during the final siting process.
Land acquisition plan	Dominion has already purchased land in fee for the property that would be used for Vontay station.
Construction responsibility	Company confidential information
Benefits/Comments	Company confidential information
Component Cost Details - In Current Year $	
Engineering & design	Company confidential information
Permitting / routing / siting	Company confidential information
ROW / land acquisition	Company confidential information
Materials & equipment	Company confidential information
Construction & commissioning	Company confidential information
Construction management	Company confidential information

Overheads & miscellaneous costs	Company confidential information
Contingency	Company confidential information
Total component cost	$233,740,787.46
Component cost (in-service year)	$270,342,731.00

Substation Upgrade Component

Component title	Heritage 500 kV Station Upgrade
Project description	Company confidential information
Substation name	Heritage 500kV Station
Substation zone	DOM
Substation upgrade scope	Upgrade the existing 500 kV Heritage station to include two additional 500 kV circuit breakers in a breaker-and-a-half configuration to interconnect with the proposed Bagpipe station.

Transformer Information

None

New equipment description	Install (2) 500kV 5000A circuit breakers
Substation assumptions	It is assumed that all necessary outages will be available, the existing AC, DC, & telecom. systems will accommodate the new equipment, the existing 345KV control house has space for new relay equipment, ground grid resistivity test data are available, ground grid upgrades will not be needed, the existing cable trench has space for the new control cables, and soil boring logs and geotechnical report are available.
Real-estate description	No additional land is required for the Heritage Station upgrades.
Construction responsibility	Company confidential information
Benefits/Comments	Company confidential information
Component Cost Details - In Current Year $	
Engineering & design	Company confidential information

Permitting / routing / siting	Company confidential information
ROW / land acquisition	Company confidential information
Materials & equipment	Company confidential information
Construction & commissioning	Company confidential information
Construction management	Company confidential information
Overheads & miscellaneous costs	Company confidential information
Contingency	Company confidential information
Total component cost	$2,500,000.00
Component cost (in-service year)	$2,891,480.00

Greenfield Transmission Line Component

Component title	Bagpipe - Vontay 765 kV Greenfield
Project description	Company confidential information
Point A	Bagpipe 765kV
Point B	Vontay 765kV
Point C	

	Normal ratings	Emergency ratings
Summer (MVA)	6625.000000	6625.000000
Winter (MVA)	6625.000000	6625.000000

Conductor size and type	6 Bundled – 795 kcmil (45/7 Strand) ACSR “Tern” conductor.
Nominal voltage	AC
Nominal voltage	765

Line construction type	Overhead
General route description	The Proposing Entity assessed environmental and land use constraints and opportunities within an area that included the greenfield Bagpipe substation and the greenfield Vontay substation as the two endpoints. The evaluation resulted in the Bid Route of approximately 73.6 miles of greenfield line through seven counties (Hanover, Goochland, Powhatan, Chesterfield, Amelia, Dinwiddie, and Brunswick) in Virginia. The 765kV line exits the greenfield Vontay Substation from the west, then travels in a predominantly southern direction until it reaches the greenfield Bagpipe substation from the north, paralleling 20.0 miles of existing transmission line. No habitable structures are present within the proposed ROW. Overall, the Route selected is the most direct route between the two existing substations and has the least overall impact on land use and environmental resources based on the Proposing Entity's qualitative review. The Route significantly reduces the number of new access roads, reducing overall constructability impacts.
Terrain description	The topography along the Bagpipe-Vontay 765kV line is relatively hilly. Land use in the area encompasses mostly agricultural and residential parcels in rural Virginia. The line crosses low density developed areas, a significant amount of highly vegetated (wooded) rural land, state/county highways, railroads, streams, and existing utilities.
Right-of-way width by segment	The Bagpipe – Vontay 765 kV route ROW will be 200 feet in width and will parallel/cross existing rights-of-way to include interstates, roads, railroads, existing transmission lines/utilities, existing pipelines and best minimizes potential impacts to the natural and human environments.
Electrical transmission infrastructure crossings	230kV: 37.5169, -77.7553, 500kV: 36.8207, -77.7373, 500kV: 36.825, -77.741, 500kV: 36.9343, -77.7642, 500kV: 37.7628, -77.7679
Civil infrastructure/major waterway facility crossing plan	Rivers 36.9517 -77.74 Nottoway River 37.2705 -77.763 Appomattox River 37.6131 -77.7901 James River Railroads 37.6185, -77.7935 CSXT 37.1473, -77.741 NS 37.4777, -77.7525 NS Pipelines 36.8196, -77.7364 36.8339, -77.7412 36.8652, -77.7444 36.8687, -77.7458 36.8734, -77.7477 36.8756, -77.7485 36.9337, -77.7645 37.3545, -77.7796 37.4809, -77.7519 37.7314, -77.7984

Environmental impacts	Land use along the Bid Route corridor is a predominantly rural agricultural landscape with pockets of residential development. The route intersects FEMA-mapped floodplains and/or floodways, and NWI-mapped wetlands primarily adjacent to streams and low-lying areas. The route also crosses named and unnamed streams in various locations. Based on existing aerial photography, the proposed route likely has unmapped wetland or drainage features. The timing of construction will be executed in accordance with state and federal agency criteria as needed. Desktop studies and record reviews for the station parcel and line route will be conducted for wetlands and streams, hazardous materials, and cultural resources. Following field studies, data will be digitized and provided to engineering so that pole locations and the station is sited to maximize avoidance of sensitive resources. For example, poles will be placed outside of or span wetlands, streams, and floodplains to the greatest extent possible. Existing access and roads will be utilized to access pole locations. If necessary, temporary access roads to pole locations will be identified and field surveyed for environmental and cultural resources and will be adjusted to avoid or minimize impacts.
Tower characteristics	This 765kV single circuit line utilizes self-supporting steel lattice tower construction with the phases arranged in a horizontal configuration. The predominant structure types will be self-supporting suspension towers (258), running angle towers (14) and tension structures (27). All towers will be supported by drilled concrete pier foundations. Self-supporting structures will be used as an effort to keep electrical infrastructure compatible with agricultural land use that is interspersed throughout the project area.
Construction responsibility	Company confidential information
Benefits/Comments	Company confidential information
Component Cost Details - In Current Year $	
Engineering & design	Company confidential information
Permitting / routing / siting	Company confidential information
ROW / land acquisition	Company confidential information
Materials & equipment	Company confidential information
Construction & commissioning	Company confidential information
Construction management	Company confidential information
Overheads & miscellaneous costs	Company confidential information
Contingency	Company confidential information

Total component cost	$420,767,718.49
Component cost (in-service year)	$486,656,589.00

Greenfield Transmission Line Component

Component title	Starfruit – Farmville 230 kV Cut In
Project description	Company confidential information
Point A	Starfruit Station
Point B	Farmville Station
Point C	

	Normal ratings	Emergency ratings
Summer (MVA)	1463.000000	1573.000000
Winter (MVA)	1463.000000	1573.000000

Conductor size and type	2 Bundle – 1,033 kcmil (54/7 Strand) ACSS Curlew
Nominal voltage	AC
Nominal voltage	230
Line construction type	Overhead
General route description	The Proposing Entity assessed environmental and land use constraints and opportunities within an area that included the existing Cunningham substation and the greenfield Lodi substation as the two endpoints. The evaluation resulted in the Bid Route of approximately 0.9-mile of greenfield line through Fluvanna County in Virginia. The 500kV line exits the existing Cunningham Substation traveling northeast generally paralleling existing transmission lines to the existing Lodi Substation. No habitable structures are present within the proposed ROW. Overall, the Route selected is the most direct route between the two existing substations and has the least overall impact on land use and environmental resources based on the Proposing Entity’s qualitative review. The Route significantly reduces the number of new access roads, reducing overall constructability impacts.

Terrain description	The topography along the Bid Route is relatively hilly. Land use in the area encompasses mostly agricultural and residential parcels in rural Virginia. The line crosses low density developed areas, a significant amount of highly vegetated (wooded) rural land, state/county highways, railroads, streams, and existing utilities.
Right-of-way width by segment	The Starfruit - Farmville 230 kV ROW will be 130 feet in width.
Electrical transmission infrastructure crossings	No existing transmission facilities will be crossed by the proposed Bid Route.
Civil infrastructure/major waterway facility crossing plan	No major waterways, railways, or other infrastructure are crossed by the proposed Bid Route.
Environmental impacts	Land use along the Bid Route corridor is a predominantly rural agricultural landscape with pockets of residential development. The route intersects FEMA-mapped floodplains and/or floodways, and NWI-mapped wetlands primarily adjacent to streams and low-lying areas. The route also crosses named and unnamed streams in various locations. Based on existing aerial photography, the proposed route likely has unmapped wetland or drainage features. The timing of construction will be executed in accordance with state and federal agency criteria as needed. Desktop studies and record reviews for the station parcel and line route will be conducted for wetlands and streams, hazardous materials, and cultural resources. Following field studies, data will be digitized and provided to engineering so that pole locations and the station is sited to maximize avoidance of sensitive resources. For example, poles will be placed outside of or span wetlands, streams, and floodplains to the greatest extent possible. Existing access and roads will be utilized to access pole locations. If necessary, temporary access roads to pole locations will be identified and field surveyed for environmental and cultural resources and will be adjusted to avoid or minimize impacts.
Tower characteristics	This 230kV single circuit line utilizes steel H-frame construction with the phases arranged in a horizontal configuration. The line will require one H-frame suspension structure and one 3-pole tension structure. Both structures will be supported by drilled concrete pier foundations.
Construction responsibility	Company confidential information
Benefits/Comments	Company confidential information
Component Cost Details - In Current Year $	
Engineering & design	Company confidential information
Permitting / routing / siting	Company confidential information
ROW / land acquisition	Company confidential information
Materials & equipment	Company confidential information

Construction & commissioning	Company confidential information
Construction management	Company confidential information
Overheads & miscellaneous costs	Company confidential information
Contingency	Company confidential information
Total component cost	$1,500,000.00
Component cost (in-service year)	$1,734,888.00

Greenfield Transmission Line Component

Component title	Bagpipe - Heritage 500 kV Cut In
Project description	Company confidential information
Point A	Bagpipe Station
Point B	Heritage Station
Point C	

	Normal ratings	Emergency ratings
Summer (MVA)	3814.000000	5149.000000
Winter (MVA)	4825.000000	5848.000000

Conductor size and type	3 Bundled – 1,351 kcmil (45/7 Strand) ACSR “Dipper” conductor.
Nominal voltage	AC
Nominal voltage	500
Line construction type	Overhead

General route description	The Proposing Entity assessed environmental and land use constraints and opportunities within an area that included the existing Heritage substation and the greenfield Bagpipe substation as the two endpoints. The evaluation resulted in the Bid Route of approximately 0.7-mile of greenfield line through Brunswick County in Virginia. The 765kV line exits the existing Heritage Substation traveling north generally paralleling existing transmission lines to the greenfield Bagpipe Substation. No habitable structures are present within the proposed ROW. Overall, the Route selected is the most direct route between the two existing substations and has the least overall impact on land use and environmental resources based on the Proposing Entity's qualitative review. The Route significantly reduces the number of new access roads, reducing overall constructability impacts.
Terrain description	The topography along the Bid Route is relatively hilly. Land use in the area encompasses mostly agricultural and residential parcels in rural Virginia. The line crosses low density developed areas, a significant amount of highly vegetated (wooded) rural land, state/county highways, railroads, streams, and existing utilities.
Right-of-way width by segment	The Bagpipe - Heritage 500 kV route tie line ROW will be 175 feet in width and will parallel/cross existing rights-of-way to include interstates, roads, railroads, existing transmission lines/utilities, existing pipelines and best minimizes potential impacts to the natural and human environments.
Electrical transmission infrastructure crossings	No existing transmission facilities are crossed by the proposed Bid Route
Civil infrastructure/major waterway facility crossing plan	No major waterways, railways, or other infrastructure are crossed by the proposed Bid Route
Environmental impacts	Land use along the Bid Route corridor is a predominantly rural agricultural landscape with pockets of residential development. The route intersects FEMA-mapped floodplains and/or floodways, and NWI-mapped wetlands primarily adjacent to streams and low-lying areas. The route also crosses named and unnamed streams in various locations. Based on existing aerial photography, the proposed route likely has unmapped wetland or drainage features. The timing of construction will be executed in accordance with state and federal agency criteria as needed. Desktop studies and record reviews for the station parcel and line route will be conducted for wetlands and streams, hazardous materials, and cultural resources. Following field studies, data will be digitized and provided to engineering so that pole locations and the station is sited to maximize avoidance of sensitive resources. For example, poles will be placed outside of or span wetlands, streams, and floodplains to the greatest extent possible. Existing access and roads will be utilized to access pole locations. If necessary, temporary access roads to pole locations will be identified and field surveyed for environmental and cultural resources and will be adjusted to avoid or minimize impacts.
Tower characteristics	This 500kV single circuit lines will utilize self-supporting steel lattice tower construction with the phases arranged in a horizontal configuration. The predominant structure types will be self-supporting suspension towers (9), with the balance of the line being self-supporting tension towers (4). Self-supporting towers will be supported by a mixture of drilled concrete pier foundations and grillage foundations.

Construction responsibility	Company confidential information
Benefits/Comments	Company confidential information
Component Cost Details - In Current Year $	
Engineering & design	Company confidential information
Permitting / routing / siting	Company confidential information
ROW / land acquisition	Company confidential information
Materials & equipment	Company confidential information
Construction & commissioning	Company confidential information
Construction management	Company confidential information
Overheads & miscellaneous costs	Company confidential information
Contingency	Company confidential information
Total component cost	$5,687,500.00
Component cost (in-service year)	$6,578,117.00

Transmission Line Upgrade Component

Component title	Vontay - North Anna 500kV rebuild
Project description	Company confidential information
Impacted transmission line	Vontay - North Anna
Point A	Vontay 500kV
Point B	North Anna 500kV
Point C	

Terrain description	The topography along the Bid Route is relatively hilly. Land use in the area encompasses mostly agricultural and residential parcels in rural Virginia. The line crosses low density developed areas, a significant amount of highly vegetated (wooded) rural land, state/county highways, railroads, streams, and existing utilities.
Existing Line Physical Characteristics	
Operating voltage	500
Conductor size and type	The conductor size for the existing line is unknown.
Hardware plan description	The age and condition of the existing line hardware is unknown. New transmission line hardware will be installed.
Tower line characteristics	The age and condition of the existing structures is unknown but it is assumed they will need to be replaced as part of this rebuild project. The existing structures will be removed, and new structures will be installed.
Proposed Line Characteristics	

	Designed	Operating
Voltage (kV)	500.000000	500.000000
	Normal ratings	Emergency ratings
Summer (MVA)	5479.000000	5479.000000
Winter (MVA)	6066.000000	6066.000000

Conductor size and type	4-Bundle – 1,590 kcmil (54/19 Strand) ACSR Falcon
Shield wire size and type	(2) 0.646’ Optical Ground Wires
Rebuild line length	21 miles
Rebuild portion description	It is assumed that this 21-mile long 500kV single circuit line rebuild will utilize a mixture of guyed-V and self-supporting steel lattice tower construction with the phases arranged in a horizontal configuration. Self-supporting structures will be used selectively in an effort to keep electrical infrastructure compatible with agricultural land use that is interspersed throughout the project area. Guyed-V structures will be used in areas with challenging access and topography.

Right of way	The Vontay – North Anna 500 kV route ROW will be 175 feet in width and will parallel/cross existing rights-of-way to include interstates, roads, railroads, existing transmission lines/utilities, existing pipelines and best minimizes potential impacts to the natural and human environments. New ROW will be acquired as needed if the existing ROW is not adequate for the line rebuild.
Construction responsibility	Company confidential information
Benefits/Comments	Company confidential information
Component Cost Details - In Current Year $	
Engineering & design	Company confidential information
Permitting / routing / siting	Company confidential information
ROW / land acquisition	Company confidential information
Materials & equipment	Company confidential information
Construction & commissioning	Company confidential information
Construction management	Company confidential information
Overheads & miscellaneous costs	Company confidential information
Contingency	Company confidential information
Total component cost	$87,148,696.00
Component cost (in-service year)	$100,690,353.00

Congestion Drivers

None

Existing Flowgates

None

New Flowgates

Company confidential information

Financial Information

Capital spend start date	03/2026
Construction start date	05/2030
Project Duration (In Months)	79

Cost Containment Commitment

Cost cap (in current year)	Company confidential information
Cost cap (in-service year)	Company confidential information

Components covered by cost containment

1. Durandal - Starfruit 765kV line - Transource
2. Starfruit - Lodi 765kV line - Transource
3. Starfruit 765/230 kV Greenfield Station - Transource
4. Lodi 765/500 kV Greenfield Station - Transource
5. Kaladin 500/230 kV Greenfield Station - Transource
6. Cunningham - Lodi 500 kV - Transource
7. Kaladin - Lodi 500 kV - Transource
8. Bagpipe 765/500 kV Greenfield Station - Transource
9. Bagpipe - Vontay 765 kV Greenfield - Transource

Cost elements covered by cost containment

Engineering & design	Yes
Permitting / routing / siting	Yes

ROW / land acquisition	Yes
Materials & equipment	Yes
Construction & commissioning	Yes
Construction management	Yes
Overheads & miscellaneous costs	Yes
Taxes	Yes
AFUDC	No
Escalation	Yes
Additional Information	Company confidential information
Is the proposer offering a binding cap on ROE?	Yes
Would this ROE cap apply to the determination of AFUDC?	No
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?	Company confidential information
Additional cost containment measures not covered above	Company confidential information

Additional Comments

None