APPALACHIAN POWER COMPANY
BEFORE THE
VIRGINIA STATE CORPORATION COMMISSION
CASE NO. PUR-2021-00219

APPLICATION FOR APPROVAL AND CERTIFICATION OF ELECTRICAL TRANSMISSION LINE

Fieldale to Ridgeway
138 kV Rebuild Project

VOLUME 1 OF 2

Application, Testimony, Response to Guidelines and Exhibits

November 2021

VOLUME 1 - Application, Testimony, Response to Guidelines and Exhibits

VOLUME 2 – Siting Study and VDEQ Supplement

VOLUME 1

EXHIBITS

VOLUME 2

MAPS AND ATTACHMENTS

ACS	American Community Service
ACSR	Aluminum Conductor Steel Reinforced
AEP	American Electric Power Company, Inc. (parent company of Appalachian)
AEPSC	American Electric Power Service Corporation
APCo	Appalachian Power Company (a unit of AEP)
Appalachian	Appalachian Power Company (a unit of AEP)
Application	Collectively refers to the application requesting Commission approval for the proposed Project, together with all of the supporting testimony, Response to Guidelines, Siting Study, VDEQ Supplement, tables, exhibits, attachments, figures and maps, etc.
ASCE	American Society of Civil Engineers
BMP	Best Management Practice
CBG	Census Block Group
CCVTs	Capacitor Coupled Voltage Transformers
CIR	Color Infrared
cmil	circular mil
Code	Code of Virginia
Company	Appalachian Power Company (a unit of AEP)
CPCN	Certificate of Public Convenience and Necessity
Duke Energy	Duke Energy Carolinas, LLC
ELF	Extremely Low Frequency
EMF	Electric and Magnetic Fields
EMF RAPID	Electric and Magnetic Fields Research and Public Information Dissemination
EPRI	Electric Power Research Institute
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
GIS	Geographic Information System
Hz	hertz
IARC	International Agency for Research on Cancer
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IEEE	Institute of Electrical and Electronics Engineers
kHz	kilohertz
kV	kilovolt (1,000 volts)
kV/m	kilovolt/meter (a unit of measurement for electric fields)
LiDAR	Light Detection and Ranging imagery
Line	Transmission Line or Power Line
Load Area	The load area depicted on Figure 2 in Section I of the Response to Guidelines representing a combined peak load of approximately 25 MVA and provides support to both the Company's Virginia transmission system and Duke Energy Carolinas, LLC.'s North Carolina transmission system.
mG	milligauss (a unit of measurement for magnetic fields)
MVA	megavolt ampere
MVAr	megavolt amps reactive
MW	milliwatt
NERC	North American Electric Reliability Corporation
NESC	National Electrical Safety Code
NHD	National Hydrography Dataset
NHL	National Historic Landmark
NIEHS	National Institute of Environmental Health Services
NLCD	National Land Cover Database
NPL	National Priority List (maintained by USEPA)
NRCS	National Resources Conservation Service of the United States Department of Agriculture
NRHP	National Register of Historic Places

NUG	Non-Utility Generator
NWI	National Wetlands Inventory (maintained by the USFWS)
OPGW	Optical Ground Wire
PEM	Palustrine emergent wetland
PFO	Palustrine forested wetland
PJM	PJM Interconnection, L.L.C. - the RTO that coordinates the movement of wholesale electricity in parts of the Northeast, Mid-Atlantic and Midwest
POWER	POWER Engineers, Inc.
Project	The proposed transmission line rebuild and other proposed work detailed in Section I of the Response to Guidelines.
PSS	Palustrine scrub-shrub wetland
QF	Qualifying Facilities
RCRA	Resource Conservation and Recovery Act Information System (maintained by USEPA)
Response to Guidelines	Response to "Guidelines of Minimum Requirements for Transmission Line Applications Filed under Title 56 of the Code of Virginia."
ROW(s)	Right(s)-of-Way
RTO	Regional Transmission Organization
RTEP	Regional Transmission Expansion Plan
SCC	Virginia State Corporation Commission
SCENIHR	Scientific Committee on Emerging and Newly Identified Health Risks
Siting Study	The Fieldale to Ridgeway 138 kV Rebuild Siting Study for the Company-owned portion of the Fieldale – Dan River 138 kV transmission line asset to be rebuilt
Siting Team	A multidisciplinary team of experts in transmission line routing, impact assessment for a wide variety of natural resources and the human environment, impact mitigation, engineering, and construction management
SSURGO	Soil Survey Geographic Database
Supplemental Work	See Section IA, Response to Guidelines
TRI	Toxics Release Inventory (maintained by USEPA)
U.S.	United States
USACE	United States Army Corps of Engineers
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VA/NC	Virginia/North Carolina state border
VDCR	Virginia Department of Conservation and Recreation
VDEQ	Virginia Department of Environmental Quality
VDEQ Supplement	The analysis included in Volume 2 of this Application, which addresses the environmental and historic features associated with the Project
VDWR	Virginia Department of Wildlife Resources
VDH	Virginia Department of Health
VDHR	Virginia Department of Historic Resources
VDOF	Virginia Department of Forestry
VDOT	Virginia Department of Transportation
VGIN	Virginia Geographic Information Network
VMRC	Virginia Marine Resources Commission
VOF	Virginia Outdoors Foundation
VPDES	Virginia Pollutant Discharge Elimination System
WHO	World Health Organization
WOTUS	Waters of the United States

EXECUTIVE SUMMARY

In order to maintain and improve the reliability of electric service to customers in its service territory, Appalachian Power Company ("Appalachian" or "Company") is seeking permission for the Fieldale to Ridgeway 138 kilovolt ("kV") Rebuild Project (the "Project"), which consists of the following:

(a) An approximate 15-mile long rebuild of the Company-owned portion of the Fieldale – Dan River 138 kV transmission line from the Company's Fieldale Substation to existing structure 28-103 near the Virginia/North Carolina border;

(b) Re-conductoring an approximately 0.3-mile portion of the line between existing structures 28-38A and 28-41A; and

(c) Upgrades and replacement of equipment at the Ridgeway Substation and updates to relay settings at the Fieldale, Ridgeway, and Commonwealth Crossing substations.

See Exhibit 1 for a map of the Project area.

The Project rebuilds an existing 138 kV transmission line due to the deteriorated condition, performance, and risk associated with the asset, including its inability to meet current National Electric Safety Code ("NESC") standards. The transmission line to be rebuilt is over 70 years old, contains numerous open conditions due to age-related deterioration, and does not comply with current NESC Grade B loading criteria. The transmission line has experienced poor operational performance due to multiple permanent and momentary outages, has outage risk to customers directly served by the associated circuits, and has outage risks to the Company's interconnection with Duke Energy Carolinas, LLC. ("Duke Energy"), which occurs near existing structure 28-103 at the Virginia/North Carolina border.

Approximately forty percent of the Project will be constructed on the existing 100-foot-wide right-of-way ("ROW") already acquired by the Company. In order to minimize the duration of time the transmission line will be out of service, the remaining portion of the Project will be rebuilt parallel to or near the existing ROW on new 100-foot-wide ROW.

The existing transmission line was built primarily with single-circuit 138 kV wood H-frame structures that are 58 feet tall on average. The Company plans to rebuild the transmission line primarily using single-circuit 138 kV steel H-frame structures, although single-circuit monopole structures will be used at certain locations, such as congested residential areas. Lattice towers are currently used at the crossing of the Smith River and will be replaced with modern lattice towers when the Project is rebuilt. The anticipated heights of the proposed structures (excluding the proposed lattice tower structures) on the Project range between 55 and 85 feet, with an average structure height of 67 feet tall. There are two lattice structures proposed for the Project and they will be 119 feet tall.

The Proposed Route can largely be rebuilt within or parallel to the existing transmission line ROW. Considering additional impacts associated with the acquisition of and construction on new ROW and given the statutory preference to the use of existing ROWs, the Company did not consider any alternative routes requiring significantly new ROW, not adjacent to existing ROW, for the Project.

The estimated functional cost of the Project is approximately $32.6 million, which includes approximately $32.2 million for transmission-related work and $0.4 million for substation-related work. The proposed in-service date for the Project is July 2025. If the Commission approves the Project, the Company estimates that it will need approximately three years after entry of the Commission's final approving order for engineering, design, ROW acquisition, permitting, material procurement and construction to place the Project in service.

COMMONWEALTH OF VIRGINIA

STATE CORPORATION COMMISSION

APPLICATION OF
APPALACHIAN POWER COMPANY **CASE NO. PUR-2021-00219**
for Approval and Certification of the
Fieldale to Ridgeway 138 kV Rebuild Project
under Title 56 of the Code of Virginia

APPALACHIAN POWER COMPANY ("Appalachian" or the "Company"), a corporation duly organized and existing under the laws of the Commonwealth of Virginia, represents as follows:

1. Appalachian is a Virginia public service corporation providing electric service in Virginia and West Virginia and having an address of P.O. Box 2021, Roanoke, Virginia 24022.

2. In order to perform its legal duty to furnish adequate and reliable electric service, Appalachian must, from time to time, replace existing transmission facilities or construct new transmission facilities in its system.

3. In this Application, the Company proposes to construct, own, operate and maintain the Fieldale to Ridgeway 138 kV Rebuild Project, to be located in Henry County, Virginia. This Project consists of: (a) An approximate 15-mile long rebuild of the Company-owned portion of the Fieldale – Dan River 138 kV transmission line from the Company's Fieldale Substation to existing structure 28-103 near the Virginia/North Carolina border; (b) Re-conductoring an approximately 0.3-mile portion of that line between existing structures 28-38A and 28-41A; and (c) Upgrades and replacement of equipment at the Ridgeway Substation and updates to relay settings at the Fieldale, Ridgeway, and Commonwealth Crossing substations, all as listed and more fully described in Section I of the Company's Response to Guidelines filed with this Application (such rebuild and other improvements collectively, the "Project"). The infrastructure needs to be replaced due to the deteriorated condition, performance, and risk associated with the asset, including its inability to meet current National Electric Safety Code ("NESC") standards. The Project will replace aging

infrastructure that is over 70 years old, contains numerous open conditions due to age-related deterioration, and does not comply with current NESC Grade B loading criteria. The Project is necessary to ensure adequate and reliable electric service and accommodate future growth in Henry County and the surrounding area.

4. Approximately forty percent of the Project will be constructed on the existing 100-foot-wide right-of-way ("ROW) already acquired by the Company. In order to minimize the duration of time the transmission line will be out of service, the remaining portion of the Project will be rebuilt parallel to or near the existing ROW on new 100-foot-wide ROW.

5. In support of this application, the Company is filing the testimony of:

(a) Nicolas C. Koehler, P.E. as to need for the Project;

(b) Mary Jane L. McMillen, P.E., with regard to the engineering characteristics of the Project;

(c) Xin Liu, P.E., regarding electric and magnetic field levels associated with the Project; and

(d) Roya A. Pardis as to route review and certain environmental matters associated with the Project.

6. The Company is also filing: (a) a Response to Guidelines, responding to the "Guidelines of Minimum Requirements for Transmission Line Applications Filed Under Title 56 of the Code of Virginia" issued by the Commission's Division of Public Utility Regulation on August 10, 2017; (b) a Siting Study and VDEQ Supplement prepared by the Company's siting and environmental consultant, POWER Engineers, Inc.; and (c) related tables, exhibits, attachments and maps (including a digital geographic information system ("GIS") constraints map and GIS shapefiles of the Project via electronic filing).

7. The Company's testimony, Response to Guidelines, Siting Study, VDEQ Supplement and related materials filed with this Application establish that:

(a) The Project is needed and the public convenience and necessity require the construction of the Project by Appalachian;

(b) The proposed route for the Project reasonably minimizes adverse impact on the scenic assets, historic districts and environment of the area in which the Project will be located; and

(c) The Project will support the Company's continued reliable electric service and accommodate future growth in Henry County and the surrounding area.

8. The proposed in-service date for the Project is July 2025. If the Commission approves the Project, the Company estimates that it will need approximately three years after entry of the Commission's final approving order for engineering, design, ROW acquisition, permitting, material procurement and construction to place the Project in service. Accordingly, the Company asks that the Commission expedite its consideration of this Application to the extent permitted under applicable law.

The Company therefore requests:

(a) That this Application be filed and docketed;

(b) That the Commission cause notice of this Application to be given as required by Virginia Code Section 56-46.1 and the Utility Facilities Act, Virginia Code Sections 56-265.1 et seq.;

(c) That the Commission Staff undertake an investigation of this Application and report its findings to the Commission;

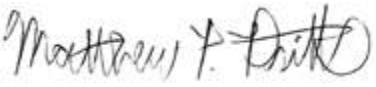
(d) That the Commission determine, as required by Virginia Code Sections 56-46.1 and 265.2 (1) that the Project is needed and the public convenience and necessity require the construction by Appalachian of the Project; and (2) that the proposed route for the transmission line to be rebuilt included in the

Project reasonably minimizes adverse impact on the scenic assets, historic districts and environment of the area concerned;

(e) That the Commission approve the construction of the Project pursuant to Virginia Code Section 56-46.1 and any other applicable law; and

(f) That the Commission grant Appalachian a certificate of public convenience and necessity under the Utility Facilities Act and grant such other relief as may be necessary for the construction and operation of the Project.

APPALACHIAN POWER COMPANY



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APCo Exhibit No. ___
Witness: NCK

DIRECT TESTIMONY OF
NICHOLAS C. KOEHLER, P.E.
FOR APPALACHIAN POWER COMPANY
IN VIRGINIA S.C.C. CASE NO. PUR-2021-00219

APCo Exhibit No. ____
Witness: NCK

SUMMARY OF DIRECT TESTIMONY OF NICOLAS C. KOEHLER, P.E.

My direct testimony supports Appalachian's Application and Response to Guidelines. I am sponsoring Exhibit 2 and Section I of the Response to Guidelines (Necessity for the Project), including the associated figures and tables.

The Company has determined that the entire 15-mile Company-owned portion of the Fieldale – Dan River 138 kV transmission line, from Fieldale Substation to existing structure 28-103 near the Virginia/North Carolina border, needs to be rebuilt due to the deteriorated condition, performance, and risk associated with the asset, including its inability to meet current National Electric Safety Code ("NESC") standards, as discussed in more detail in Section I of the Response to Guidelines. The line segment subject to this Application carries portions of three electrical circuits: Commonwealth Crossing – Fieldale 138 kV, Commonwealth Crossing – Ridgeway 138 kV and Dan River – Ridgeway 138 kV. The customer risk associated with the associated circuits is a combined peak load of approximately 25 megavolt amperes ("MVA"). The system risk associated with this line is the critical system interconnection providing support to the Company's Virginia transmission system and Duke Energy's North Carolina transmission system.

The transmission line to be rebuilt is over 70 years old, does not comply with current NESC Grade B loading criteria, and contains numerous documented open conditions due to age-related deterioration. This portion of the transmission line has experienced poor operational performance due to multiple permanent and momentary outages, has outage risk to customers directly served by the associated circuits, and has outage risk to the Company's interconnection with Duke Energy.

As a result, the Company-owned portion of the existing Fieldale – Dan River 138 kV transmission line from Fieldale Substation to existing structure 28-103 near the Virginia/North Carolina border cannot continue to adequately serve the needs of the Company and its customers. Completing the Project will support the Company's continued reliable electric service and accommodate future growth in Henry County and the surrounding area.

DIRECT TESTIMONY OF
NICOLAS C. KOEHLER
FOR APPALACHIAN POWER COMPANY
IN VIRGINIA S.C.C. CASE NO. PUR-2021-00219

Q: PLEASE STATE YOUR NAME, ADDRESS AND PRESENT POSITION.

A: My name is Nicolas C. Koehler. My position is Director, East Transmission Planning for American Electric Power Service Corporation ("AEPSC"). AEPSC supplies engineering, financing, accounting, planning, advisory, and other services to the subsidiaries of the American Electric Power ("AEP") system, one of which is Appalachian Power Company ("Appalachian" or "the Company"). My business address is 8600 Smiths Mill Road, New Albany, Ohio 43054.

Q: PLEASE REVIEW YOUR EDUCATIONAL BACKGROUND AND YOUR WORK EXPERIENCE.

A: I received a Bachelor of Science – Electrical Engineering degree from Ohio Northern University in Ada, Ohio. In 2008, I joined AEP as a Planning Engineer where I advanced through increasing levels of responsibility. I received my Professional Engineer license in the state of Ohio in 2012 (license number 76967). In May 2019, I assumed my current position.

Q. WHAT ARE YOUR RESPONSIBILITIES AS DIRECTOR OF EAST TRANSMISSION PLANNING?

A. My role includes organizing and managing all activities related to assessing the adequacy of AEP's transmission network to meet the needs of its customers in a reliable, cost-effective, and environmentally compatible manner. I participate in planning activities with Appalachian to address overall system performance.

Q: WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A: The purpose of my testimony is to support certain aspects of Appalachian's Application to this Commission for approval and certification of the proposed Project, which is in the southeastern portion of Appalachian's service territory.

Q: WHICH OF THE SPECIFIC MATERIALS INCLUDED IN THE RESPONSE TO GUIDELINES ARE YOU SPONSORING?

A: I am responsible for Section I, Necessity for the Proposed Project, and Exhibit 2 filed with this Application in response to the Commission Staff's "Guidelines for Transmission Line Applications Filed Under Title 56 of the Code of Virginia."

Q: WERE THE PORTIONS OF APPALACHIAN'S FILING WHICH YOU ARE SPONSORING PREPARED BY YOU OR UNDER YOUR SUPERVISION AND DIRECTION?

A: Yes.

Q: PLEASE SUMMARIZE THE NEED FOR THE PROJECT.

A: The Company determined that the entire 15-mile Company-owned portion of the Fieldale – Dan River 138 kV transmission line, from Fieldale Substation to existing structure 28-103 near the Virginia/North Carolina border, needs to be rebuilt due to the deteriorated condition, performance, and risk associated with the asset, including its inability to meet current National Electric Safety Code ("NESC") standards, as discussed in more detail in Section I of the Response to Guidelines. The line segment subject to this Application carries portions of three electrical circuits: Commonwealth Crossing-Fieldale 138 kV, Commonwealth Crossing-Ridgeway 138 kV and Dan River-Ridgeway 138 kV. The customer risk associated with the associated circuits is a combined peak load of

approximately 25 megavolt amperes ("MVA"). Accordingly, the Project will address Appalachian's obligation under Virginia law to provide adequate and reliable electric service to customers within its service territory.

Q: WHAT ARE THE REASONS FOR THE REBUILD?

A: The transmission line to be rebuilt is over 70 years old, contains numerous documented open conditions due to age-related deterioration, and does not comply with current NESC Grade B loading criteria. This portion of the transmission line has experienced poor operational performance due to multiple permanent and momentary outages, has outage risk to customers directly served by the associated circuits, and has outage risk to the Company's interconnection with Duke Energy. As a result, the transmission line cannot continue to adequately serve the needs of the Company and its customers because of the combination of condition, performance, and risk of the infrastructure, as discussed in more detail in Section I. Completing the Project will support the Company's continued reliable electric service and accommodate future growth in Henry County and the surrounding area.

Q: PLEASE DESCRIBE THE OUTAGE CONSTRAINTS FOR THE PROJECT.

A: The existing Fieldale – Dan River 138 kV transmission line is outage constrained and can only be taken out of service for a limited amount of time during the spring and fall outage windows. Therefore, the Project must be removed and rebuilt in sections in order to minimize disruptions to the affected Load Area during peak seasons. Rebuilding the Project entirely on existing ROW would result in a significant number of customers (industrial, residential, and commercial) on radial feeds at the Sheffield and Commonwealth Crossing substations. Additionally, the Dan River – Ridgeway 138 kV Circuit is an interconnection with Duke Energy, which typically supports the Load Area during peak summer and winter

months, and thus minimizing the outage duration on this interconnection reduces the risk to customers. With the Company's outage planners, the Siting Team reviewed areas where rebuilding off centerline was feasible and could minimize Project risk. See Witness Pardis' testimony for information regarding the Proposed Route.

Q: WHAT IS THE TOTAL ESTIMATED COST OF THE PROJECT?

A: The functional estimated cost of the project is $32.6 million.

Q: WHAT IS THE PROPOSED IN-SERVICE DATE FOR THE PROJECT?

A: The proposed in-service date is July 2025 and the Company estimates that it will take approximately three years from SCC approval to coordinate outages and construct the Project.

Q: DOES THIS CONCLUDE YOUR TESTIMONY?

A: Yes.

APCo Exhibit No. ____
Witness: MJM

DIRECT TESTIMONY OF
MARY JANE L. MCMILLEN, P.E.
FOR APPALACHIAN POWER COMPANY
IN VIRGINIA S.C.C. CASE NO. PUR-2021-00219

APCo Exhibit No. ____
Witness: MJM

SUMMARY OF DIRECT TESTIMONY OF MARY JANE L. MCMILLEN, P.E.

My direct testimony supports the transmission line and other engineering components of the Company's Application and Response to Guidelines in connection with the Project. I sponsor the description of the transmission line and other engineering components of the Project in Sections II (but not Sections II.A.2, 3 and 9) and V of the Response to Guidelines. I also sponsor Exhibits 4 – 11, Exhibit 12 and digital copy of the Virginia Department of Transportation ("VDOT") General Highway Map for Henry County showing the Project, and geographic information system ("GIS") shapefiles of the Project to be submitted electronically to the Commission with the Application.

The Project includes the following supplemental work:

(a) An approximate 15-mile long rebuild of the Company-owned portion of the Fieldale – Dan River 138 kV transmission line from the Company's Fieldale Substation to existing structure 28-103 near the Virginia/North Carolina border;

(b) Re-conductoring an approximately 0.3-mile portion of the line between existing structures 28-38A and 28-41A; and

(c) Upgrades and replacement of equipment at Ridgeway Substation and updates to relay settings at the Fieldale, Ridgeway, and Commonwealth Crossing substations.

My testimony summarizes the numbers, multiple types and height ranges of the transmission structures that will be used for the Project. Approximately six miles of the Project transmission line will be rebuilt on the centerline of the existing ROW and due to outage constraints, approximately nine miles of the transmission line will be rebuilt parallel to or near the existing ROW, on new ROW. If the Commission approves the Project, the Company estimates that it will need approximately three years for engineering, design, ROW acquisition, permitting, material procurement, outage coordination and construction to place the Project in service.

DIRECT TESTIMONY OF
MARY JANE L. MCMILLEN, P.E.
FOR APPALACHIAN POWER COMPANY
IN VIRGINIA S.C.C. CASE NO. PUR-2021-00219

Q: PLEASE STATE YOUR NAME, PRESENT POSITION AND BUSINESS ADDRESS.

A: My name is Mary Jane L. McMillen. I am the Manager of Transmission Line Engineering for American Electric Power Service Corporation ("AEPSC"). AEPSC is a subsidiary of American Electric Power Company, Inc. ("AEP") that provides corporate support services to the operating subsidiaries of AEP, including Appalachian Power Company ("Appalachian" or "Company"). My business address is 40 Franklin Road SW, Roanoke, Virginia, 24011.

Q: PLEASE REVIEW YOUR EDUCATIONAL BACKGROUND AND YOUR WORK EXPERIENCE.

A: I graduated from Purdue University with a Bachelor of Science in Civil Engineering followed by a Master of Science in Civil Engineering with an emphasis on Structural Engineering. I am a licensed professional engineer in the Commonwealth of Virginia. I worked for a number of years with an architectural and engineering firm and I joined AEP in 2006 as a consultant. In 2013, I was hired by AEP as a full-time employee and was promoted to the position of Supervisor within Transmission Engineering Standards in 2014. I was promoted to my current position in AEPSC in 2019. I am responsible for coordinating and directing the engineering for the AEP transmission line system (including transmission lines operating at voltages from 34.5 kV through 765 kV) in Virginia, West Virginia, Tennessee, and Kentucky.

Q: WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A: The purpose of my testimony is to support the transmission line and other engineering components of Appalachian's Application to this Commission for approval and certification of the proposed Project. In this connection, I am sponsoring various sections of the Response to Guidelines filed by the Company together with the Application in response to the Commission Staff's "Guidelines for Transmission Line Applications Filed Under Title 56 of the Code of Virginia."

Q: WHAT ARE YOUR RESPONSIBILITIES AS RELATED TO THE PROJECT?

A: As a Manager of Transmission Line Engineering at AEP, my primary duties involve the oversight of the engineering, design, material procurement, and other technical requirements associated with the construction of the transmission lines associated with the Project.

Q: WHICH SPECIFIC MATERIALS INCLUDED IN THE RESPONSE TO GUIDELINES ARE YOU SPONSORING?

A: I am sponsoring: (1) the information describing the transmission line and other engineering components of the Project set forth in Sections II (excluding Section II.A.2, 3 and 9) and V of the Response to Guidelines; (2) Exhibits 4 – 11; (3) Exhibit 12 and the digital copy of the VDOT General Transportation Highway Map for Henry County, showing the Project; and (4) GIS shapefiles of the Project which will be submitted electronically to the Commission with the Application.

Q: WERE THE PORTIONS OF APPALACHIAN'S FILING THAT YOU ARE SPONSORING PREPARED BY YOU OR UNDER YOUR SUPERVISION AND DIRECTION?

A: Yes.

Q: PLEASE DESCRIBE TRANSMISSION LINE ENGINEERING'S ROLE IN THE ROUTE REVIEW PROCESS.

A: Company transmission line engineers were part of the Siting Team and were involved throughout the route review process. Specifically, transmission line engineers conducted desktop and field reviews of the Proposed Route to validate feasibility of rebuilding the transmission line largely within and parallel to the existing ROW from an engineering and constructability standpoint. For more information on the route review process, please see witness Pardis' testimony.

Q: PLEASE DESCRIBE THE TRANSMISSION LINE COMPONENT OF THE PROJECT.

A: The transmission line component of the Project includes rebuilding approximately 15 miles of the Fieldale – Dan River 138 kV transmission line, from the Fieldale Substation to existing structure 28-103, located near the Virginia/North Carolina border where the Company's interconnection with Duke Energy occurs. Due to outage constraints, the rebuild will be completed in sections and both on and off the existing centerline. Between the Company's Fieldale Substation and existing structure 28-38A, the transmission line section to be rebuilt is approximately 6.3 miles long, of which 2.1 miles will be rebuilt within the existing ROW and 4.2 miles will be rebuilt parallel to or near the existing ROW. An approximately 0.3-mile long portion of the transmission line will be reconductored using existing structures to match the capacity of the rebuilt transmission line as shown on Map 12 of Exhibit 3. Between existing structure 28-41A and the Ridgeway Substation, the 138 kV transmission line section is 3.7 miles long and will be rebuilt within the existing ROW. Between Ridgeway Substation and existing structure 28-103 near the

Virginia/North Carolina border, the transmission line section is approximately 4.5 miles long and will be rebuilt parallel to or near the existing ROW.

The Project will largely be rebuilt within or parallel to the existing transmission line ROW. There may be modifications from the proposed centerline based upon the results of ground surveys, geotechnical and environmental surveys, landowner input, ROW negotiations, and final line design. An approximately 100-foot-wide ROW will be required to construct the Project, maintain the transmission line, and will generally be similar to the existing ROW.

Q: IS THERE ANY SECTION THAT HAS MORE THAN A 100-FOOT-WIDE ROW?

A: There is one span across the Smith River that is approximately 2,600 feet long between proposed structures 28-6A and 28-7A. The span crosses the Smith River at the existing crossing and will require an increased ROW width because of the conductor's lateral sway during wind events. In this span, the ROW width will be approximately 185 feet; however, the Company anticipates the amount of tree clearing area will be similar to the existing ROW.

Q: WHAT STRUCTURE TYPES WILL BE USED FOR THE PROJECT?

A: The Project requires multiple types of structures as described in Section II.B of the Response to Guidelines. The structure types included in this Application are preliminary and final structure types will be determined during final engineering, which includes ground survey and geotechnical studies. Nevertheless, based on preliminary engineering, the Company anticipates primarily using single circuit steel H-Frame structures and single circuit monopole structures with braced post insulators for the rebuilt 138kV transmission line. Two lattice tower structures are proposed at the Smith River crossing.

Q: WHY WERE LATTICE TOWER STRUCTURES SELECTED FOR THE SMITH RIVER CROSSING?

A: The Company anticipates replacing the existing lattice towers with two modern, self-supporting single circuit lattice tower structures at the Smith River crossing. Proposed lattice tower structures 28-6A and 28-7A will be placed on either side of the approximate 2,600-foot-long span across the Smith River and near their existing locations. Lattice towers are currently used at this location and are an efficient structure type for long-span construction given the loads and length of the proposed span. See Exhibit 4 for a cross-section of the existing lattice towers and Exhibit 11 for a cross-section of the proposed self-supporting lattice towers.

Q: WHY DID THE COMPANY CHOOSE STEEL POLES FOR THE REBUILD STRUCTURES AS COMPARED TO THE WOOD USED ON THE EXISTING TRANSMISSION STRUCTURES?

A: The existing wooden transmission structures have age-related deterioration including woodpecker damage, which is typical for the area and structure material. Galvanized steel structures are a proven, durable, reliable and efficient structure in this area, and generally have a longer life span than their wooden counterparts. The proposed galvanized steel structures will have a low-reflective finish to minimize visual impacts.

Q: WHY ARE THE PROPOSED STRUCTURES A DIFFERENT HEIGHT THAN THE EXISTING STRUCTURES?

A: There is typically an approximate 10-foot increase in height between the existing structures and the proposed structures. The difference in height is needed to accommodate changes in industry code standards since the original construction and a heavier conductor, which

results in a greater amount of conductor sag between the structures. The proposed structures will be slightly taller where monopoles support a delta or vertical conductor configuration, compared with the existing horizontal configuration of the wooden H-frame structures. Being sensitive to the area, the Company has selected economical structures of minimum height that will meet the clearance criteria. The existing average structure height is 58 feet. The anticipated heights of the proposed structures (excluding the lattice tower structures) on the Project range between 55 and 85 feet, with an average structure height of 67 feet tall. The two lattice towers proposed for the Project will be 119 feet tall.

Q: WHY WAS A COMBINATION OF H-FRAMES AND MONOPOLES CHOSEN FOR THIS PROJECT?

A: H-frame structures will be used for the majority of the line rebuild. H-frame structures are typically used for lines in rolling terrain with conductor spans above 800 feet supporting 1033.5 Aluminum Conductor Steel Reinforced ("ACSR") 54/7 KCM "Curlew" conductor. A portion of the line between proposed structures 28-48A and 28-55A is located in an urban area with shorter spans and within the existing ROW. This section crosses less rolling terrain, allowing for monopole structures to be used in order to reduce the structure footprint and maximize clearances to adjacent residences. Final structure types will be determined during final engineering.

Q: WILL THE COMPANY EMPLOY LOW-COST AND EFFECTIVE MEANS TO IMPROVE THE AESTHETICS OF THE PROPOSED TRANSMISSION LINE?

A: The Company plans to use a low-reflective finish on its galvanized steel structures and non-specular conductors to improve the aesthetics of the proposed transmission line. The

foregoing measures are a low-cost and effective means of improving the aesthetics of the proposed transmission lines, and thus reduce the visual presence of the new structures.

Q: WHAT IS THE COMPANY'S TRANSMISSION LINE ENGINEERING TEAM'S OPINION ON THE PROPOSED ROUTE?

A: The Company's transmission line engineering team supports the Proposed Route for the Project, which is largely within or parallel to the existing transmission line ROW, is the most suitable due to outage constraints and reasonably avoids or minimizes adverse impacts on landowners, historic resources and environment of the area concerned. See Section II.A.9 of the Response to Guidelines and the direct testimony of witness Pardis for a detailed description of the Proposed Route. The Company reasonably expects that it will be able to engineer, build, operate, and maintain the rebuilt transmission line efficiently and effectively with minimized adverse impacts on the environment.

Q: ARE THERE ANY DWELLINGS IN THE PROPOSED 100-FOOT-WIDE ROW FOR THE PROJECT?

A: Three residences have encroached on the existing 100-foot-wide transmission line ROW between the Sheffield and Ridgeway substations. Based on preliminary engineering analysis, the Company expects the Project can be designed and constructed as to avoid the affected buildings in the conductor zone. Accordingly, and subject to completion of final engineering and ROW negotiations with affected landowners, the Company does not expect that any residences located within the ROW will need to be removed to accommodate the rebuilt line. These locations are identified in Exhibit 3, GIS Constraints Map.

Q: PLEASE DESCRIBE ANY OTHER WORK RELATED TO THE CONSTRUCTION OF THE TRANSMISSION LINE PROJECT.

A: Temporary material laydown yards and access roads for structure erection and conductor stringing will be necessary. The final location and extent of required laydown yards and access roads cannot be determined until after completion of final line design, environmental studies and subsequent field reconnaissance by the Company's construction representatives and land agents.

Q: THERE IS CURRENTLY ONE LOCATION WHERE THIRD-PARTY CELLULAR ANTENNAS ARE COLLOCATED ON THE EXISTING TRANSMISSION STRUCTURES TO BE REBUILT. HOW WILL THESE COLLOCATIONS BE RESOLVED?

A: The Company will work with the cellular company to determine the desire to perpetuate the collocation. Collocation poles for cellular antennas may impact the height and diameter of the transmission structure to accommodate cellular antenna requirements, which is discussed in Section II.B.3 of the Response to Guidelines.

Q: IS PLACING ALL OR PART OF THE TRANSMISSION LINES UNDERGROUND A REASONABLE OPTION?

A: No. The additional cost, reliability risks and environmental impacts associated with locating a line, in whole or in part, underground are not appropriate for this Project. Additionally, the Proposed Route reasonably avoids or minimizes adverse impacts on people and the scenic assets, historic resources and environment of the area concerned.

Q: DESCRIBE THE CONSTRUCTION ACTIVITIES FOR THE TRANSMISSION LINE COMPONENTS OF THE PROJECT.

A: Project construction activities will include the installation and maintenance of soil erosion and sedimentation control measures; temporary access road construction; minimal grading

for foundation, structure, equipment and wire installations; and the subsequent rehabilitation of all areas disturbed during construction. All required environmental compliance permits and studies will be completed and a stormwater pollution prevention plan will be developed and implemented under the state's "General Permit for Discharges of Stormwater from Construction Activities."

Q: DESCRIBE THE SUBSTATION WORK FOR THE PROJECT.

A: The substation work for this Project includes removal of a ground switch and replacement of a line trap and three Capacitor Coupled Voltage Transformers ("CCVTs") at the Ridgeway Substation. Protection and control work includes new relaying and new line settings at the Fieldale, Ridgeway and Commonwealth Crossing substations.

Q: IF THE COMMISSION GRANTS THE COMPANY'S APPLICATION TO CONSTRUCT AND OPERATE THE PROJECT, HOW LONG WILL IT TAKE TO COMPLETE AND PLACE IT IN SERVICE?

A: The construction plans for the Project, including the proposed construction sequence, are detailed in Section II.A.10 of the Response to Guidelines. If the Commission approves the Project, the Company estimates that it will need approximately three years for engineering, design, ROW acquisition, permitting, material procurement, outage coordination and construction to place the entire Project in service.

Q: DOES THIS CONCLUDE YOUR TESTIMONY?

A: Yes.

APCo Exhibit No. ____
Witness: XL

DIRECT TESTIMONY OF
XIN LIU, P.E.
FOR APPALACHIAN POWER COMPANY
IN VIRGINIA S.C.C. CASE NO. PUR-2021-00219

APCo Exhibit No. ____
Witness: XL

SUMMARY OF DIRECT TESTIMONY OF XIN LIU, P.E.

My direct testimony supports Appalachian's Application and Response to Guidelines. I sponsor Section IV of the Response to Guidelines.

The Project's proposed rebuild consists of a single-circuit 138 kV transmission line. The maximum electric and magnetic field ("EMF") levels expected to occur at the ROW edge of the proposed rebuilt 138 kV transmission line section from the Fieldale Substation to the Commonwealth Crossing 138kV tap are 0.63 kV/m and 3.18 mG respectively (assuming a 100-foot wide ROW). The maximum existing EMF levels for the existing line section from the Fieldale Substation to the Commonwealth Crossing 138kV tap are 0.59 kV/m and 3.19 mG, respectively.

The maximum EMF levels expected to occur at the ROW edge of the proposed rebuilt 138 kV transmission line section from the Commonwealth Crossing 138kV tap to the Ridgeway Substation are 0.63 kV/m and 3.28 mG respectively (assuming a 100-foot wide ROW).

The maximum existing EMF levels for the existing line section from the Commonwealth Crossing 138kV tap to the Ridgeway Substation are 0.59 kV/m and 3.29 mG, respectively.

The maximum EMF levels expected to occur at the ROW edge of the proposed rebuilt 138 kV transmission line section from the Ridgeway Substation to existing structure 28-103 are 0.63 kV/m and 9.38 mG respectively (assuming a 100-foot wide ROW).

The maximum existing EMF levels for the existing line section from the Ridgeway Substation to existing structure 28-103 are 0.59 kV/m and 9.46 mG, respectively.

These maximum EMF levels for the proposed transmission line are typical and expected results for such transmission lines, and are well within the limits specified in Institute of Electrical and Electronics Engineers ("IEEE") Standard C95.6TM-2002, which sets the safety levels with respect to human exposure to electromagnetic fields.

Appalachian considered the presence and proximity of dwellings, schools, hospitals, and other community facilities as features to avoid wherever practical during its route selection process in order to minimize EMF exposure. No significant adverse health effects will result from the construction and operation of the Project. Section IV of the Response to Guidelines provides further documentation and detail regarding the absence of adverse health effects from the construction and operation of the Project.

DIRECT TESTIMONY OF
XIN LIU, P.E.
FOR APPALACHIAN POWER COMPANY
IN VIRGINIA S.C.C. CASE NO. PUR-2021-00219

Q: PLEASE STATE YOUR NAME, PRESENT POSITION AND BUSINESS ADDRESS.

A: My name is Xin Liu. I am the Manager of System Performance Analysis for American Electric Power Service Corporation ("AEPSC"). AEPSC is a subsidiary of American Electric Power Company, Inc. ("AEP") that provides corporate support services to the operating subsidiaries of AEP, including Appalachian Power Company ("APCo," "Appalachian" or "Company"). My business address is 8500 Smiths Mill Road, New Albany, Ohio 43054.

Q: PLEASE SUMMARIZE YOUR EDUCATIONAL BACKGROUND AND WORK EXPERIENCE.

A: I received a Master of Science degree and a Ph.D. degree, both in Electrical Engineering, from The Ohio State University. I am a senior member of the Institute of Electrical and Electronics Engineers ("IEEE"), and a licensed professional engineer in the state of Ohio. I joined AEPSC in 2006 as an Engineer; was promoted to Senior Engineer in 2008, was promoted to Principal Engineer in 2012 and promoted to Manager, System Performance Analysis in 2016.

Q: WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A: The purpose of my testimony is to support certain aspects of Appalachian's Application to this Commission for approval and certification of the Project.

Q: WHICH SPECIFIC MATERIALS INCLUDED IN THE APPLICATION ARE YOU SPONSORING?

A: I am sponsoring Section IV, Health Aspects of EMF, of the Response to Guidelines filed by the Company in response to the Commission Staff's "Guidelines for Transmission Line Applications Filed Under Title 56 of the Code of Virginia."

Q: WERE THE PORTIONS OF THE FILING THAT YOU ARE SPONSORING PREPARED BY YOU OR UNDER YOUR SUPERVISION AND DIRECTION?

A: Yes.

Q: WHAT IS EMF?

A: "EMF" is an acronym for electric and magnetic fields, which exist wherever there is a flow of electricity. Electric transmission and distribution lines, electrical wiring in homes, and electric appliances all have electric and magnetic fields associated with their use. Electric fields are produced by the voltage gradient between a power line and ground; their strength is dependent upon the voltage difference of the energized line to ground, the physical characteristics of the line, and the distance from the line to the observation point at which the field strength is measured. The electric field strength is commonly measured in kilovolts per meter ("kV/m"). Magnetic fields are created by the flow of electric current in a conductor. The magnetic field density generated by a transmission line varies with the load current of the line, the physical characteristics of the line, and the distance from the line to the observation point at which the magnetic field density is measured. The magnetic field density is measured in units known as gauss, or milligauss ("mG"). The electric and magnetic fields associated with power lines and electric appliances in the United States have a frequency of 60 hertz ("Hz"), or 60 cycles per second.

Q: PLEASE DETAIL FOR THE COMMISSION YOUR EXPERIENCE IN CALCULATING AND ANALYZING EMF.

A: I have over 18 years of experience conducting, managing and directing the calculation and analysis of a variety of issues in power systems for safe, reliable, economic and environmentally-compatible operation of power equipment and transmission lines, for high-voltage grid development, for system voltage coordination, for power quality, and for development and implementation of advanced technologies. I have been a teaching assistant at the High Voltage Lab at the Ohio State University for six years while conducting and teaching EMF-related experiments. I also have extensive experience measuring the EMF under a transmission line through many research projects at the Ohio State University as well as field testing at AEP.

Q: WHAT ARE THE CALCULATED MAXIMUM EMF LEVELS ASSOCIATED WITH THE PROPOSED TRANSMISSION LINE IN THIS PROJECT?

A: As set forth in part A of Section IV of the Response to Guidelines, the maximum EMF levels expected to occur at the edge of the typical 100-foot-wide right-of-way ("ROW") from the Fieldale Substation to the Commonwealth Crossing 138kV tap are 0.63 kV/m and 3.18 mG, respectively. The maximum EMF levels for the existing line section from the Fieldale Substation to the Commonwealth Crossing 138kV tap are 0.59 kV/m and 3.19 mG, respectively. The maximum EMF levels expected to occur at the ROW edge of the proposed rebuilt 138 kV transmission line section from the Commonwealth Crossing 138kV tap to the Ridgeway Substation are 0.63 kV/m and 3.28 mG respectively (assuming a typical 100-foot wide ROW). The maximum existing EMF levels for the existing line section from the Commonwealth Crossing 138kV tap to the Ridgeway Substation are 0.59 kV/m and 3.29 mG, respectively. The maximum EMF levels expected to occur at the ROW edge of the proposed rebuilt 138 kV transmission line section from the Ridgeway station to existing

structure 28-103 are 0.63 kV/m and 9.38 mG respectively (assuming a typical 100-foot wide ROW). The maximum existing EMF levels for the existing line section from the Ridgeway Substation to existing structure 28-103 are 0.59 kV/m and 9.46 mG, respectively.

Q: ARE THE CALCULATED MAXIMUM EMF LEVELS FOR THE PROPOSED TRANSMISSION LINE EXTRAORDINARY?

A: No. They are typical and expected results for such transmission lines. Both EMF levels drop sharply from the centerline to the edge of the ROW and will continue to drop with distance from the ROW edge. These field levels are well within the limits specified in IEEE Standard C95.6™-2002, which sets the safety levels with respect to human exposure to electromagnetic fields.

Q: IS THE PROPOSED ROUTE FOR THE PROJECT A PRUDENT CHOICE TO REDUCE EMF LEVELS?

A: Yes. From an EMF perspective, the Company's Proposed Route is a prudent choice and consistent with the intent of both the Virginia Department of Health and World Health Organization, which promote public safety relative to EMF. For a description of the Company's Proposed Route, please see witness Pardis' testimony.

Q: WERE PRUDENT AVOIDANCE MEASURES UTILIZED DURING THE ROUTE SELECTION PROCESS IN ORDER TO MINIMIZE EMF EXPOSURE?

A: Yes. The presence and proximity of dwellings, schools, hospitals, and other community facilities were considered throughout the route selection process as features to avoid, to the extent practical, as described in the direct testimony of witness Pardis.

Q: DOES THE COMPANY HAVE AN OPINION ON WHETHER ANY SIGNIFICANT ADVERSE HEALTH EFFECTS WILL RESULT FROM THE CONSTRUCTION AND OPERATION OF THE PROJECT?

A: Based upon the Company's ongoing review of the scientific literature on EMF, the Company's experience with its existing 138 kV transmission lines, and the fact that the calculated maximum EMF levels at the edges of the ROW for the proposed line are well within the limits specified in IEEE Standard C95.6™-2002, the Company is of the opinion that no significant adverse health effects will result from the construction and operation of the Project. This position is consistent with the conclusions expressed in the final report to the Virginia General Assembly, dated October 31, 2000, by Vickie L. O'Dell and Khizar Wasti, Ph.D. of the Virginia Department of Health, in association with this Commission, entitled "Monitoring of Ongoing Research on the Health Effects of High Voltage Transmission Lines (Final Report)" and subsequent assessments as listed in Section IV of the Response to Guidelines.

Q: DOES THIS CONCLUDE YOUR TESTIMONY?

A: Yes.

APCo Exhibit No. ____
Witness: RAP

DIRECT TESTIMONY OF
ROYA A. PARDIS
FOR APPALACHIAN POWER COMPANY
IN VIRGINIA S.C.C. CASE NO. PUR-2021-00219

APCo Exhibit No. ____
Witness: RAP

SUMMARY OF DIRECT TESTIMONY OF ROYA A. PARDIS

My direct testimony supports the Project's route review study and environmental analysis of Appalachian's Application and Response to Guidelines, including specifically:

- Exhibit 1: Project Area Map
- Exhibit 3: GIS Constraints Map
- Exhibit 13: Visual Simulations
- Exhibit 14: Public Notice Map
- Sections II.A.2, 3, and 9 of the Response to Guidelines and the information concerning scenic, environmental, and historic features set forth in Section III of the Response to Guidelines.
- The entirety of Volume 2 of the Application, which includes the *Fieldale to Ridgeway 138 kV Rebuild Siting Study* (the "Siting Study") and Virginia Department of Environmental Quality Supplement (the "VDEQ Supplement") with their respective attachments, figures, tables, photographs, and maps.

I also describe the methods used by the Siting Team, which included representatives of the Company and POWER Engineers, Inc. ("POWER"), in conducting the route review submitted in support of the Company's Application and discuss the Proposed Route for the Project.

The Siting Team used a traditional siting methodology that began with reviewing the existing centerline for opportunities to parallel or use the existing ROW. The Siting Team's analysis shows that the Proposed Route for the Project is the most suitable and minimizes overall human and natural environment impacts by largely rebuilding within or parallel to the existing ROW. The Project is not anticipated to have a disproportionately high or adverse impact on Environmental Justice Communities as defined in the Virginia Environmental Justice Act (§ 2.2-234 et seq. of the Code of Virginia). In addition, the Project is not anticipated to affect any federally- or state-protected species, but habitat studies or species-specific surveys will be conducted prior to construction to ensure compliance with existing environmental regulations and laws.

DIRECT TESTIMONY OF
ROYA A. PARDIS
FOR APPALACHIAN POWER COMPANY
IN VIRGINIA S. C. C. CASE NO. PUR-2021-00219

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Roya A. Pardis. My business address is 7400 Beaufont Springs Drive, Suite 316, Richmond, Virginia 23225.

Q. BY WHOM ARE YOU EMPLOYED AND WHAT IS YOUR POSITION?

A. I serve as an Environmental Planner in the Central Environmental Service Project Management Division at POWER Engineers, Inc. ("POWER").

Q. DOES POWER HAVE EXPERIENCE IN ENVIRONMENTAL ANALYSIS AND ROUTING TRANSMISSION LINES AND IDENTIFYING SUBSTATION SITES?

A. Yes. POWER was founded in 1976 and employs more than 2,700 employees nationwide and overseas. POWER has successfully sited and/or permitted over 400 transmission line projects covering thousands of miles of high voltage transmission lines and associated facilities. POWER has previously supported or provided written testimony to this Commission for six Company projects, including the Reusens to New London 138 kV Rebuild Project (SCC Case No. PUR-2021-00049), Central Virginia Transmission Reliability Project (SCC Case No. PUR-2021-00001), Glendale Area Improvements 138 kV Transmission Project (SCC Case No. PUR-2018-00188), South Abingdon 138 kV Extension transmission line (SCC Case No. PUE-2016-00011), the Huntington Court-Roanoke 138 kV transmission line (SCC Case No. PUE-2008-00096), and the Matt Funk 138 kV transmission line (SCC Case No. PUE-2008-00079).

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THIS COMMISSION?

A. Yes. I was the Company's siting witness and provided written testimony in the Reusens to New London 138 kV Rebuild Project (SCC Case. No. PUR-2021-00049).

Q. WHAT IS YOUR ROLE WITH THE COMPANY'S PROPOSED PROJECT?

A. I serve as the lead Siting Specialist providing management and oversight for the Project's route development process and environmental analysis.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. The purpose of my testimony is to support the route development process and environmental analysis completed as part of the Company's Application to this Commission for approval and certification of the proposed Project. For this Application, I am sponsoring various sections of the Response to Guidelines filed by Appalachian together with the Application in response to the Commission Staff's "Guidelines for Transmission Line Applications Filed under Title 56 of the Code of Virginia," as well as the Siting Study and the Virginia Department of Environmental Quality ("VDEQ") Supplement filed with the Application.

Q. WHICH SPECIFIC MATERIALS ARE YOU SPONSORING?

A. In Volume 1 of the Application, I am sponsoring:

- Exhibit 1 (the "Project Area Map").
- Exhibit 3 (the "GIS Constraints Map").
- Exhibit 13 (the "Visual Simulations").
- Exhibit 14 (the "Public Notice Map").
- Sections II.A.2, 3, and 9, of the Response to Guidelines; and the information concerning scenic, environmental, and historic features set forth in Section III of the Response to Guidelines.

I am also sponsoring the entirety of Volume 2 of the Application, which includes the Siting Study and the VDEQ Supplement, and their respective attachments, figures, tables, photographs and maps.

Q. WERE THE PORTIONS OF APPALACHIAN POWER'S FILING THAT YOU ARE SPONSORING PREPARED BY YOU OR UNDER YOUR SUPERVISION AND DIRECTION?

A. Yes.

Q. PLEASE SUMMARIZE YOUR EDUCATIONAL BACKGROUND AND WORK EXPERIENCE.

A. In 2015, I received a Bachelor of Science degree in Environmental Policy and Planning from Virginia Tech, and in 2018, I received a Master of Business Administration from the Virginia Commonwealth University. I have been associated with POWER since 2017 and have had technical and supervisory roles for multiple electric utility transmission siting projects, many of which have been associated with the Company. In my previous experience, I was the Environmental Compliance Coordinator and Interim Director of Community Development for a locality in eastern Virginia. I have a combined seven years of experience working on the siting of electric transmission lines and land use planning. I routinely oversee the work of and help support POWER technical staff members responsible for siting aspects of POWER's transmission line projects. I have served as an Environmental Planner or Lead Siting Specialist or otherwise supported routing, siting, planning and permitting for transmission line projects in Virginia, West Virginia, Kentucky, South Carolina, and Florida.

Q. SPECIFICALLY, HOW IS THIS PRIOR EXPERIENCE APPLICABLE TO THE

CURRENT PROJECT?

A. My experience siting electrical facilities across various land use types such as developed (densely populated or planned for development) and undeveloped (agricultural, forested, or mountainous) has given me extensive knowledge and understanding of routing opportunities and constraints. I have led or supported route development and selection studies for transmission line projects submitted to this Commission that were located in areas similar to the Project area.

This experience has equipped me to determine the types of information and analyses necessary to develop a transmission line route that minimizes impacts to the natural environment, land use, and visual, recreational and cultural resources, while also considering engineering concerns and constructability issues. Minimizing impacts on the scenic assets, historic districts, environmental justice communities, and the environment are primary route selection objectives for the Company.

Q. PLEASE DESCRIBE FOR THE COMMISSION YOUR PRIMARY DUTIES AS RELATED TO THE PROPOSED PROJECT.

A. POWER was retained by the Company to develop and evaluate the Company-owned section of the existing Fieldale – Dan River 138 kV transmission line to be rebuilt between the Fieldale Substation and existing structure 28-103 located near the Virginia/North Carolina border. As the lead Siting Specialist for the Project, my primary duties involved planning, organizing, coordinating and controlling activities related to: (a) identifying constraints in evaluating the feasibility of rebuilding parallel to the existing ROW for the Project; and (b) selecting a Proposed Route that reasonably minimizes adverse impacts on the scenic assets,

historical resources and environment of the Project area, and is consistent with general routing guidelines, technical criteria, and outage restrictions on the infrastructure.

Q. WHO WAS ON THE SITING TEAM?

A. The Siting Team for the Project consisted of a multi-disciplinary team, including employees of POWER, Appalachian, and other consultants retained by or on behalf of the Company, who supported the route review and public involvement process. The Siting Team members have experience in transmission line siting and impact assessment for a wide variety of natural resources and the human environment. Additionally, members of the Siting Team have experience in disciplines such as transmission line, substation, and distribution engineering, ROW, public outreach, outage planning, and construction management.

Q. PLEASE DESCRIBE FOR THE COMMISSION THE PURPOSE OF THE SITING STUDY FOR THE PROJECT.

A. The primary purpose of the Siting Study is to document the transmission line route development process and the rationale for the proposed route selection. The Siting Study summarizes the siting methodology for evaluating the constraints and opportunities within the Project area. The Siting Study identifies a proposed centerline for the rebuild Project that the Company will use to engineer, construct, operate, and maintain the line, while minimizing overall natural and human environment impacts, if the Project is approved by the Virginia SCC. The Siting Study discusses the definition of a study area, which encompasses the area between the Company-owned substations (Fieldale, Sheffield, and Ridgeway) and existing structure 28-103, and the environmental and land use constraints and opportunities. It also documents siting methodologies and guidelines, documents public

involvement, provides a comparative analysis, and aids in the selection of a proposed route to rebuild the transmission line. The Siting Study is included in Volume 2 of the Application.

Q. PLEASE DESCRIBE THE SITING METHODOLOGY EMPLOYED FOR THE PROJECT.

A. The methodology employed by the Siting Team began with a review of the existing ROW and outage requirements with the Company's planners as summarized in Section II.A.9 of the Response to Guidelines. The duration in which the existing transmission line is out of service should be limited due to outage constraints (see Company witness Koehler's testimony); therefore, the Project cannot be rebuilt entirely within the existing ROW. The Siting Team considered rebuilding on the existing centerline in constrained areas and paralleling the existing ROW where possible to minimize outage durations.

Q. WAS THE SITING METHODOLOGY CONSISTENTLY EMPLOYED FOR THE PROJECT?

A. Yes. The Company and Siting Team's siting methodology evaluated constraint and opportunity areas along the existing ROW, which crosses predominantly forested, agricultural, and developed land uses, including residential, commercial and recreational areas, in Henry County. Given the presence of constraints, the Company and Siting Team determined where rebuilding in or parallel to the existing ROW was practicable for each rebuild section.

Q: PLEASE DESCRIBE THE CONSTRAINTS AND OPPORTUNITIES ANALYSIS USED BY THE SITING TEAM.

A. Using the available data collected and the routing and technical criteria, the Siting Team identified constraints and opportunities within the defined study area. Constraints are specific areas that should be avoided to the extent practical during the route development process. The main opportunity feature is rebuilding within or parallel to the existing Fieldale – Dan River 138 kV transmission line ROW. The Siting Team identified constraints in or near the existing ROW such as residences and other buildings, cemeteries, and recreational areas. Specific examples of constraints and opportunities can be found in the Siting Study.

Q. PLEASE DESCRIBE THE AREAS WHERE THE SITING TEAM CONSIDERED ON CENTERLINE ROUTES.

A. Between the Sheffield and Ridgeway substations, the Siting Team reviewed potential reroute segments to connect the substations, but due to the dense residential development around the Greensboro Road corridor, a direct parallel to the existing ROW was not feasible. The off-centerline routes considered were approximately 0.5 mile longer compared to the on-centerline routes and required many angles through areas not already crossed by the existing ROW. These off-centerline routes would require additional transmission structures, viewshed impacts in open, rural areas, and significant tree clearing and ROW on new landowners.

With the Company's outage planners, the Siting Team explored the possibility of staying on the existing centerline for the 3.7-mile section between the Sheffield and Ridgeway substations and determined that an extended outage to rebuild the existing transmission line within the existing ROW is feasible. Additionally, the Proposed Route remains on centerline for approximately two miles from the Fieldale Substation and across

the Smith River to avoid new impacts to surrounding residential, historical, and recreational areas. For other sections of the Project, rebuilding parallel to the existing ROW is feasible and meets the goal of minimizing outage durations. Additional information can be found in the Siting Study, located in Volume 2.

Q: DID THE SITING TEAM CONSIDER ANY GENERAL OR TECHNICAL CRITERIA FOR THE EXISTING LINE TO BE REBUILT?

A. Yes. The Siting Team considered various siting and technical guidelines during the route development process for the transmission line to be rebuilt. Rebuilding within or parallel to the existing Fieldale – Dan River 138 kV transmission line ROW was a primary siting criterion. When paralleling the existing ROW, the Siting Team attempted to minimize the crossings of the existing centerline, keeping a 100-foot centerline to centerline parallel, and avoid adding heavy angles, where possible. Stakeholder and landowner input, engineering requirements, existing and future land uses, and visual impacts were reviewed by the Siting Team.

Q. DID THE COMPANY CONSIDER STAKEHOLDER AND PUBLIC INPUT DURING THE ROUTE DEVELOPMENT AND DATA COLLECTION PROCESS

A. Yes. The Company and Siting Team obtained information from or contacted various federal, state, and local agencies and/or officials to inform them of the Project and request input for the route development process. Public participation and stakeholder input is important to Appalachian and used during the siting process. The Company met with local Henry County officials on September 18, 2019 to introduce the Project and obtain information for the route planning process. After the initial meeting, Company representatives continued to provide updates throughout the duration of the Project to Henry

County officials, most recently in November 2021. After initial stakeholder coordination, the Company performed feasibility studies for the Project and later announced a virtual public open house on March 17, 2021. Twenty-nine agencies were contacted during the announcement as part of the data collection effort and 10 responses have been received to date. Copies of the agency letters, contact list, and correspondence are included in Attachment F to the Siting Study in Volume 2.

Q. PLEASE DESCRIBE THE OUTREACH EFFORTS THE COMPANY HAS FOLLOWED TO DISCUSS THE REBUILD PROJECT AND SOLICIT FEEDBACK?

A. An in-person public open house was not advisable, given the travel restriction and social distancing recommendations and requirements of the Centers for Disease Control and Prevention and the Executive Orders issued by the Governor of the Commonwealth during the COVID-19 pandemic. In lieu of an in-person public meeting, a virtual open house was created on the Project website (www.AppalachianPower.com/Fieldale-Ridgeway).

The Company engaged and provided notification to landowners within a 1,000-foot corridor (500 feet on either side of the study segment route centerlines) using multiple methods of contact and news releases for the virtual open house in March 2021. Notification included newspaper advertisements, automated telephone notifications, and three separate project mailings to landowners, which included a letter, fact sheet, detailed flyer about transmission line routing, and a comment card with a prepaid postage return envelope. Input received during the virtual open house noted the use of existing ROW and general project information questions, such as structure type and viewshed around densely developed areas. In addition, the Company's ROW agents attempted to reach landowners

where rebuilding parallel to the existing centerline or deviations were proposed. The Company received 41 comments from landowners during the public outreach efforts. The Company will continue to engage all affected landowners, including Environmental Justice Communities, as defined in the Virginia Environmental Justice Act, or the "Act", throughout the duration of the Project. The public involvement process and extent of comments received is further detailed in the Siting Study located in Volume 2. The public notice map is included as Exhibit 14.

Q: REGARDING THE VIRGINIA ENVIRONMENTAL JUSTICE ACT (§ 2.2-234 ET SEQ. OF THE CODE OF VIRGINIA), DID THE SITING TEAM RESEARCH THE DEMOGRAPHICS OF THE COMMUNITIES SURROUNDING THE PROJECT?

A: Yes. The Siting Team reviewed the EJSCREEN (2020) tool, developed by the United States Environmental Protection Agency ("USEPA"), and used data from the American Community Survey ("ACS") from the United States Census Bureau. Per the available EJSCREEN and ACS data, there are 15 Census Block Groups ("CBGs") in Virginia within one mile of the Project. The results of the dataset are provided in Table 2 and the CBGs located within one mile of the Project are shown in Attachment G of the Siting Study. It is the Company's practice in its route development processes to avoid or reasonably minimize impacts to the human environment, including EJ communities and fenceline communities. The Project will largely be rebuilt within or parallel to the existing ROW, which has been in place for more than 70 years and will not be relocated to other communities not already affected by the existing transmission line (see Attachment G to the Siting Study). Relocating the Project from its current general location would result in crossing other similar EJ communities, while also requiring new ROW and additional impacts and was not

considered a feasible alternative for the Project. The Company and Siting Team believe that the Proposed Route will not have a disproportionately high or adverse impact on EJ communities, as defined in the Virginia Environmental Justice Act (§ 2.2-234 et seq. of the Code of Virginia). The demographics of the communities are further discussed in Section 7.4 of the Siting Study.

Q. HAS THE COMPANY ENGAGED, AND WILL IT CONTINUE TO ENGAGE, ANY ENVIRONMENTAL JUSTICE COMMUNITIES AND OTHERS AFFECTED BY THE PROPOSED REBUILD PROJECT IN A MANNER THAT ALLOWS THEM TO MEANINGFULLY PARTICIPATE IN THE PROJECT?

A. Yes. Please see the Siting Study in Volume 2 for additional information regarding outreach efforts and environmental justice communities.

Q. WHY WERE ALTERNATIVE ROUTES NOT CONSIDERED FOR THE PROJECT?

A. The Siting Team determined that the Study Segments between the Project endpoints can largely use or parallel the existing ROW with little to no constraints or significant impacts, and that they are feasible for construction; therefore, no alternative routes requiring significantly new ROW, not adjacent to existing ROW, were evaluated to rebuild the Project. Additional full alternative routes would require more ROW farther from existing infrastructure. Using existing ROW is consistent with Sections 56-46.1 and 56-259 of the Code of Virginia, but outage restrictions limit the use of existing ROW for the entire Project. Paralleling the existing ROW minimizes impacts of the natural and human environments in the Project area while also supporting safe and efficient construction

methods. The Proposed Route includes two minor deviations from the centerline in order to minimize impacts to homes, outbuildings and a cemetery.

Q. PLEASE DESCRIBE THE PROPOSED ROUTE.

A. The Proposed Route for the Project is approximately 15 miles long and is largely located within or parallel to the existing transmission line ROW. Between the Fieldale and Sheffield substations, the Proposed Route is located on and off centerline for 6.6 miles. Between the Sheffield and Ridgeway substations, the Project will be rebuilt in the existing ROW for the entire 3.7-mile section. Between the Ridgeway Substation and existing structure 28-103, near the Virginia/North Carolina border, the Proposed Route parallels the existing ROW for 4.5 miles. The Proposed Route includes two minor deviations from the centerline in order to minimize impacts to homes, outbuildings, and a cemetery. The Proposed Route is further discussed in Section 8.0 in the Siting Study and depicted in Exhibit 3, GIS Constraints Map.

Q. PLEASE DESCRIBE THE TWO MINOR DEVIATIONS ALONG THE PROPOSED ROUTE.

A. Two minor deviations from the existing centerline will be required to avoid constraints immediately adjacent to and within the existing ROW. Between the Fieldale and Sheffield substations, the first deviation occurs at proposed structure 28-34A where the centerline of the Fieldale – Dan River 138 kV transmission line will be shifted approximately 285 feet to the east in order to avoid residential buildings in the existing ROW. After the Ridgeway Substation, the second deviation occurs at proposed structure 28-88A where the centerline of the Fieldale – Dan River 138 kV transmission line will be shifted approximately 190 feet east to avoid a cemetery in the existing ROW. These deviations are shown in Exhibit 3 and further described in Section II.A.4 of the Response to Guidelines in Volume 1 and in the

Siting Study in Volume 2.

Q. PLEASE COMPARE THE EXISTING FIELDALE – DAN RIVER 138 KV TRANSMISSION LINE TO THE PROPOSED ROUTE.

A. The majority of the existing structures are wood H-frame structures and approximately 58 feet tall on average, excluding the lattice tower structures. Lattice towers are currently used at the crossing of the Smith River and will be replaced with modern lattice towers near their existing locations when the Project is rebuilt. In areas where the Project will be rebuilt in the existing ROW, the proposed structures will generally be the same number and location in the existing ROW. In areas where the Project will be rebuilt parallel to the existing ROW, or where minor deviations from the centerline are proposed, the new structures are generally near their existing locations and largely located in timbering areas with minimal development and lesser visual impacts. The off-centerline areas along the Proposed Route address existing engineering and residential constraints and are not expected to result in significant new environment or visual impacts. Additionally, the proposed ROW will be similar to the existing 100-foot-wide ROW.

Q. PLEASE DESCRIBE TO THE COMMISSION THE FILING CORRIDOR USED FOR THE PROPOSED ROUTE?

A. An approximately 100-foot-wide ROW will be sited within an approximately 200-to 250-foot-wide corridor. Based on the preliminary engineering analysis to date, the Company believes that the Proposed Route is the most suitable alignment; however, the Company needs the flexibility to shift the centerlines no more than 50 feet in either direction where the Proposed Route is on the existing centerline, with the exception of the Smith River crossing, and 100 feet in the direction of the existing centerline where the Proposed Route is parallel

to the existing ROW. Due to preliminary engineering and input received, the filing corridor is expanded to include the existing ROW limits at the two deviations and at the Smith River crossing to accommodate the increased ROW width (see Company witness McMillen's testimony). Final line routes and structure locations will be determined during final engineering and after additional studies including, but not limited to, ground surveys, geotechnical and environmental studies, and additional interviews with landowners are completed. The Filing Corridor for the Project is depicted in Exhibit 3, GIS Constraints Map.

Q. IS IT ANTICIPATED THE PROJECT WILL AFFECT ANY FEDERALLY OR STATE PROTECTED SPECIES?

A. No. Habitat studies or species-specific surveys will be conducted prior to construction to ensure protected species impacts are avoided or mitigated to the extent practicable. Compliance with existing regulations and laws relating to protected species is of high importance to the Company.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

SECTION I. NECESSITY FOR THE PROPOSED PROJECT

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

Response:

The proposed Fieldale to Ridgeway 138 kV Rebuild Project (the "Project") involves rebuilding approximately 15 miles of an existing 138 kV transmission line, owned by Appalachian Power Company ("Appalachian" or "Company"), due to the deteriorated condition, performance, and risk associated with the asset, including its inability to meet current National Electric Safety Code ("NESC") standards. The transmission line to be rebuilt is over 70 years old, contains numerous open conditions due to age-related deterioration, and does not comply with current NESC Grade B loading criteria. The transmission line to be rebuilt has experienced poor operational performance due to multiple permanent and momentary outages, has outage risk to customers directly served by the associated circuits, and has outage risk to the Company's interconnection with Duke Energy Carolinas, LLC. ("Duke Energy"), which occurs near existing structure 28-103 at the Virginia/North Carolina border.

The purpose of the Project is to address the combination of condition, performance, and risk of the infrastructure in order to maintain reliability of the existing transmission network that serves customers in the region. The Project is located in Henry County, Virginia, which is in the southeastern part of Appalachian's service territory. A map of the Project and surrounding area transmission system is shown in Figure 1 below and a Project Area Map can be found as Exhibit 1. The area encompasses industrial, commercial, and residential load. Due to the limited amount of generation within the southeastern portion of Appalachian's service territory, customers in the Project area depend on the reliability of the transmission system that transfers power from generating facilities located farther away on the transmission system. In addition, the associated Dan River-Ridgeway 138 kV Circuit is a tie-line providing support to both the Company and Duke Energy.

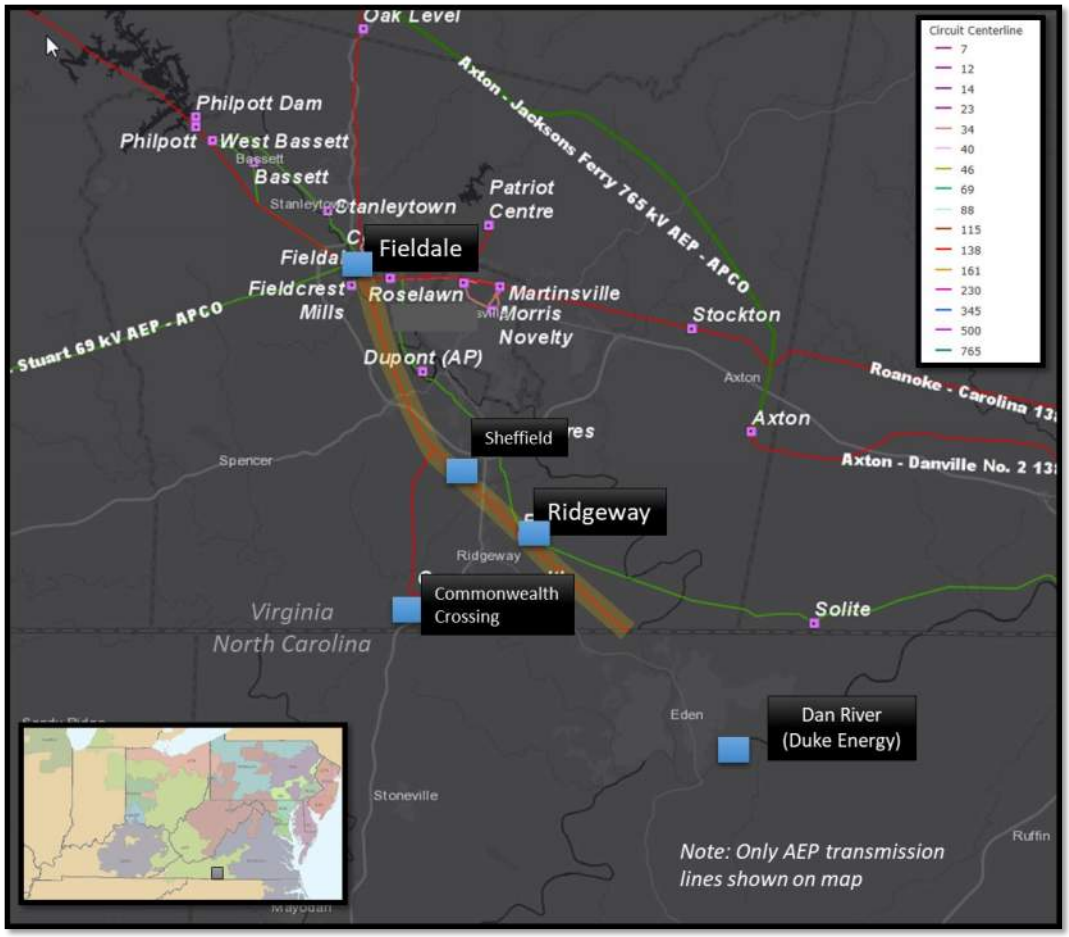


Figure 1
Project Area and Surrounding Transmission System

Today, American Electric Power Company, Inc. ("AEP")'s transmission system consists of approximately 40,000 miles of transmission lines, 3,600 stations, 5,000 power transformers, 8,000 circuit breakers, and operating voltages between 23 kV and 765 kV in three different RTOs, connecting over 30 different electric utilities while providing service to over 5.4 million customers in 11 different states. AEP's interconnected transmission system was established in 1911 and is comprised of a large and diverse combination of line, station, and telecommunication assets. AEP is obligated to manage and maintain this diverse set of assets to provide for a safe, adequate, reliable, flexible, efficient, cost-effective, and resilient transmission system that meets the needs of all customers while complying with federal, state, RTO, and industry standards. This requires that AEP determine when the useful life of these transmission assets is coming to an end so that appropriate improvements can be deployed. AEP identifies these needs through the criteria and guidelines set forth in a document entitled *AEP Transmission Planning Criteria and Guidelines for End-Of-Life and Other Asset Management Needs*, a current copy of which is included as Exhibit 2. This document constitutes the transmission planning criteria and guidelines for End-of-Life and other asset management needs as required in the Federal Energy Regulatory Commission ("FERC")-approved Attachment M-3 to the PJM Tariff.

Annually, AEP identifies and addresses transmission asset condition, performance, and risk through a three-step process.

Step one is the Needs Identification. AEP gathers information from many internal and external sources to identify assets with various needs. Internal sources include inspection reports on asset conditions, reports of outages resulting from equipment failures or inadequate lightning protection, and reports on abnormal conditions. External sources include stakeholder input, customer feedback, and RTO or Independent System Operator issued notices. AEP also reviews assets for compliance with industry standards and guidelines for design, safety, and other issues. These inputs are reviewed and analyzed to identify the transmission assets that are exhibiting unacceptable condition, performance, and risk.

AEP's Needs Identification methodology considers factors including severity of the asset condition and overall system impacts. In assessing the condition of transmission line assets, AEP considers factors such as age, structure type (wood, steel, lattice), conductor type, static wire type, shielding and grounding design criteria, and NESC standards compliance (structural strength, clearances, etc.). AEP also considers the physical condition, such as the open conditions on the transmission line assets. Needs Identification also assesses the historical performance of the asset in question, including outage rates, outage durations, customer minutes of interruption, number of customers interrupted, and system average interruption indices. AEP also determines the asset's level of risk by reviewing the severity of the reported condition of the asset and the possible impact to customers and to the AEP transmission system from an outage. AEP keeps in mind certain equipment that has resulted in operational, restoration, environmental, or safety issues in the past that cannot be directly quantified, but that remain as acknowledged risks. These include things such as wood pole construction, poor lightning and grounding performance, and radial facilities.

Step two is the Solution Development. AEP applies appropriate industry standards, engineering judgment, and good utility practices to develop solution options. AEP solicits customer and external stakeholder input on potential solutions through stakeholder summits and the PJM Project Submission process. Solution options consider many factors such as environmental condition, community impacts, land availability, permitting requirements, customer needs, system needs, and asset conditions in ultimately identifying the best solution to the identified need. Selected solutions are then reviewed to determine if the proposed solution does not adversely impact or create baseline planning criteria violations on other parts of the system. AEP then considers the existing portfolio of baseline planning criteria driven projects to see if there can be a combination of projects into a more efficient and cost-effective solution.

Step three is the Solution Scheduling. Solution Scheduling depends on factors such as severity of the asset condition, overall system impacts, outage availability, siting requirements, availability of labor and material, constructability, and available capital funding. AEP uses its discretion and engineering judgment to determine suitable timelines for project execution.

Following the application of the above criteria, the Company determined that the Company-owned portion of the Fieldale – Dan River 138 kV transmission line (between the Fieldale Substation and the Virginia/North Carolina border near existing structure 28-103) needs to be rebuilt due to the combination of condition, performance, and risk of the infrastructure. The line segment subject to this Application carries portions of three electrical circuits: Commonwealth Crossing – Fieldale 138 kV, Commonwealth Crossing – Ridgeway 138 kV, and Dan River – Ridgeway 138 kV. Between the Fieldale Substation and the Virginia/North

Carolina border, the Company-owned portion of the Fieldale – Dan River 138 kV transmission line asset consists of an approximately 6.4-mile single-circuit section between the Fieldale Substation and existing structure 28-38A, an approximately 0.3-mile single-circuit section between existing structures 28-38A and 28-41A, an approximately four-mile single-circuit section between existing structure 28-41A and the Ridgeway Substation, and an approximately 4.6-mile single-circuit section between the Ridgeway Substation and the Virginia/North Carolina border (near existing structure 28-103).

The existing line was constructed as a single-circuit transmission line in 1949 primarily using a combination of wood H-frame and wood three-pole structures, which are now over 70 years old. As shown below in Section I.L, there are 50 structures with at least one open structural condition. In total, these 50 structures represent 49% of the structures on this line between Fieldale Substation and the Virginia/North Carolina border. Typical structural degradation includes woodpecker-damaged poles, insect-damaged crossarms, and rotted poles. The typical wood pole structures used during the time of construction in the 1940s fail to comply with 2017 NESC Grade B loading criteria.

As shown below in Section I.K, 12 of the 19 outages recorded in the past five years (2016-2020) were attributed to lightning and wind, including two of the top four longest duration outages. As far as direct customer impacts, a pole failure in 2017 caused outages to 1,074 customers.

The customer risk associated with the Project circuits is a combined peak load of approximately 25 megavolt ampere ("MVA"). The system risk associated with this line is the critical system tie providing support to both the Company's Virginia transmission system and Duke Energy's North Carolina transmission system. The documented condition and performance of the line, discussed herein, further raises the risk of future outage impacts associated with this line.

If approved, the Project would enable the Company to maintain the overall long-term reliability of its transmission system. The Company proposes the following improvements with the rebuild of the Company-owned portion of the 138 kV transmission line between the Fieldale, Sheffield, and Ridgeway substations and existing structure 28-103 (Company/Duke Energy ownership changes at the Virginia/North Carolina border). The improvements associated with the submittal of this Application and for which the Company is seeking approval include:

- Rebuild a 6.3-mile portion of the Fieldale – Dan River 138 kV transmission line (in new and existing ROW) between the Company's Fieldale Substation and existing structure 28-38A, near the intersection with the Commonwealth Crossing 138 kV Extension.

- Re-conductor an approximately 0.3-mile long portion of the 138 kV line between existing structures 28-38A and 28-41A (located at the Sheffield 138 kV Loop and Sheffield Substation).

- Rebuild a 3.7-mile portion of the Fieldale – Dan River 138 kV transmission line within the existing ROW and between existing structure 28-41A and the Ridgeway Substation.

- Rebuild a 4.5-mile portion of the Fieldale – Dan River 138 kV transmission line parallel to or near the existing ROW, in new ROW, between the Company's Ridgeway Substation and existing structure 28-103 near the Virginia/North Carolina border.

- Upgrades and replacement of equipment at the Ridgeway Substation and updates to relay settings at the Fieldale, Ridgeway, and Commonwealth Crossing substations.

The re-conductoring of the approximately 0.3-mile section between existing structures 28-38A and 28-41A is required to match the capacity of the rebuilt transmission line and prevents additional splicing of the conductor, and thus reduces the risk of future outage impacts associated with this line. Existing structures 28-38A, 28-39A, and 28-40A were replaced in 2019 and were designed with enough capacity to allow new conductor and shield wire to be installed as part of this Project without replacing the structures. The Commonwealth Crossing 138 kV Extension and Sheffield 138 kV Loop will not be rebuilt as a result of this Project.

AEP is a member of PJM Interconnection, LLC ("PJM"), the regional transmission organization that operates to a large portion of the eastern United States ("U.S."). PJM oversees the ongoing Regional Transmission Expansion Plan ("RTEP") process to ensure that the regional transmission system owned by its members can reliably meet the projected demand of the customers served by that system.

Outcomes of the RTEP process include three types of transmission system upgrades or projects: (i) baseline upgrades are those that address planning criteria violations caused by network load; (ii) network upgrades are those that address planning criteria violations caused by proposed generation, merchant transmission, or long-term firm transmission service requests; and (iii) supplemental projects are those that are initiated by the transmission owner in order to interconnect new customer load, address degraded equipment performance, improve operational flexibility and efficiency, and increase infrastructure resilience.

Supplemental projects are planned subject to the Attachment M-3 process wherein Transmission Owners review assumptions, needs, and solutions with PJM stakeholders through the regional and sub-regional RTEP meetings to solicit input and feedback from stakeholders. PJM then performs do-no-harm analysis for all supplemental solutions to ensure that proposed solutions do not cause any reliability violations before those projects are submitted for inclusion into the Local Plan and integration into the RTEP. The components of the Project (as outlined above) have been presented to PJM stakeholders through the Attachment M-3 process. PJM has completed the do-no-harm analysis and assigned project number s2190 to the Project. The Company developed the Project as a comprehensive solution to address the identified asset renewal needs and is seeking approval to complete this work.

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

Response:

(1) Engineering Justification for Project

The Project pertains to an existing 138 kV transmission line asset which is over 70 years old and which needs to be rebuilt due to the deteriorated condition, performance, and risk associated with the asset. For a detailed description of the engineering justification of the proposed Project, see Section I.A.

(2) Known Future Projects

There are no known future projects that require the Project to be constructed. The Project is required by AEP's asset renewal criteria as described in Section I.A and to continue service to the existing customers directly connected to the associated circuits at the Commonwealth Crossing and Sheffield substations. PJM completed do-no-harm analysis as part of the submittal of the Project, which considers all known future generation and transmission facilities in the area. PJM found no reliability issues with the Project and assigned supplemental project number s2190.

(3) Planning Studies

See Section I.D.

(4) Facilities List

Not applicable.

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

Response:

The portion of the Fieldale – Dan River 138 kV transmission line to be rebuilt serves customers at the Commonwealth Crossing and Sheffield substations, which are located in Henry County, Virginia (see Figure 2), and is also an interconnection with Duke Energy.

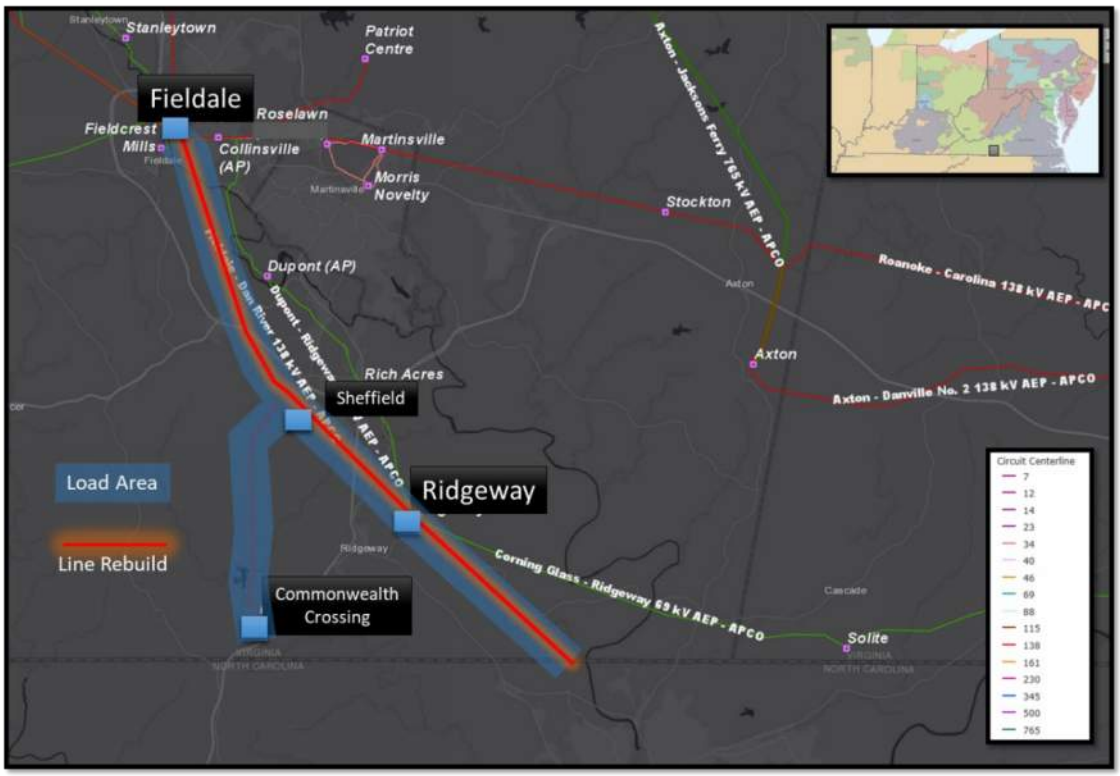


Figure 2
Load Area (Commonwealth Crossing & Sheffield Substations)

AEP developed a load forecast for the Project Load Area using an econometric model that forecasts peak demand. This model had explanatory variables for the gross regional product for Henry County, Virginia, the combined, minimum and maximum temperatures on the day of the peak and binary variables. The Project Load Area is winter peaking. The model used historical data for the period from the winter of 2010/11 through winter of 2019/20. Gross county product forecast data were obtained from Moody's Analytics. AEP developed forecasts of maximum and minimum temperatures on the day of the peak from an average of historical temperatures.

Tables 1 and 2 and Figures 3 and 4 show historical and projected summer and winter peak loads for the Project Load Area. These figures show the actual summer and winter peak loads for the previous ten years and the projected summer and winter peak loads for the next ten years.

Table 1
Historical and Forecasted Summer Peak Load Data

Fieldale-Ridgeway Load Area

	Actual Peak Load (MW)										Projected Peak Load (MW)									
Summer	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Peak	22.1	22.4	23.2	23.0	16.7	16.9	18.0	18.4	20.5	19.2	20.5	21.5	21.9	22.5	23.0	23.3	23.7	24.0	24.4	24.7

Table 2
Historical and Forecasted Winter Peak Load Data

Fieldale-Ridgeway Load Area

	Actual Peak Load (MW)										Projected Peak Load (MW)									
Winter	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Peak	24.9	25.4	21.6	21.9	27.6	24.6	19.9	22.0	23.6	22.0	23.0	24.8	25.3	25.7	26.3	26.7	27.1	27.4	27.8	28.1

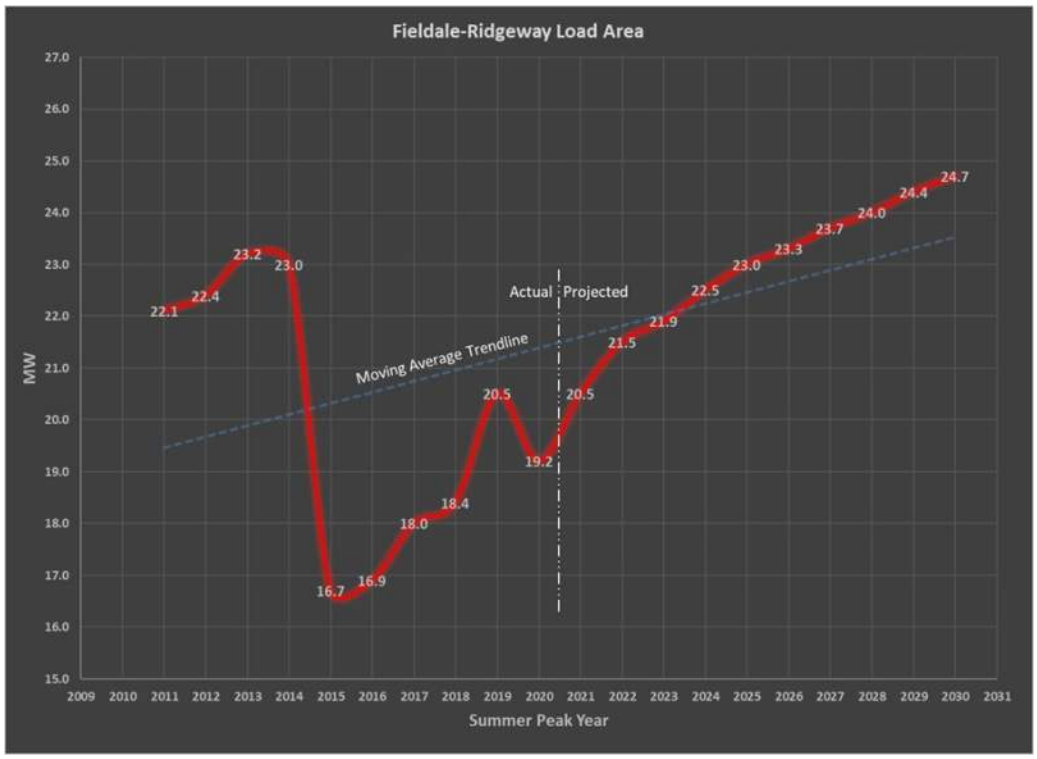


Figure 3
Project Load Area
Historical and Forecasted Summer Peak Load Data

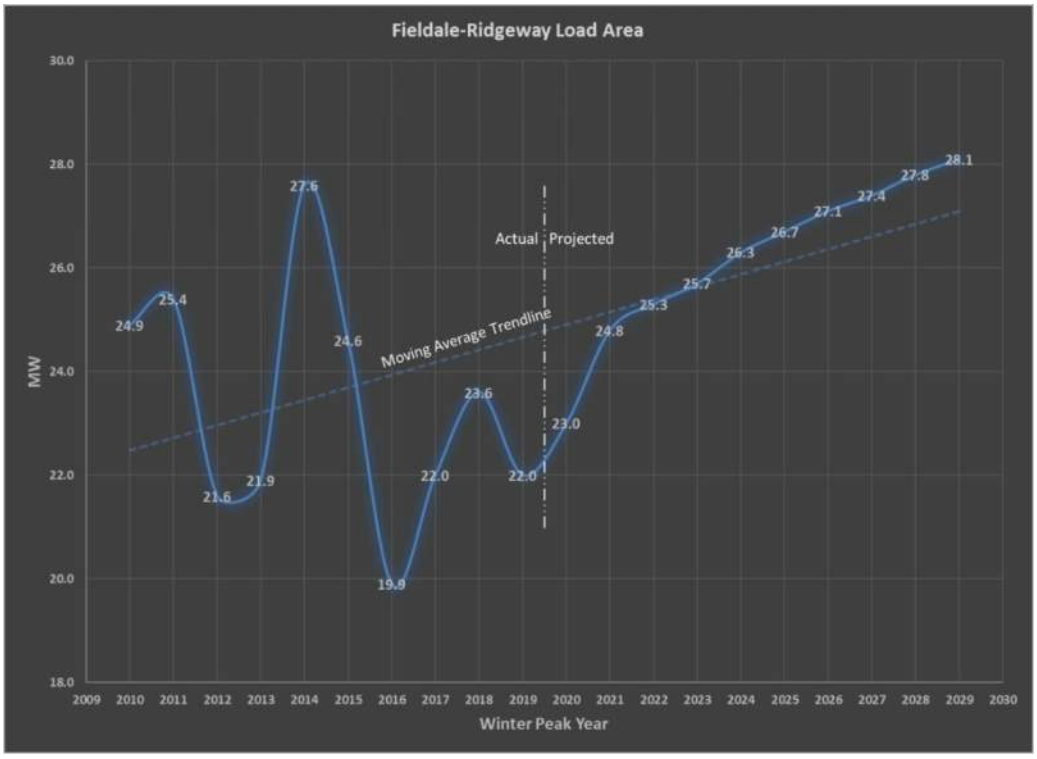


Figure 4
Project Load Area
Historical and Forecasted Winter Peak Load Data

The Project Load Area summer and winter peak demand are anticipated to grow at an average annual rate of approximately 2% over the course of the next ten years, beginning in 2021.

The existing Fieldale – Dan River 138 kV transmission line cannot continue to adequately serve the needs of the Company and its customers because of the infrastructure's inability to meet current NESC Grade B loading criteria and age-related deterioration as discussed in Section I.A. Completing the Project will support the Company's continued reliable electric service to support the future overall growth in Henry County and the surrounding area.

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

Response:
Not applicable, as the Project is not a baseline project.

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

Response:
The proposed Project is to be built on approximately six miles of existing ROW and approximately nine miles will be built parallel to or near the existing transmission line ROW, on new ROW. No feasible alternatives were identified that would address the condition, performance, and risk of the existing transmission line while continuing to serve the needs of the Company's customers, substations, and interconnection with Duke Energy at the Virginia/North Carolina border. The Project team considered rebuilding the entire Project in existing ROW; however, due to outage constraints, this was not a feasible solution. An in-the-clear alternative deviating significantly from the existing ROW was also considered unfeasible for this Project due to the additional impact and risk associated with acquisition of new ROW. In addition, this alternative was not chosen, as rebuilding within or parallel to the existing ROW was possible for the majority of the line.

Retirement of the line is not practical due to the location of the existing stations and customers served from this line and the interconnection with Duke Energy.

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

Response:
The Project involves the removal and replacement of existing facilities on the Fieldale – Dan River 138 kV transmission line asset as described above. There will be no lines permanently taken out of service as part of the proposed Project.

The proposed rebuild of the Fieldale – Dan River 138 kV transmission line asset between the Fieldale Substation and existing structure 28-103 (located near the Virginia/North Carolina border) is comprised of the following three electrical 138 kV circuits: Commonwealth Crossing – Fieldale, Commonwealth Crossing – Ridgeway, and Dan River – Ridgeway.

The resulting Summer Normal/Summer Emergency/Winter Normal/Winter Emergency (SN/SE/WN/WE) ratings in MVA after the rebuild are:

(1) Commonwealth Crossing-Fieldale 138 kV Circuit (8.93 miles).

- 287/337/363/400 (MVA).
- Limited by station conductor at Fieldale Substation.

(2) Commonwealth Crossing-Ridgeway 138 kV Circuit (6.8 miles).

(a) Commonwealth Crossing-Sheffield 138 kV Line Section (3.08 miles).

- 251/251/317/317 (MVA).
- Limited by 795 ACSR 45/7 overhead conductor on the Sheffield Loop.

(b) Ridgeway-Sheffield 138 kV Line Section (3.72 miles).

- 251/251/317/317 (MVA).
- Limited by 795 ACSR 45/7 overhead conductor on the Sheffield Loop.

(3) Dan River-Ridgeway 138 kV Circuit (10.8 miles).

- 149/149/172/172 (MVA).
- Limited by Non-AEP element owned by Duke Energy.

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

Response:
See Exhibit 1, Project Area Map.

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

Response:
The desired in-service date is July 2025. If the Commission approves the Project, the Company estimates that it will need approximately three years after entry of the Commission's final approving order for engineering, design, ROW acquisition, permitting, material procurement and construction to place the Project in service.

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

Response:
Functional estimated substation related cost is approximately $0.4 M.
Functional estimated transmission line related cost is approximately $32.2 M.
Functional estimated total cost of the project is approximately $32.6 M.

Functional estimates are based on project scopes developed by AEP engineering using information obtained from tabletop studies and design criteria.

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

Response:
The proposed Project is supplemental and has been assigned PJM project number s2190.

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

Response:
See Tables 3 through 9.

Circuit Outage Cause Summary			
Fieldale – Ridgeway 138kV Circuit* (01/01/2016 – 12/19/2019)			
Date	**Cause**	**Duration (Hours)**	**CI**
04/14/16	Vehicle Accident (non AEP)	20.53	0
06/16/17	Weather - Lightning/Tstorm	0	0
07/19/17	Equip-Line-Pole	27.77	1,074
07/07/18	Weather - Lightning/Tstorm	15.08	0
10/11/18	Weather - Lightning/Tstorm	0	0
01/30/19	Weather - Wind	0	0
10/29/19	Relay Misoperation	3.60	3,032
*Original Circuit; Sectionalized at Commonwealth Crossing Substation on 12/20/2019			

Table 3
Fieldale - Ridgeway 138 kV Circuit Outage History

Circuit Outage Cause Summary			
Commonwealth Crossing - Fieldale 138kV Circuit (12/20/2019 – 12/31/2020)			
Date	**Cause**	**Duration (Hours)**	**CI**
10/30/20	Relay Misoperation	0	0
Commonwealth Crossing - Ridgeway 138kV Circuit (12/20/2019 – 12/31/2020)			
No Forced Outages Recorded			

Table 4
Commonwealth Crossing – Fieldale and Commonwealth Crossing – Ridgeway 138 kV Circuit Outage Histories

Circuit Outage Cause Summary			
Dan River – Ridgeway 138kV Circuit (01/01/2016 – 12/31/2020)			
Date	Cause	Duration (Hours)	CI
02/16/16	Vegetation Fall-In (Outside R/W)	146.50	0
08/06/16	Customer/Other Utility	61.22	0
05/11/17	Weather - Lightning/Tstorm	0	0
05/11/17	Weather - Lightning/Tstorm	45.98	0
10/11/18	Weather - Lightning/Tstorm	91.05	0
04/19/19	Unknown	0	0
01/11/20	Weather - Lightning/Tstorm	0	0
10/29/20	Weather - Wind	0	0
10/29/20	Weather - Wind	0	0
10/29/20	Weather - Wind	0	0
10/29/20	Weather - Wind	0	0

Table 5
Dan River – Ridgeway 138 kV Circuit Outage History

Appalachian (VA) 138kV Circuits Annual Outage Averages		
5 Years (2016 - 2020)		
# of 138kV Circuits	Frequency	Duration (Hours)
113	1.47	0.04

Table 6
Appalachian (VA) 138 kV Circuit Outages

Circuit Annual Outage Averages		
5 Years (2016 - 2020)		
Circuit Name	Frequency	Duration (Hours)
Dan River – Ridgeway 138kV	2.20	43.58

Table 7
Dan River – Ridgeway 138 kV Circuit Outage Averages

Circuit Annual Outage Averages		
01/01/2016 - 12/19/2019		
Circuit Name	Frequency	Duration (Hours)
Fieldale – Ridgeway 138kV	1.76	11.03
12/20/2019 - 12/31/2020		
Commonwealth Crossing – Fieldale 138kV	0.97	0
Commonwealth Crossing – Ridgeway 138kV	0	0

Table 8
Fieldale – Ridgeway, Commonwealth Crossing – Fieldale, and Commonwealth Crossing – Ridgeway 138 kV Circuit Outage Averages

Line Maintenance History		
5 Years (2016-2020)		
Year	Work Performed	Cost ($)
2020	EMERGENCY DEBRIS ON CONDUCTOR STR 28-68	15,566.47
2020	COMMONWEALTH CROSSING-SINK	24,456.46
2020	ROW WIDENING-SINK	73,315.81
2020	ROW WIDENING-SINK	48,202.95
2019	ROW WIDENING-SINK	11,298.14
2019	ROW WIDENING-SINK	32,771.70
2019	EMERGENCY STR. 28-25 REPLACEMENT	137,204.70
2018	REPLACEMENT OF STRS. 28-11 & 13	77,511.53
2018	TEMPORARY BRACE POST FOR STR. 28-13	20,035.09
2017	REPLACEMENT OF STR. 28-51	31,599.63
2017	EMERGENCY STRS. 28-85 AND 28-86 WORK	57,517.82
2017	EMERGENCY STRS. 28-27 & 28-27A WORK	44,511.11
2016	REPLACEMENT OF BROKEN POLE - STR. 28-68	28,680.76
2016	EMERGENCY GROUND BASED INSPECTION	11,960.52
2016	REPLACEMENT OF STR. 28-75	151,271.10
2016	T-LINE STRUCUTRE MAINTANENCE OF OPEN CONDITIONS	9,891.66

Table 9
5 Year Line Maintenance History

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

Response:
The approximately 15-mile section of the Fieldale – Dan River 138 kV transmission line is being rebuilt between the Company's Fieldale Substation and existing structure 28-103 near the Virginia/North Carolina state border to address the deterioration of structures and associated equipment. Based on the most recent Fieldale – Dan River 138 kV transmission line inspection report (updated on November 2, 2020), there are 50 structures with at least one open structural condition, which is 49% of the structures on this line.

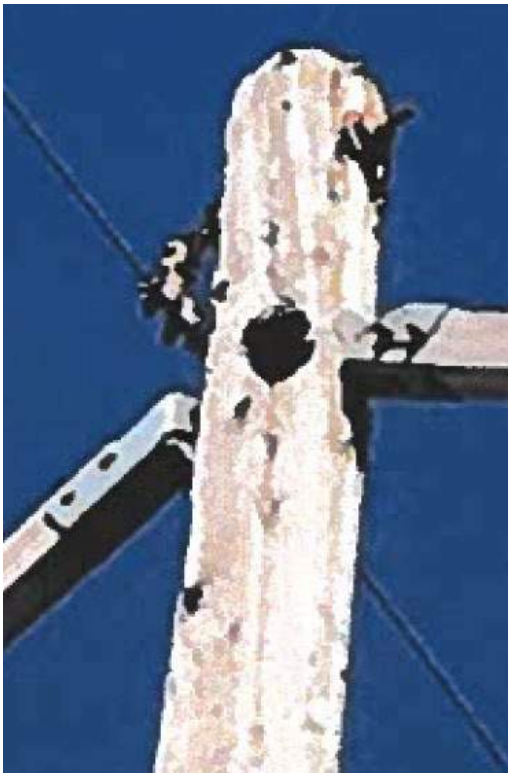
On those 50 structures, there are 91 unique open structural conditions, which include woodpecker-damaged poles (31), insect-damaged crossarms (16), rot top crossarms (16), corroded crossarms (10), rot heart poles (8), rot shell poles (7), a broken crossarm (1), a

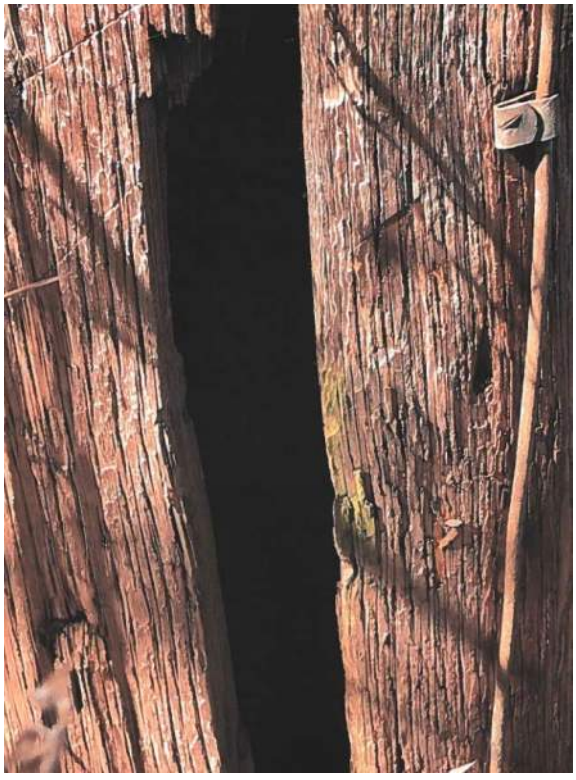
damaged pole (1), and a rot top filler block (1). There is one open conductor condition related to broken strands. There is one open shield wire condition related to broken strands.

See Figures 5 through 14 showing representative photographs regarding the condition of the existing Fieldale – Dan River 138 kV transmission line subject to the Project.

Figure 5
Structure 28-6: Multiple Woodpecker Holes along the Entire Length of the Pole

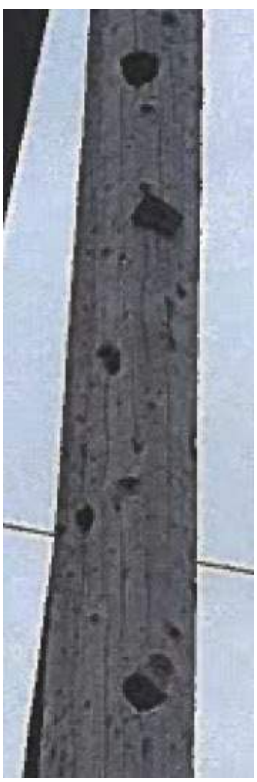
Figure 6
Structure 28-13: Broken Crossarm Repaired with New Insulators





Figures 7 and 8
Structure 28-16: Significant Butt Rot, Severe Section Loss,
and Woodpecker Hole at Top of Pole

Figure 9
Structure 28A-29: Several Woodpecker Holes and Upper Pole Decay



Figures 10, 11, and 12
Structure 28-40: Several Woodpecker Holes and Vertical Pole Cracking


Figures 13 and 14
Structure 28-62: Significant Vertical Pole Cracking

M. In addition to all other information required by these guidelines, applications for approval to construct facilities and transmission lines inter-connecting a Non-Utility Generator ("NUG") and a utility shall include the following information.

1. **The full name of the NUG as it appears in its contract with the utility and the dates of the initial contract and any amendments;**

2. **A description of the arrangements for financing the facilities, including information on the allocation of costs between the utility and the NUG;**

3. a. **For Qualifying Facilities ("QFs") certificated by FERC order, provide the QF or docket number, the dates of all certification or recertification orders, and the citation to FERC Reports, if available;**

   b. **For self-certified QFs, provide a copy of the notice filed with the FERC;**

4. **In addition to the information required in 3a or 3b, provide the project number and project name used by the FERC in licensing hydro-electric projects, also provide the dates of all orders and citations to FERC Reports, if available; and**

5. **If the name provided in 1 above differs from the name provided in 3 above, give a full explanation.**

Response:
Not applicable.

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

Response:
No new substations, switching stations, or other facilities are being proposed as part of this Project.

SECTION II. DESCRIPTION OF THE PROPOSED PROJECT

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

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

Response:
The Proposed Route for the Project is approximately 15 miles long between the Company's Fieldale Substation and existing structure 28-103, located near the Virginia/North Carolina border and where the Company's interconnection with Duke Energy occurs. The Proposed Route is largely within or parallel to the existing transmission line ROW and no viable alternative routes are being submitted as part of this Application. See Section II.A.9 and the Fieldale to Ridgeway 138 kV Rebuild Siting Study (the "Siting Study"), located in Volume 2 of the Application, for an explanation of the Company's route selection process.

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

Response:
A Project area map is attached as Exhibit 1. More detailed GIS constraints mapping illustrating the Project and various resources and sensitive features in relation to the Project is attached as Exhibit 3. The shapefile for the Proposed Route will be provided electronically. Furthermore, the Siting Study includes additional GIS maps and descriptions. The Proposed Route is largely located within or near the existing Fieldale – Dan River 138 kV transmission line ROW.

In locations where the Project will be rebuilt parallel to the existing transmission line ROW on new ROW, it is anticipated that the existing ROW will be quitclaimed or otherwise relinquished as part of the supplemental agreement with the landowner.

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

   Response:
   See Exhibit 1, Project Area Map.

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

   Response:
   The existing Fieldale – Dan River 138 kV transmission line is outage constrained and can only be taken out of service for a limited amount of time during the spring and fall outage windows. Rebuilding the Project entirely on existing ROW would result in a significant number of customers (industrial, residential, and commercial) on radial feeds at the Sheffield and Commonwealth Crossing substations. Additionally, the Dan River – Ridgeway 138 kV Circuit is an interconnection with Duke Energy and has outage risk. Approximately six miles of the Project will be built on existing ROW due to residential and commercial constraints limiting the ability to build in the clear and on new ROW. Approximately nine miles of the Project will be built parallel to or near the existing ROW, on new ROW, to minimize the duration of time the transmission line will be out of service.

5. **Provide drawings of the ROW cross section showing typical transmission line structure placements referenced to the edge of the ROW. These drawings should include:**

   a) ROW width for each cross section drawing;

   b) Lateral distance between the conductors and edge of ROW;

   c) Existing utility facilities on the ROW; and

   d) For lines being rebuilt in existing ROW, provide all of the above (i) as it currently exists, and (ii) as it will exist at the conclusion of the proposed project.

   Response:
   See Exhibits 4 – 6 for the typical existing ROW cross sections. See Exhibits 7 – 11 for the proposed ROW cross sections.

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

Response:
The entire Project ROW will generally be 100 feet wide in areas of new, supplemental, or existing easements. Areas where the Project will be built within the existing ROW (approximately six miles) are subject to existing easements, dating from the 1940s. A small minority of the existing easement agreements contain some special provisions, such as those limiting the type of the structures permitted (e.g., wood vs. steel), and the Company intends to address this through the acquisition of supplemental easements.

Approximately nine miles of the Project will be parallel to or near the existing ROW due to outage risk and land use constraints. In these areas the Company plans to supplement the existing easements or obtain new easements unless the existing easements allow for the relocation of the ROW nearby. There also may be minor deviations from the proposed centerline based upon the results of ground survey, geotechnical and environmental surveys, landowner input, ROW negotiations, and final line design.

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

Response:
The following are the Company's typical transmission line ROW clearing, restoration and maintenance practices. Case-by-case exceptions are considered to address sensitive environmental areas/features and/or property owner requests while maintaining the Company and NESC safety clearances.

<u>ROW Clearing</u>

a. In areas with 100 feet or more vertical conductor-to-ground design clearance, the ROW is typically not cleared, except in the following instances:
   - Trees with less than 25 feet clearance from the conductor (at maximum sag conditions) will be removed.
   - Where a conductor stringing path is specified.
   - Where wire setup areas and other work areas are required.

b. In locations with less than 100-foot vertical clearance from conductor (at maximum sag conditions) to ground, all woody stemmed vegetation will be removed to the appropriate ROW width, leaving the cleared area of the ROW populated with grasses and herbaceous growth.

c. Cutting vegetation will be done by either manual or mechanical methods. Worker safety is first and foremost in determining a method; land use and landowner preference may influence the method utilized. Factors influencing safety include terrain, access, tree height, etc. Manual clearing involves the use of contract

personnel using chain saws to cut vegetation. Mechanical clearing includes mowers, feller-bunchers, and other heavy operator-run equipment. Mechanical pruning operations employ a variety of configurations of boom-mounted saws mounted on vehicles capable of traversing the ROW. In very difficult terrain or inaccessible areas (high safety risk areas), an aerial saw may be employed for side trimming the ROW.

d. Where reasonable and practical, the Company will utilize selective clearing methods to retain low-growth shrubs and other compatible vegetation within:

- 50 feet of all year-round streams, ponds or wetlands and will undertake erosion control measures where necessary.
- 50 feet of road crossings.
- 25 feet of karst features and outcrops of limestone or dolomite rock.

e. Trees will be felled in a manner to minimize damage to crops, fences and other facilities.

f. Where tree pruning is required, best management practices and standards established by the International Society of Arboriculture, the American Standards Institute, and the Tree Care Industry Association will be used together with best management practices.

g. Logs, including fallen timber, may be left in tree lengths, log lengths or as otherwise designated by the property owner. The property owner will retain ownership of all logs and may dispose of them by commercial sale, use them as firewood or provide them for use as firewood by others. If the property owner does not want to retain ownership and wants the logs removed, the Company will dispose of them in a suitable location.

h. The disposal by the Company of all trees, brush and slash will, where possible, be consistent with property owner preferences, wildlife values and particular site conditions. Typical disposal methods consist of one or more of the following:

- Windrowing - the cut material will be windrowed at either or both sides of the ROW. This is the preferred method where slopes are 30% or less.
- Chipping - woody vegetation will be chipped and either scattered over the ROW area or disposed of in a suitable location. Logs will be windrowed on either or both sides of the ROW, as designated. The ROW must be accessible to chipping equipment for this option to be viable.
- Let Lie - the cut material will be left in a scattered manner over the ROW area. This is recommended where slopes exceed 30% in order to reduce erosion and otherwise minimize impact on soils. All woody vegetation will be lopped and scattered so that it lays as close to the ground as practical, but not to exceed two feet in height. This will accelerate the decomposition of this material and will improve the aesthetic impact by allowing more rapid vegetation coverage of the cut material.

i. All clearing debris will be kept out of streams, ponds and other water areas,

wetlands, pastures, and fields.

ROW Restoration

a. Where stream banks are disturbed, they will be restored (by planting of low-growing species, where necessary) in order to prevent bank erosion.
b. The Company will take measures to drain and stabilize the surfaces of all construction roads both during construction and during future line maintenance phases.
c. Restoration, including temporary and permanent seeding, will be coordinated with the construction activities to ensure that revegetation and soil stabilization are achieved at the earliest practical time. Following construction, all structure sites, construction sites and access roads will be seeded with a suitable grass seed mixture.
d. Revegetation techniques will, where possible, seek to enhance the ROW for wildlife food and habitat.
e. Qualified personnel will perform all permanent reseeding and revegetation.
f. After restoration is complete, the Company will periodically inspect the ROW to discover areas of erosion, sedimentation and inadequate revegetation conditions. Upon discovery of such conditions, prompt efforts will be taken to correct them.
g. Fences and gates will be kept in sufficient state of repair to confine livestock satisfactorily and gates will be kept closed when not in immediate use. All fences cut or damaged will be restored to a condition as good as, or better than, the condition as found. Where frequent access is required, gates will be installed at no cost to the property owner.

ROW Maintenance

a. All herbicides used will be applied in accordance with applicable state and federal laws and regulations.
b. All herbicides used shall be registered with the Environmental Protection Agency and with the Virginia Department of Agriculture and Consumer Services. Herbicides will be used in accordance with label and manufacturer directions.
c. All herbicide applications will be performed under the direct supervision of certified applicators.
d. Regarding herbicide applications:
    - Herbicides will not be applied when rainfall is imminent, during rainfall or within one day of large rain events (usually greater than 1.0 centimeter) that result in soil moisture capacity occurring above field capacity.
    - Buffer zones will be maintained and used in accordance with herbicide label and manufacturer directions around streams, ponds, springs, wetlands, water supply wells, channelized drainage ways (perennial or intermittent), and karst features.

Long-term ROW Maintenance Plan

The Company will periodically inspect the ROW for areas of erosion, sedimentation and inadequate revegetation conditions. Upon discovery of such conditions, prompt efforts will be taken to correct them. Any property owner concerns will also be investigated. Additionally, the Company will implement a comprehensive vegetation management program designed to ensure that vegetation along each transmission line is managed at the proper time, and in the most cost-effective, environmentally sound manner. The plan will be reviewed periodically to ensure that the goals and objectives are being addressed.

Compatible Tree Species

Where reasonable and practical, the Company will use selective clearing methods to retain low-growth shrubs and other compatible vegetation. The following is a partial list of compatible tree species that may be allowed within the Company's transmission line ROW, depending upon the particular line and circumstances and subject to the approval of the Company's forestry staff:

COMMON NAME	**BOTANICAL NAME**
Trident Maple	*Acer buergeranum*
Amur Maple	*Acer ginnala*
Japanese Maple	*Acer palmatum*
Serviceberry	*Amelanchier arborea or canadensis*
Redbud	*Cercis Canadensis*
Fringetree	*Chionanthus retusus or viginicus*
Pink Dogwood	*Cornus florida "Rubra"*
Dogwood	*Cornus florida "White"*
Kousa Dogwood	*Cornus kousa*
Washington Hawthorn	*Crataegus phaenopyrum*
Golden Raintree	*Koelreuteria paniculata*
Crape Myrtle	*Lagerstroemia indica*
Galaxy Magnolia	*Magnolia "Galaxy"*
Star Magnolia	*Magnolia stellata*
Saucer Magnolia	*Magnolia x soulangeana*
Flowering Crabapple	*Malus spp.*
Kwansan Cherry	*Prunus serrulata*
Japanese Weeping Cherry	*Prunus subhirtella*
Purple-leaf Plum	*Prunus x accolade*
Cleveland Select Flowering Pear	*Pyrus x blireiana*
Japanese Tree Lilac	*Syringa reticulate*
Pyramidal Arborvitae	*Thuja occidentalis pyrimidalis*
Littleleaf Linden	*Tilia cordata*
Leatherleaf Viburnum	*Viburnum rhytidophyllum*

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

   Response:
   Under the existing, new, and/or supplemental transmission line easements, the property owner will generally have the right to use the easement area for uses such as grazing, pasture lands, gardens, cultivated fields, driveways, parking, and bike and walking paths or any other use that is not inconsistent with the Company's right to construct, operate, maintain or remove its electric transmission line. The Company retains the right to clear and keep the easement clear of buildings and/or other obstructions together with the right to clear any woody vegetation within the ROW or which is adjacent to the ROW, but which may endanger the safe operation of the electric transmission line.

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

   Response:
   The Company's route selection procedures for the transmission line rebuild are described in detail in the Siting Study, located in Volume 2 of this Application. The Company's engineers determined that the duration of circuit outages is limited and restricts the amount of work that can be completed within the existing ROW. The Project will largely be rebuilt within or parallel to the existing ROW where constraints can be minimized, and no Alternative Routes were considered for the Project.

   The Project does not cross any land managed by federal, state, or local agencies or any conservation easements or open space easements qualifying under Sections 10.1-1009 – 1016 or 10.1-1700 – 1705 of the Code (or a comparable prior or subsequent provision of the Code). There is one parcel encumbered by a Henry County conservation easement, the Fieldale Trail and River Access parcel, that is crossed by the existing ROW. The Proposed Route remains on the existing centerline, with structures in generally the same location, across this local conservation easement.

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

Response:

Project construction activities include the installation and maintenance of soil erosion and sedimentation control measures; access road construction; removal of the existing transmission line wire, structures, and foundations; foundation, structure, and wire installation; and the subsequent rehabilitation of all areas disturbed during construction. All required environmental compliance permits and studies will be completed, and a stormwater pollution prevention plan will be developed and implemented under the state's "General Permit for Discharges of Stormwater from Construction Activities."

The Company estimates that it will take approximately three years from SCC approval to coordinate outages and construct the Project.

Where the Proposed Route is located within the existing ROW, circuit outages are needed on the Commonwealth Crossing – Fieldale, Commonwealth Crossing – Ridgeway, and Dan River – Ridgeway 138 kV circuits in order to rebuild on existing centerline. Circuit outages also are required for any portion of the Proposed Route that crosses the existing 138 kV centerline. Outages to completely remove and rebuild the Fieldale – Dan River 138 kV transmission line are not feasible due to reliability concerns and the existing transmission line must be removed in sections in order to minimize disruptions to the affected Load Area. The Dan River – Ridgeway 138 kV Circuit is also an interconnection with Duke Energy, which typically supports the Load Area during peak summer and winter months, and thus minimizing the outage duration on this tie reduces the risk to customers.

The Company generally plans to construct the Project in sections starting from existing structure 28-103 near the Virginia/North Carolina border to Ridgeway Substation, then from Ridgeway Substation to Sheffield Substation, and ending with the section from Sheffield Substation to Fieldale Substation. Portions of the line that are in new ROW will be constructed in the clear prior to beginning the circuit outage in each section. If the Commission approves the Project, engineering, RTO outage approvals, and any necessary ROW acquisition, the estimated construction sequence can be summarized briefly as follows:

1. Begin the work between existing structure 28-103 and Ridgeway Substation, installing all except one structure and three sections of wire in the clear with daily circuit outages as needed.
2. Take the Dan River – Ridgeway 138 kV Circuit out of service to install the remaining structure and wire and remove the existing 138kV transmission line in this section. During this time, the Ridgeway Substation will be fed from the Sheffield Substation.
3. Energize the rebuild section between Ridgeway Substation and existing structure

28-103 near the Virginia/North Carolina border.

4. Take the Ridgeway to Sheffield section of the Commonwealth Crossing – Ridgeway 138 kV Circuit out of service and remove and rebuild the section of the Fieldale – Dan River 138 kV line on the existing centerline. During this time, Ridgeway Substation will be fed from Duke Energy's Dan River Substation and the Sheffield Substation will be fed from the Commonwealth Crossing Substation.
5. Energize the rebuild section between the Ridgeway and Sheffield substations.
6. Take the section of the Commonwealth Crossing – Ridgeway 138 kV Circuit from Sheffield Substation to Commonwealth Crossing Substation out of service and reconductor the section of the Fieldale – Dan River 138 kV line between existing structures 28-41A and 28-39A. During this time, Sheffield Substation will be fed from Ridgeway Substation and Commonwealth Crossing Substation will be fed from Fieldale Substation.
7. Begin the work between existing structure 28-38A and Fieldale Substation, installing approximately 3.2 miles of new 138 kV transmission line in the clear with daily circuit outages as needed.
8. Energize the circuit section between Sheffield and Commonwealth substations.
9. Take the existing structure 28-39A to Fieldale section of the Commonwealth Crossing – Fieldale 138 kV Circuit out of service, reconductor between existing structures 28-39A and 28-38A, and remove and rebuild the section of the Fieldale – Dan River 138 kV line on the existing centerline. During this time, Commonwealth Crossing Substation will be fed from Sheffield Substation.
10. Energize the rebuild section between existing structure 28-39A and Fieldale Substation.

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

Response:
Protecting environmental resources such as natural, historic, scenic, and recreation values is of high importance to the Company. The siting and construction phases of the Project will generally follow the above-referenced guidelines to the extent practical. For a detailed discussion of the attention given to environmental resources and siting process used for this Project, see the Siting Study and the VDEQ Supplement prepared by the Siting Team, included in Volume 2 of this Application. Additionally, see Section III of this Response to Guidelines.

12. a. Detail counties and localities through which the line will pass. If any portion of the line will be located outside of the Applicant's certificated service area: (1) identify each electric utility affected; (2) state whether any affected electric utility objects to such construction; and (3) identify the length of line(s) proposed to be located in the service area of an electric utility other than the Applicant; and

Response:
The Project is located entirely in Henry County. The Company's interconnection with Duke Energy occurs at the Virginia/North Carolina border near existing structure 28-103. The associated Dan River – Ridgeway 138 kV Circuit is a tie-line providing support to both the Company and Duke Energy. No portion of the Project will be located outside of the Company's certificated service territory as all 15 miles of the Project are within the Company's territory. The Company has conducted preliminary conversations with Duke Energy to make them aware of the Project due to the interconnection and will continue to coordinate with Duke Energy when scheduling outages and during construction.

b. Provide three (3) color copies of the Virginia Department of Transportation ("VDOT")"General Highway Map" for each county and city through which the line will pass. On the maps show the proposed line and all previously approved and certificated facilities of the Applicant. Also, where the line will be located outside of the Applicant's certificated service area, show the boundaries between the Applicant and each affected electric utility. On each map where the proposed line would be outside of the Applicant's certificated service area, the map must include a signature of an appropriate representative of the affected electric utility indicating that the affected utility is not opposed to the proposed construction within its service area.

Response:
The Company will provide a digital copy of the VDOT General Highway Map for Henry County to the Commission Staff with this Application in lieu of providing three hardcopies. A reduced copy of this map is included as Exhibit 12 to this Application. The map includes the proposed Project and the Company's existing high-voltage transmission facilities. The Company's interconnection with Duke Energy occurs near existing structure 28-103 at the Virginia/North Carolina border; however, no portion of the Project will be located outside of the Company's certificated service territory.

B. Line Design and Operational Features

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

Response:
The proposed rebuild of the Company owned portion of Fieldale – Dan River 138 kV Line will be a single-circuit, three-phase transmission line with a nominal phase-to-phase voltage of 138 kV. A voltage upgrade is not anticipated for the Project. The maximum load transfer capability of the new overhead conductor is 414 MVA (summer emergency rating) and 464 MVA (winter emergency rating). The overall ratings for each line section are provided in Section I of this Response to Guidelines.

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

Response:
The proposed three-phase 138 kV circuit will consist of three 1,033,000 cmil Aluminum Conductor Steel Reinforced ("ACSR") "Curlew" conductors with 54/7 stranding (1.245-inch diameter). One conductor will be installed per phase. The circuit will typically be arranged in a horizontal configuration; however, when monopole construction is used the circuit will be arranged in a delta or vertical configuration.

The proposed single-circuit transmission line section will typically use one Alumoweld ground wire (0.385-inch diameter) and one 0.646-inch diameter Optical Ground Wire ("OPGW") for lightning protection. The OPGW is composed of aluminum clad steel strands surrounding a stainless-steel tube containing fiber optic strands used for utility operations and communication.

The proposed conductors and ground wires were selected to meet the electrical requirements of the Project including load capacity, system stability, and efficiency. The mechanical strength and impacts on constructability are also considered in the selection process. The proposed conductors and ground wires will have a non-specular finish.

3. **With regard to the proposed supporting structures over each portion of the ROW for the preferred route, provide diagrams (including foundation reveal) and descriptions of all the structure types, to include:**

    a) ***mapping that identifies each portion of the preferred route;***

    b) ***the rationale for the selection of the structure type;***

    c) ***the number of each type of structure and the length of each portion of the ROW;***

    d) ***the structure material and rationale for the selection of such material;***

    e) ***the foundation material;***

    f) ***the average width at cross arms;***

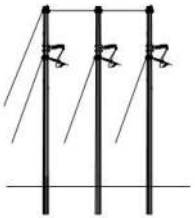
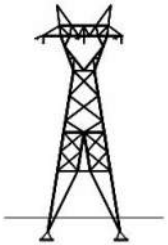
    g) ***the average width at the base;***

    h) ***the maximum, minimum and average structure heights;***

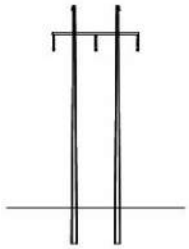
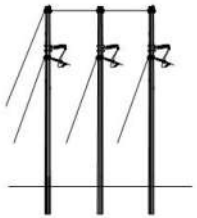
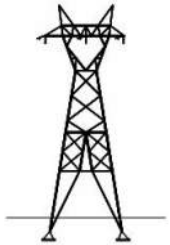
    i) ***the average span length; and***

    j) ***the minimum conductor-to-ground clearances under maximum operating conditions.***

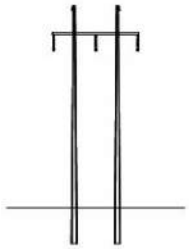
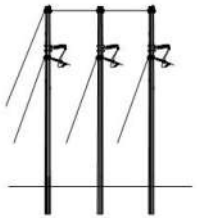
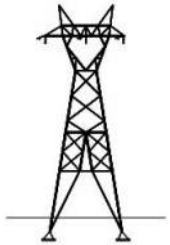
Response:
Final structure types will be determined during final engineering, which includes ground surveys and geotechnical studies. Nevertheless, based on preliminary engineering, the Company anticipates primarily using single-circuit steel H-frames and single-circuit monopole structures for the rebuilt 138 kV transmission line. The Company plans to remove 85 H-frame structures, 11 three-pole structures, and three lattice tower structures, and replace them with structures as shown in the below table, based on preliminary engineering analysis at the date of this Application.

Structure Type	 **138 kV H-Frame** See Exhibit 7	 **138 kV Three-Pole** See Exhibit 8	 **138 kV Tangent Braced-Post Monopole** See Exhibit 9	 **138 kV Dead-End Monopole** See Exhibit 10	 **138 kV Lattice Tower** See Exhibit 11
a. mapping that identifies each portion of the preferred route.	See Exhibit 3	See Exhibit 3	See Exhibit 3	See Exhibit 3	See Exhibit 3
b. rationale for the selection of the structure type.	The proposed 138 kV H-frame is best suited for medium-to-long spans.	The proposed 138 kV three-pole dead-end structure is best suited for heavy line angle locations and breaking wire tension.	The proposed 138 kV tangent braced-post monopole structure is best suited for short-to-medium spans and narrow rights-of-way.	The proposed 138 kV dead-end monopole structure is best suited for heavy line angle locations, breaking wire tension, and narrow rights-of-way.	The proposed 138 kV lattice tower dead-end structure is best suited for long span, heavy line angle locations and breaking wire tension.
c-1. estimated number of each type of structure.	70	19	8	2	2
c-2. estimated length of each portion of the ROW.	10.5 miles	2.7 miles	1 mile[1]	0.1 mile	0.5 mile
d-1. structure material.	Dulled galvanized steel	Dulled galvanized steel	Dulled galvanized steel	Dulled galvanized steel	Darkened galvanized steel

[1] The total estimated length includes the approximately 0.3-mile section to be reconductored between existing structures 28-38A to 28-41A.

Structure Type	 **138 kV H-Frame** See Exhibit 7	 **138 kV Three-Pole** See Exhibit 8	 **138 kV Tangent Braced-Post Monopole** See Exhibit 9	 **138 kV Dead-End Monopole** See Exhibit 10	 **138 kV Lattice Tower** See Exhibit 11
d-2. rationale for the selection of such material.	Galvanized steel was chosen for its durability and proven reliability in this region. A dulled finish was selected to minimize visual impacts.	Galvanized steel was chosen for its durability and proven reliability in this region. A dulled finish was selected to minimize visual impacts.	Galvanized steel was chosen for its durability and proven reliability in this region. A dulled finish was selected to minimize visual impacts.	Galvanized steel was chosen for its durability and proven reliability in this region. A dulled finish was selected to minimize visual impacts.	Galvanized steel was chosen for its durability and proven reliability in this region. A darkened finish was selected to minimize visual impacts.
e. foundation material.	Steel poles will be direct embedded to an average depth of 11'.	Steel poles will be direct embedded to an average depth of 12'.	Steel pole will be direct embedded to an average depth of 13'.	Drilled concrete pier with an average depth of 25'. The typical concrete pier reveal height will be 1' above grade.	Four earth grillages will be installed per structure to an average depth of 12’.
f. average width at cross arms.	39’	40’	11'	2’	42’
g. average width at the base.	3’ Diameter Pole	3’ Diameter Pole[2]	3’ Diameter Pole	5'-0" Diameter Pole 6'-0" Diameter Concrete Pier	35’

[2] Collocation poles for cellular antennas may be larger in diameter and taller to accommodate cellular antenna requirements (see Company Witness McMillen’s testimony). Existing structure 28A-28 is a collocation site for a cellular antenna (see Exhibit 3, GIS Constraints Map).

Structure Type	 **138 kV H-Frame** See Exhibit 7	 **138 kV Three-Pole** See Exhibit 8	 **138 kV Tangent Braced-Post Monopole** See Exhibit 9	 **138 kV Dead-End Monopole** See Exhibit 10	 **138 kV Lattice Tower** See Exhibit 11
h-1. approximate average height of structures (above ground).	65'	70'	75'	85’	119’
h-2. approximate typical structure height range (above ground).	55' to 85'	55' to 85'[3]	65' to 85'	85'	119’
i. average span length.	800’	700’	700'	150'	2,600'
j. minimum conductor-to-ground clearances under maximum operating conditions.	22'-7"	22'-7"	22'-7"	22'-7"	22'-7"

[3] Collocation poles for cellular antennas may be larger in diameter and taller to accommodate cellular antenna requirements (see Company Witness McMillen’s testimony). Existing structure 28A-28 is a collocation site for a cellular antenna (see Exhibit 3, GIS Constraints Map).

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

   Response:
   The anticipated heights of the proposed structures (excluding the proposed lattice tower structures) on the Project range between 55 and 85 feet, with an average structure height of 67 feet tall. The two lattice towers proposed for the Project will be 119 feet tall.

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

   Response:
   See Exhibit 3, GIS Constraints Map.

6. **Provide photographs for typical existing facilities to be removed, comparable photographs or representations for proposed structures, and visual simulations showing the appearance of all planned transmission structures at identified historic locations within one mile of the proposed centerline and in key locations identified by the Applicant.**

   Response:
   See Exhibits 4 – 6 for photographs of existing structures and Exhibit 13 for representations of proposed structures using visual simulations. For visual simulations showing the appearance of all planned transmission structures at identified historic locations within one mile of the proposed centerline, see the VDEQ Supplement in Volume 2 of the Application.

C. Describe and furnish plan drawings of all new substations, switching stations, and other ground facilities associated with the proposed project. Include size, acreage, and bus configurations. Describe substation expansion capability and plans. Provide one-line diagrams for each.

Response:
There are no new substations or expansions planned for the Project. The Company plans to update relay settings at the existing Fieldale, Ridgeway, and Commonwealth Crossing substations. Additionally, equipment related to the Dan River – Ridgeway 138 kV circuit will be replaced and upgraded at the Ridgeway Substation. The upgrades and improvements for which the Company is seeking approval will be entirely contained within the existing fence line of the substations.

SECTION III. IMPACT OF LINE ON SCENIC, ENVIRONMENTAL, AND HISTORIC FEATURES

The Siting Study and the VDEQ Supplement included in Volume 2 of this Application address scenic, environmental, and historic features associated with the Project. Brief responses to the Section III guideline questions are provided below, but for in-depth discussion of these issues, please refer to the Siting Study and the VDEQ Supplement. A Project area map is included as Exhibit 1 and a more detailed GIS constraints map, which illustrates the various resources and sensitive features relative to the proposed Project, is included as Exhibit 3. Furthermore, the Siting Study (included in Volume 2) includes additional Project maps describing the route development process.

A. Describe the character of the area that will be traversed by this line, including land use, wetlands, etc. Provide the number of dwellings within 500 feet, 250 feet and 100 feet of the centerline, and within the ROW for each route considered. Provide the estimated amount of farmland and forestland within the ROW that the proposed project would impact.

Response:

The Project area is characterized predominantly by forested, agricultural, and developed land uses, including residential, commercial and recreational areas in Henry County. The Project will be constructed largely within or parallel to the existing transmission line ROW and includes two minor deviations from the parallel to minimize impacts to land use constraints.

Between the Fieldale and Sheffield substations, the Project area consists of residential land uses, undeveloped areas, timbering areas, and recreational features such as the Smith River and Henry County's Fieldale Trail and River Access easement area. From the Fieldale Substation, the Proposed Route is on the existing centerline for 2.1 miles and shifts to be parallel to or near the existing ROW for 4.2 miles, ending near the Sheffield Substation. Near the Sheffield Substation, an approximately 0.3-mile long portion of the transmission line will be reconductored using existing structures. Between the Sheffield and Ridgeway substations, the Project area consists largely of residential and commercial land uses that have occurred in and around the existing ROW. Because of the development, this section of line is proposed to be rebuilt on the existing centerline for 3.7 miles. Between the Ridgeway Substation and existing structure 28-103 near the Virginia/North Carolina border, the Project area primarily crosses timbering and agricultural lands with scattered residential development and the Proposed Route is parallel to or near the existing ROW.

Residential and commercial land uses are concentrated on major roadways and highways such as U.S. Routes 58 (A. L. Philpott Highway), 220 (Greensboro Road), and 58 and 220 Bypass (William F. Stone Highway), State Route 57 (Appalachian Drive), and secondary roadways such as Morgan Ford Road and Mitchell Road. Impacts to wetlands and streams are expected to be minimal and can be spanned in most instances. The Project crosses the Smith River, a Section 10 navigable waterway and recreational resource, but no modification to this crossing location is proposed.

The estimates provided below of the residences, cropland and forest for the Proposed Route are based on the typical 100-foot-wide ROW on the proposed centerline and consider Light Detection and Ranging ("LiDAR") survey and National Land Cover Database ("NLCD") data. There are 198 dwellings located within 500 feet, 70 dwellings within 250 feet, and 19 dwellings within 100 feet of the Proposed Route centerline. Three residences have encroached on the existing ROW and are located between the Sheffield and Ridgeway substations, where the Project will be rebuilt on the existing centerline. Based on preliminary engineering analysis, the Company expects the Project can be designed and constructed as to avoid the affected buildings in the conductor zone. Accordingly, and subject to completion of final engineering and ROW negotiations with affected landowners, the Company does not expect that any residences located within the ROW will need to be removed to accommodate the rebuilt line.

The Proposed Route has approximately 84 acres of either prime and unique farmland or farmland of statewide importance located within the typical 100-foot-wide ROW based on United States Department of Agriculture's Natural Resources Conservation Service ("NRCS") Soil Survey Geographic Database ("SSURGO"). There are approximately 31 acres of pasture/rangeland or cropland crossed by the Proposed Route, according to the NLCD data. The Proposed Route crosses agricultural areas in or near existing ROW locations and avoids significant diversions on properties and therefore, is not expected that the Project will permanently impact farmland. Based on digitized aerial imagery, approximately 80 acres of forested land is within the Proposed Route's 100-foot ROW. Because the Project cannot be rebuilt entirely within the existing ROW due to outage constraints, the Proposed Route largely parallels the existing ROW to minimize tree clearing where practicable.

B. Describe any public meetings the Applicant has had with neighborhood associations and/or officials of local, state or federal governments that would have an interest or responsibility with respect to the affected area or areas.

Response:

Federal, State, and Local Government Coordination

As described in the Siting Study, the Company and Siting Team obtained information from or contacted various federal, state, and local agencies and/or officials to inform them of the Project and request input for the route development process. The Company met with local Henry County officials on September 18, 2019 to introduce the Project and obtain information to aid the route planning process. After the initial meeting, Company representatives continued to provide updates throughout the duration of the Project to Henry County officials, most recently in November 2021. Input from the local officials supported rebuilding close to the existing the transmission line and confirmed that no active development plans were in place in the Project area. After initial stakeholder coordination, the Company performed feasibility studies for the Project and later announced a virtual open house. Letters and maps regarding the Project were sent to 29 representatives on March 17, 2021 as part of the data collection effort and 10 responses were received. A full list of agencies receiving a letter and map and the responses received to date are included as Attachment F to the Siting Study in Volume 2. The Company coordinated with VDOT regarding the Martinsville Southern Connector Study, which evaluates a road improvement

corridor that crosses the Project near the Sheffield Substation. In discussions with VDOT staff, the final road alignment will not impact the Sheffield Substation and their project is pending funding.

Public Involvement

An in-person public open house was not advisable during the COVID-19 pandemic given the travel restriction and social distancing recommendations and requirements of the Centers for Disease Control and Prevention and the Executive Orders issued by the Governor of the Commonwealth. In lieu of an in-person public meeting, a virtual open house was created on the Project website (www.AppalachianPower.com/Fieldale-Ridgeway) and landowners within 1,000 feet of the Project centerlines were notified. Three separate mailings were sent to landowners and included an informational packet, which contained a letter, fact sheet, detailed flyer about transmission line routing, and a comment card with a prepaid postage return envelope. The Project was publicly announced with a news release and virtual open house on March 17, 2021. Appalachian Power representatives requested input on the Project by April 19, 2021 and provided similar content to that of in-person public open houses. For additional information regarding the virtual open house, see Section 5.0 in the Siting Study (Volume 2). A total of 41 comments were received through comment cards, the Project website or phone calls. Those comments were reviewed by the Siting Team and entered into the Project public comment database, and generally related to the use of existing ROW and general project information questions, such as structure type and how the rebuild will differ from the existing line. The Company also contacted interested stakeholders and landowners throughout the siting process to gather feedback. The public involvement process is described in the Siting Study located in Volume 2 of the Application.

C. Detail the nature, location, and ownership of each building that would have to be demolished or relocated if the project is built as proposed.

Response:

The Project will be rebuilt within or near the existing ROW. Three residences have encroached on the existing 100-foot-wide transmission line ROW between the Sheffield and Ridgeway substations. Based on preliminary engineering analysis, the Company expects the Project can be designed and constructed as to avoid the affected buildings in the conductor zone. Accordingly, and subject to completion of final engineering and ROW negotiations with affected landowners, the Company does not expect that any residences located within the ROW will need to be removed to accommodate the rebuilt line.

Based on available aerial imagery and LiDAR survey, there are 11 secondary structures such as barns, outbuildings, sheds, and garages that are within the typical 100-foot-wide ROW of the Proposed Route. Additional field work, engineering, and discussions with landowners are needed to determine if these secondary structures will need to be removed to construct the Project. These building locations are identified in Exhibit 3, GIS Constraints Map.

D. Identify existing physical facilities that the line will parallel, if any, such as existing transmission lines, railroad tracks, highways, pipelines, etc. Describe the current use and physical appearance and characteristics of the existing ROW that would be paralleled, as well as the length of time the transmission ROW has been in use.

Response:
For the most part, the Project will either use the existing ROW or be built parallel to the existing Fieldale – Dan River 138 kV transmission line, which is to be rebuilt as part of this Project. Approximately nine miles of the Project will be built parallel to or near the existing ROW, on new ROW, to minimize the outage duration during construction. The existing 138 kV transmission line ROW is parallel to an existing East Tennessee Natural Gas Company pipeline near the Virginia/North Carolina border. The Proposed Route parallels the existing 138 kV transmission line ROW and the pipeline corridor for about 0.7 mile and is on the north side of the existing ROWs, farther from the pipeline. The Project does not directly parallel highway or railroad corridors.

E. Indicate whether the Applicant has investigated land use plans in the areas of the proposed route and indicate how the building of the proposed line would affect any proposed land use.

Response:
The existing Fieldale – Dan River 138 kV Transmission Line has been in service for over 70 years and is located entirely in Henry County, west of the City of Martinsville. In discussions with local Henry County officials, definite future land use plans were not identified, although the local officials noted commercial and residential growth in areas around the highway corridors crossed by the existing ROW. The Company reviewed Henry County's most recent and available Comprehensive Plan (1995-2010), which identifies planned growth areas around the Fieldale and Ridgeway areas. The Project will largely be rebuilt within or parallel to the existing ROW and is not anticipated to impact any proposed land uses.

F. Government Bodies

1. Indicate if the Applicant determined from the governing bodies of each county, city and town in which the proposed facilities will be located whether those bodies have designated the important farmlands within their jurisdictions, as required by § 3.2-205 B of the Code.

Response:
The Siting Team's review of available planning documents and input from local officials determined the ROW of the Proposed Route does not cross any designated important farmlands in Henry County as determined by § 3.2-205 B of the Code. The Project is not expected to adversely impact farmland, given the Project will largely be rebuilt within or parallel to the existing ROW that has been in use since for over 70 years.

2. **If so, and if any portion of the proposed facilities will be located on any such important farmland:**

   a. **Include maps and other evidence showing the nature and extent of the impact on such farmlands;**

      Response:
      N/A

   b. **Describe what alternatives exist to locating the proposed facilities on the affected farmlands, and why those alternatives are not suitable; and**

      Response:
      N/A

   c. **Describe the Applicant's proposals to minimize the impact of the facilities on the affected farmland.**

      Response:
      N/A

G. Identify the following that lie within or adjacent to the proposed ROW:

Per the *Guidelines for Assessing Impacts of Proposed Electric Facilities on Historic Resources in the Commonwealth of Virginia* (2008) (the "Guidelines"), issued by the Virginia Department of Historic Resources ("VDHR"), the Company contracted POWER to complete a Pre-Application Analysis for the proposed Project (see Attachment 2.H.1 to the VDEQ Supplement included in Volume 2 of this Application).

1. **Any district, site, building, structure, or other object included in the National Register of Historic Places maintained by the U.S. Secretary of the Interior;**

   Response:
   No National Historic Landmark ("NHL") resources are located within 1.5 miles of the Proposed Route. The following five National Register of Historic Places ("NRHP")-listed resources are located within one mile of the Project:

   - Fieldale Historic District (VDHR# 044-5173)
   - Virginia Home (VDHR# 044-5010)
   - Fieldcrest Lodge (VDHR# 044-5166)
   - Belleview (VDHR# 044-0002)
   - Ingleside Place (VDHR# 044-0013)

   The Fieldale Historic District (VDHR# 044-5173) is located approximately 0.2 mile from the Project at its nearest location, west of the Fieldale Substation. The existing transmission line and proposed Project is visible from various locations within the Fieldale Historic District; however, multiple existing buildings, unrelated transmission

and distribution lines, and a substation are in the foreground and viewshed of the district. Therefore, POWER recommends the Project will have no more than a minimal impact on the NRHP-listed Fieldale Historic District. Within the Fieldale Historic District, the NRHP-listed Virginia Home (VDHR# 044-5010) is located approximately 0.4 mile from the Project. Based on field reconnaissance, the existing transmission line is not visible from the historic property due to intervening vegetation and no impacts are anticipated to the NRHP-listed resource. Overall, it is anticipated the rebuilt transmission line will have no more than a minimal impact on the NRHP-listed Fieldale Historic District, which includes NRHP-eligible sites.

The NRHP-listed Fieldcrest Lodge property (VDHR# 044-5166), also known as the Marshall Field & Company Clubhouse, is crossed by the Project at its existing ROW location but the buildings are located approximately 0.2 mile west of the Proposed Route. At publicly accessible locations, the Project is not visible from the Fieldcrest Lodge buildings due to intervening topography and vegetation; however, the Project may be visible from the northern portion of the historical property (away from the buildings/structures) after seasonal abscission. Two NRHP-listed resources located between the Sheffield and Ridgeway substations, Belleview (VDHR# 044-0002) and Ingleside Place (VDHR# 044-0013), are located approximately 0.8 and 0.2 mile from the Project, respectively. The existing transmission line is not currently visible from either resource based on the intervening distance, surrounding vegetation, and topography. No more than a minimal impact is anticipated for the Fieldcrest Lodge or Belleview properties due to the seasonal abscission of leaves. No impact is anticipated on the Ingleside property given the intervening terrain and vegetation, which obstructs the view of the Project.

The five NRHP-listed resources are discussed in the Pre-Application Analysis in the VDEQ Supplement, located in Volume 2. No more than a minimal impact is anticipated to the five NRHP-listed resources located within one mile of the Project.

2. **Any historic architectural, archeological, and cultural resources, such as historic landmarks, battlefields, sites, buildings, structures, districts or objects listed or determined eligible by the Virginia Department of Historic Resources ("VDHR");**

Response:
Two NRHP-eligible resources are located within 0.5 mile of the Proposed Route but are not within the existing or proposed ROW.

- Fieldale Elementary School (VDHR# 044-5168)
- Copeland House (VDHR# 044-5179)

The Fieldale Elementary School (VDHR# 044-5168) and Copeland House (VDHR# 044-5179) are located approximately 0.5 mile west of the Project and within the NRHP-listed Fieldale Historic District (VDHR# 044-5173). The Project is visible from the Fieldale Elementary School; however, due to the intervening distance, existing utility infrastructure, and partial vegetative cover, the proposed structure height increases for the Project represents a minimal change to the existing viewshed. The

Project is not visible from the Copeland House and due to the distance and the intervening building and vegetation, providing partial cover, the rebuilt line will continue to not be visible from the property where the proposed structure will be taller. Therefore, no impact is anticipated to the NRHP-eligible Copeland House.

The two NRHP-eligible resources are discussed in the Pre-Application Analysis in the VDEQ Supplement, located in Volume 2. In addition, the potentially NRHP-eligible Odell Farm (VDHR# 044-5490) is located approximately 0.4 mile northeast of the Project at its nearest location. The Odell Farm will not have a view of the Project due to trees and intervening topography and no impact is anticipated for the potentially eligible resource.

3. **Any historic district designated by the governing body of any city or county;**

   Response:
   None. The Fieldale Historic District, listed on the NRHP, is discussed above.

4. **Any state archaeological site or zone designated by the Director of the VDHR, or its predecessor, and any site designated by a local archaeological commission, or similar body;**

   Response:
   None.

5. **Any underwater historic assets designated by the VDHR, or predecessor agency or board;**

   Response:
   None.

6. **Any National Natural Landmark designated by the U.S. Secretary of the Interior;**

   Response:
   None.

7. **Any area or feature included in the Virginia Registry of Natural Areas maintained by the Virginia Department of Conservation and Recreation ("VDCR");**

   Response:
   None.

8. **Any area accepted by the Director of the VDCR for the Virginia Natural Area Preserves System;**

   Response:
   None.

9. **Any conservation easement or open space easement qualifying under §§ 10.1-1009 – 1016, or §§ 10.1-1700 – 1705, of the Code (or a comparable prior or subsequent provision of the Code);**

   Response:
   No conservation or open space easements qualifying under § 10.1-1009 – 1016, or § 10.1-1700 – 1705, of the Code (or a comparable prior or subsequent provision of the Code) are crossed or within 1.5 miles of the Proposed Route based on input and available data.

10. **Any state scenic river;**

    Response:
    None.

11. **Any lands owned by a municipality or school district; and**

    Response:
    Nine parcels owned by a municipality or school district are crossed by or adjacent to the ROW of the Proposed Route. Four parcels owned by the Henry County Public Service Authority are crossed by the Proposed Route at the existing ROW crossing on the parcels. Five parcels owned by the Henry County School Board are near the Project and not crossed by the proposed ROW. In discussions with Henry County officials, no impacts to future development plans were noted.

12. **Any federal, state or local battlefield, park, forest, game or wildlife preserve, recreational area, or similar facility. Features, sites, and the like listed in 1 through 11 above need not be identified again.**

    Response:
    The existing Fieldale – Dan River 138 kV Transmission Line crosses Henry County's Fieldale Trail and River Access easement area, which consists of a recreational trail and public river access along the bank of the Smith River. The Proposed Route uses existing ROW to cross the river and recreational area as to minimize new and visual impacts. No other federal, state or local property other than described above are within or adjacent to the proposed ROW.

H. List any registered aeronautical facilities (airports, helipads) where the proposed route would place a structure or conductor within the federally-defined airspace of the facilities. Advise of contacts, and results of contacts, made with appropriate officials regarding the effect on the facilities' operations.

Response:
No public use airport is located within 20,000 linear feet of the Project according to a response received from the Virginia Department of Aviation on April 22, 2021 (see Attachment F in the Siting Study in Volume 2).

The Company utilized the Federal Aviation Administration's ("FAA") Obstruction Evaluation/Airport Airspace Analysis tool to review the proposed structure locations. Based on preliminary engineering, the Company does not expect to file Form 7460 for any structures.

I. Advise of any scenic byways that are in proximity to or that will be crossed by the proposed transmission line and describe what steps will be taken to mitigate any visual impacts on such byways. Describe typical mitigation techniques for other highways' crossings.

Response:
No scenic byways as designated by the Federal Highway Administration or the VDOT are crossed by the Proposed Route.

J. Identify coordination with appropriate municipal, state, and federal agencies.

Response:
The Company coordinated with various federal, state, and local agencies and/or officials early in the route development process to inform them of the Project and receive feedback. A list of the agencies contacted, the letter and map provided, and associated responses for the Project is included as Attachment F to the Siting Study found in Volume 2 of the Application. A total of ten responses have been received at the time of filing this Application.

K. Identify coordination with any non-governmental organizations or private citizen groups.

Response:
Coordination with known non-governmental organizations and/or private citizen groups was made early and throughout the route development process to inform them of the Project and receive feedback. The Company solicited input from landowners and invited the general public to review the Project information and submit comments as part of the virtual open house. The input received on the Project was used in the route planning process and is summarized in the Siting Study in Volume 2 of the Application.

L. Identify any environmental permits or special permissions anticipated to be needed.

Response:
The following is a list of environmental permits or special permissions that are anticipated to be needed for the Project:

- A general Virginia Pollutant Discharge Elimination System Permit for Discharges of Stormwater from Construction Activities from VDEQ.
- Surveys and coordination with the United States Fish and Wildlife Service and the Virginia Department of Wildlife Resources will be conducted for potential occurrence of state- and federally-protected species.
- The USACE Section 10 Permit in compliance with Section 404 of the Clean Water Act will apply to the Project.
- If impacts to cultural resources occur, compliance with Section 106 of the National Historic and Preservation Act of 1966 and coordination with VDHR will be required.
- A general Land Use Permit for work within designated ROW from VDOT.

SECTION IV. HEALTH ASPECTS OF EMF

A. State the calculated maximum electric and magnetic field ("EMF") levels that are expected to occur at the edge of the ROW. If the new transmission line is to be constructed on an existing electric transmission line ROW, provide the present EMF levels as well as the maximum levels calculated at the edge of ROW after the new line is operational.

Response:

The following is an analysis of EMF associated with the transmission line components of the Project.

The rebuild of the existing Fieldale – Dan River 138 kV transmission line consists of a single-circuit 138 kV transmission line. Final structure types will be determined during final engineering, which includes ground surveys and geotechnical studies. Nevertheless, based on preliminary engineering, the Company anticipates primarily using single-circuit steel H-frames and single-circuit monopole structures for the Project.

EMF levels were computed at the ROW edges of the existing and proposed line configurations at the point of minimum ground clearance, where EMF is the highest. Lower EMF levels are expected beyond the ROW edges, as levels decline with distance.

Factors that affect EMF include the ROW width, operating voltage, current flow and direction, electrical unbalance, line configuration, conductor height above ground, and other nearby objects. Nominal voltages and balanced conditions are assumed, with maximum current levels and directions expected during normal system operation. No trees, shrubs, buildings or other objects that can block EMF are assumed in proximity to the existing and proposed lines.

Normal maximum loading levels, representing peak load conditions, were assumed in the analysis to maximize the calculated magnetic fields. These loading levels are based on winter 2026-2027 projected system conditions. Daily/hourly loads will fluctuate below these levels. All calculations were obtained at the height of 3.28 feet (one meter) above ground using the Electric Power Research Institute ("EPRI") EMF Workstation computer program.

Based on the foregoing, the maximum electric and magnetic field levels expected to occur at the ROW edge of the proposed rebuilt line section from the Fieldale Substation to the Commonwealth Crossing 138 kV Extension are 0.63 kilovolts per meter ("kV/m") and 3.18 milligauss ("mG"), respectively. The maximum electric and magnetic field levels expected to occur at the ROW edge of the proposed rebuilt line section from the Commonwealth Crossing 138 kV Extension to the Ridgeway Substation are 0.63 kV/m and 3.28 mG, respectively. Similarly, the maximum electric and magnetic field levels expected to occur at the ROW edge of the proposed rebuilt line section from the Ridgeway Substation to existing structure 28-103 are 0.63 kV/m and 9.38 mG, respectively.

The maximum existing EMF levels for the existing line section from the Fieldale Substation to the Commonwealth Crossing 138 kV Extension are 0.59 kV/m and 3.19 mG, respectively. The maximum existing EMF levels for the existing line section from the Commonwealth Crossing 138 kV Extension to the Ridgeway Substation are 0.59 kV/m and 3.29 mG, respectively.

Similarly, the maximum existing EMF levels for the existing line section from the Ridgeway Substation to existing structure 28-103 are 0.59 kV/m and 9.46 mG, respectively.

B. If Company is of the opinion that no significant health effects will result from the construction and operation of the line, describe in detail the reasons for that opinion and provide references or citations to supporting documentation.

Response:

EMFs occur naturally in the environment. An electric field is present between the earth and its atmosphere, and can discharge as lightning during thunderstorms. The earth also has a magnetic field, which provides an operating basis for the magnetic compass. EMF exists wherever there is a flow of electricity, including electrical appliances and power equipment.

Electric fields are produced by voltage or electric charge. A lamp cord that is plugged in produces an electric field even if the lamp is turned off. These fields commonly are measured in kV/m; the higher the voltage, the greater is the electric field. Magnetic fields are created by the flow of current in a wire. As current increases, the magnetic field strength also increases; these fields are measured in units known as gauss, or mG.

Electric fields are blocked by trees, shrubs, buildings and other objects. Magnetic fields are not easily blocked and can pass through most objects. The strength of these fields decreases rapidly with distance from the source.

EMF associated with power lines and household appliances oscillate at the power frequency (60 Hz in the U.S.). When people are exposed to these fields, small electric currents are produced in their bodies. These currents are weaker than natural electric currents in the heart and nervous system.

Possible health effects from exposure to EMF have been studied for several decades. Initial research, focused on electric fields, found no evidence of biologic changes that could lead to adverse health effects. Subsequently, a large number of epidemiologic studies examined the possible role of magnetic fields in the development of cancer and other diseases in adults and children. While some studies have suggested an association between magnetic fields and certain types of cancer, researchers have been unable to consistently replicate those results in other studies. Similarly, inconclusive or inconsistent results have been reported in laboratory studies of animals exposed to magnetic fields that are representative of common human exposures. A summary of such exposures, found in residential settings, is provided in Table 10.

Appliance Type	Number of Devices	Magnetic Field (mG)		
		1.2" (0.1 feet)	12" (1.0 feet)	User Distance
AC Adapters	3	1.4 – 863	0 - 7.5	0 - 0.8
Blood Pressure Monitors	4	4.2 - 39.6	0 - 0.3	0 – 0.2
Bluetooth Headsets	3	0	0	0
Coffee Grinders	3	60.9 – 779	0.3 – 6.5	0.8 - 40.9
Compact Fluorescent Bulbs	15	0 – 32.8	0 - 0.1	0 - 0.6
Compact Fluorescent Bulb Ballast	1	8.5 – 23.5[1]	0 – 0.1[1]	0 - 0.1[1]
Computers, Desktop	3	3.8 – 68.9	0 -1.1	0.1 – 0.5
Computers, Laptop	4	0 – 5.1	0	0 – 0.1
Digital Cameras	3	0	0	0
Digital Photo Frames	5	0	0	0
Digital Video Recorders	4	0 – 29.6	0 – 0.2	0
Dimmer Switches	4	11.5 – 32.1	0 – 0.8	0 – 0.8
DVD Players	5	0 – 28.9	0 – 0.5	0
Electric Lawn Mower	1	1939	156	14.1
Electric Leaf Blowers	4	272 – 4642	17.1 – 155	28.3 – 61.5
Electric Toothbrushes	5	3.6 - 742	0 – 4.8	3.6 – 742
Electric Toothbrush Chargers	5	0 – 4.2	0	0
External Hard Drives	4	0.6 – 1.7	0	0
Gaming Consoles	10	0 – 215	0 – 0.5	0 – 0.6
GPS, Handheld	5	0 – 0.1	0	0
Hobby Tools	2	126 – 438	1.4 – 2.4	1.4 - 438
Hot Glue Guns	3	0 – 0.9	0	0
LCD Computer Monitors	4	0 – 4.5	0	0
LCD Televisions	4	1.1 – 3.9	0 – 2.5	0 – 0.6
Massagers/Massage Chairs	3	81.9 – 500	0.6 – 2.3	21.4 - 500
MP3 Players	5	0	0	0
Noise Cancellation Headphones	1	0	0	0
Paper Shredders	4	11.0 – 4841	0.5 – 102	0.5 – 33.4
Plasma Televisions	2	45.1 – 73.6	1.4 – 2.2	0 – 0.1
Power Tools – Corded	3	784 – 982	8.8 – 31.3	46.8 - 123
Power Tools – Cordless	6	9.0 – 227	0 – 2.2	0 – 13.7
Printers	5	0.1 – 6.2	0 – 0.3	0 – 0.3
Scanners	3	0.6 – 6.7	0 – 0.3	0
Security System Panels	3	0 – 0.3	0	0
Tankless Hot Water Heater	1	10.1 – 21.9[2]	1.2	0.2
Track Lighting	5	0.2 – 4.0	0 – 0.3	0
Vacuum Cleaners, Personal/Car	3	75.5 – 2226	0.6 – 23.3	0.1 – 23.1
Wireless Game Controllers	11	0	0	0
Wireless Routers	4	0 – 0.5	0	0-0.3

Source: Electric Power Research Institute [1]

Table 10
Magnetic Fields from Household Electrical Appliances and Devices

As part of the National Energy Policy Act of 1992, the U.S. Congress enacted the Electric and Magnetic Fields Research and Public Information Dissemination ("EMF RAPID") program. The National Institute of Environmental Health Sciences ("NIEHS") was charged with overseeing the health research and conducting an EMF risk evaluation. In its final report to Congress, issued in 1999, NIEHS concluded that power-frequency "EMF exposure cannot be recognized at this time as entirely safe because of weak scientific evidence that exposure may pose a leukemia hazard." Nonetheless, the report stated that "this finding is insufficient to warrant aggressive regulatory concern." [2]

In 2001, the Standing Committee on Epidemiology of International Commission on Non-Ionizing Radiation Protection ("ICNIRP") wrote in its review of the epidemiologic

literature on EMF and health that "given the methodological uncertainties and in many cases inconsistencies of the existing epidemiologic literature, there is no chronic disease outcome for which an etiological [causal] relation to EMF exposure can be regarded as established." [3]

Also, in 2001, International Agency for Research on Cancer ("IARC") published the results of an EMF health risk evaluation conducted by an expert scientific working group, which concluded that power-frequency "magnetic fields are 'possibly carcinogenic to humans,' based on consistent statistical associations of high level residential magnetic fields with a doubling of risk of childhood leukemia."[4] IARC assigns its 'possibly carcinogenic to humans' classification (Group 2B) if there is "limited evidence" of carcinogenicity in both humans and experimental animals, or if there is "sufficient evidence" in animals, but "inadequate evidence" in humans. Group 2B includes some 288 "agents" such as coffee, pickled vegetables, carpentry, textile manufacturing and gasoline, among others (last update: October 26, 2015).

A comprehensive assessment of the EMF health risks was published by the World Health Organization ("WHO") in 2007. In its assessment, WHO wrote: "Scientific evidence suggesting that every day, chronic, low-intensity (above 0.3-0.4 μT) [3-4 mG] power-frequency magnetic field exposure poses a possible health risk is based on epidemiological studies demonstrating a consistent pattern of increased risk for childhood leukemia."[5] It added, however, that "virtually all of the laboratory evidence and the mechanistic evidence fail to support a relationship between low-level ELF [extremely low frequency] magnetic fields and changes in biological function or disease status. Thus, on balance, the evidence is not strong enough to be considered causal, but sufficiently strong to remain a concern."

Regarding acute effects, WHO noted, "Acute biological effects have been established for exposure to ELF electric and magnetic fields in the frequency range up to 100 kHz that may have adverse consequences on health. Therefore, exposure limits are needed. International guidelines exist that have addressed this issue. Compliance with these guidelines provides adequate protection for acute effects." [5]

In summary, some studies have reported an association between long-term magnetic field exposure and particular types of health effects, while other studies have not. The nature of the reported association remains uncertain as no known mechanism or laboratory animal data exist to support the cause-and-effect relationship.

In view of the scientific evidence, the Institute of Electrical and Electronics Engineers ("IEEE") and other organizations have established guidelines limiting EMF exposure for workers in a controlled environment and for the general public. These guidelines focus on prevention of acute neural stimulation. No limits have been established to address potential long-term EMF effects, as the guideline organizations consider the scientific evidence insufficient to form the basis for such action. For power-frequency EMF, IEEE Standard C95.6TM-2002 [6] recommends the following limits:

	General Public	Controlled Environment
Electric Field Limit (kV/m)	5.0	20.0*
Magnetic Field Limit (mG)	9040.0	27,100.0

*10.0 kV/m within power line ROW.

To address public concerns about EMF, the Government of Canada in 2012 updated its website with the latest knowledge on the subject. It contains the following statements on the EMF health-related risks: “Health Canada does not consider that any precautionary measures are needed regarding daily exposures to EMFs at ELFs. There is no conclusive evidence of any harm caused by exposures at levels found in Canadian homes and schools, including those located just outside the boundaries of power line corridors.” [7]

Similarly, in 2013, the updated website of the WHO concluded: “to date there is no evidence to conclude that exposure to low level electromagnetic fields is harmful to human health.” [8]

Most recently, in its January 2015 report, the Scientific Committee on Emerging and Newly Identified Health Risks (“SCENIHR”), an independent advisory body to the European Commission on Public Health, issued the following opinion: “Overall, existing studies do not provide convincing evidence for a causal relationship between ELF MF [extremely low frequency magnetic field] exposure and self-reported symptoms.” [9]

AEP has been following the EMF scientific developments worldwide, participating in and sponsoring EMF studies, and communicating with customers and employees on the subject. Also, AEP is a member of EPRI, an independent, non-profit organization sponsoring and coordinating EMF epidemiological, laboratory and exposure studies.

The line rebuild construction proposed in this Project will be compliant with the EMF limits specified in IEEE Standard C95.6TM-2002.

C. Describe any research studies the Company is aware of that meet the following criteria:

1. **Became available for consideration since the completion of the Virginia Department of Health's most recent review of studies on EMF and its subsequent report to the Virginia General Assembly in compliance with 1985 Senate Joint Resolution No. 126;**

2. **Include findings regarding EMF that have not previously been reported and/or provide substantial additional insight into previous findings; and**

3. **Have been subjected to peer review.**

Response:

In its report to the Virginia General Assembly, issued on October 31, 2000, the Virginia Department of Health stated the following: "the Virginia Department of Health is of the opinion that there is no conclusive and convincing evidence that exposure to extremely low frequency electromagnetic fields emanated from nearby high voltage transmission lines is causally associated with an increased incidence of cancer or other detrimental health effects in humans."[10]

Key publications on the subject, which became available after that report, are included below as references to the discussion contained in Section IV.B of this Response to Guidelines.

References

[1] "Magnetic Fields from Electrical Appliances and Devices," Electric Power Research Institute, Product ID 1021221, September 28, 2010.

[2] "NIEHS Report on Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields," National Institute of Environmental Health Sciences, National Institutes of Health, NIH Publication No. 99-4493, May 4, 1999 (http://www.niehs.nih.gov/about/materials/niehs-report.pdf).

[3] "Review of the Epidemiologic Literature on EMF and Health," International Commission for Non-Ionizing Radiation Protection (ICNIRP) Standing Committee on Epidemiology, Environmental Health Perspectives, Volume 109, Supplement 6, December 2001

(http://www.icnirp.de/documents/epireview1.pdf).

[4] "IARC Finds Limited Evidence that Residential Magnetic Fields Increase Risk of Childhood Leukemia," International Agency for Research on Cancer, Press Release No 136, June 27, 2001 (http://www.iarc.fr/en/media-centre/pr/2001/pr136.html).

[5] "Extremely Low Frequency Field (Environmental Health Criteria 238)," World Health Organization, June 1, 2007 (http://www.who.int/peh-emf/publications/Complet_DEC_2007.pdf).

[6] "C95.6™ IEEE Standard for Safety Levels with Respect to Human Exposure to Electromagnetic Fields, 0-3 kHz," IEEE Standards Coordinating Committee 28, October 23, 2002.

[7] "Electric and Magnetic Fields from Power Lines and Electrical Appliances," Healthy Canadians, November 7, 2012

(http://www.healthycanadians.gc.ca/environment-environnement/home-maison/emf-cem-eng.php).

[8] "What are Electromagnetic Fields? Summary of Health Effects," World Health Organization, 2013, (http://www.who.int/peh-emf/about/WhatisEMF/en/index1.html)

[9] "Opinion on Potential Health Effects of Exposure to Electromagnetic Fields (EMF)," Scientific Committee on Emerging and Newly Identified Health Risks, SCENIHR, January 27, 2015 (http://ec.europa.eu/health/scientific_committees/emerging/docs/scenihr_o_041.pdf).

[10] "Monitoring of Ongoing Research on the Health Effects of High Voltage Transmission Lines (Final Report)," Virginia Department of Health, October 31, 2000 (http://www.vdh.state.va.us/Epidemiology/DEE/publichealthtoxicology/documents/pdf/highfinal.PDF).

SECTION V. NOTICE

A. Furnish a proposed route description to be used for public notice purposes. Provide a map of suitable scale showing the route of the proposed project. For all routes that the Applicant proposes to be noticed, provide minimum, maximum and average structure heights.

Response:
A description of the Proposed Route is provided below. The requested public notice map is included as Exhibit 14.

The Proposed Route for the Project is approximately 15 miles long and is largely within or parallel to the existing transmission line ROW. The Proposed Route begins at the Company's existing Fieldale Substation (4645 Appalachian Drive) located in the central extents of Henry County and on the east side of the Smith River. The Proposed Route exits the Fieldale Substation within the existing right-of-way (ROW) for about two miles and crosses State Route 57 (Appalachian Drive), Daniels Creek Road, Longview Drive, S. River Road and the Smith River. South of the Smith River crossing, the Proposed Route shifts to parallel the existing ROW to the west for 1.8 miles and then crosses Lookout Mountain Road. Continuing parallel for one mile, the Proposed Route crosses U.S. Routes 58 (A. L. Philpott Highway) and 58 and 220 Bypass (William F. Stone Highway). After the highway crossings, the Proposed Route crosses Cameron Road and the existing centerline to continue near or parallel to the existing ROW.

The Proposed Route continues on the east side of the existing ROW for 1.3 miles to existing structure 28-38A. At this point, approximately 0.3 mile of the existing line will be reconductored on three existing structures near the Sheffield Substation (1986 Joseph Martin Highway). Past the Sheffield Substation, the Proposed Route is located within the existing ROW for approximately four miles and continues southeast crossing several residential roads including, Joseph Martin Highway, New Light Church Road, Owsley Drive, Ken Lane and Steve Drive. After Steve Drive, the Proposed Route continues in the existing ROW across U.S. Route 220 (Greensboro Road), Mica Road, Phospho Springs Road and Old Mill Road before entering the Ridgeway Substation (2689 Old Mill Road). After the Ridgeway Substation, the Proposed Route parallels the southwest side of the existing ROW for about two miles crossing Mitchell Road, Flanagan Branch Road, and Morgan Ford Road, before crossing to the northeast side of the existing ROW at Keeling Drive. The Proposed Route continues southeast paralleling the existing ROW for 1.1 miles crossing Powell Road and continues for 0.6 mile to an existing transmission line structure near the Virginia/North Carolina border, and southeastern extents of the Company's service territory.

Final structure types will be determined during detailed engineering, which incorporates information from ground surveys and geotechnical studies. Based on preliminary engineering, the Company anticipates primarily using galvanized steel H-frame and monopole structures with a low-reflective finish for the Project. The anticipated structure

heights for the H-frame and monopole structures range from 55 feet to 85 feet tall, with an average structure height of approximately 67 feet, excluding the two proposed lattice tower structures. Lattice structures are required at the Smith River crossing and will be 119 feet tall. The proposed structures for the rebuilt line will be approximately 10 feet taller to meet current engineering requirements but will be constructed near their existing locations in ROW or close to the existing ROW.

B. List Applicant offices where members of the public may inspect the application. If applicable, provide a link to website(s) where the application may be found.

Response:
This Application and all exhibits, tables, and maps made a part hereof will be available for inspection at the following locations:

Blue Ridge Regional Library – Collinsville Branch
2540 Virginia Avenue
Collinsville, VA 24078

Blue Ridge Regional Library – Ridgeway Branch
900 Vista View Lane
Ridgeway, VA 24148

This Application, exhibits, and maps are also digitally available at the Company's Project website: www.AppalachianPower.com/Fieldale-Ridgeway.

C. List all federal, state, and local agencies and/or officials that may reasonably be expected to have an interest in the proposed construction and to whom the Applicant has furnished or will furnish a copy of the application.

Response:
Federal
United States Army Corps of Engineers, Norfolk District, Western Virginia Regulatory Section
United States Environmental Protection Agency, Region 3
United States Fish and Wildlife Services, Virginia Field Office
United States Department of Transportation Federal Aviation Administration, Eastern Region Planning and Programming Branch
United States House of Representatives, 5th District (Bob Good)*
United States House of Representatives, 9th District (H. Morgan Griffith)*

State
Virginia Department of Environmental Quality*
Virginia Department of Agriculture and Consumer Services
Virginia Department of Aviation
Virginia Department of Conservation and Recreation, Division of Natural Heritage

Virginia Department of Conservation and Recreation, Karst Protection Program
Virginia Department of Conservation and Recreation, Planning and Recreation
Virginia Department of Historic Resources, Division of Review and Compliance
Virginia Department of Forestry
Virginia Department of Wildlife Resources, Environmental Services Section
Virginia Department of Mines, Minerals, and Energy
Virginia Department of Transportation (Central Office - Richmond)
Virginia Department of Transportation (Salem District)
Virginia Department of Health, Danville Field Office
Virginia Marine Resources Commission
Virginia Outdoors Foundation
Senate of Virginia, 20th District (William M. Stanley)*
Virginia House of Delegates, District 14 (Daniel W. Marshall)*
Virginia House of Delegates, District 16 (Leslie R. Adams)*

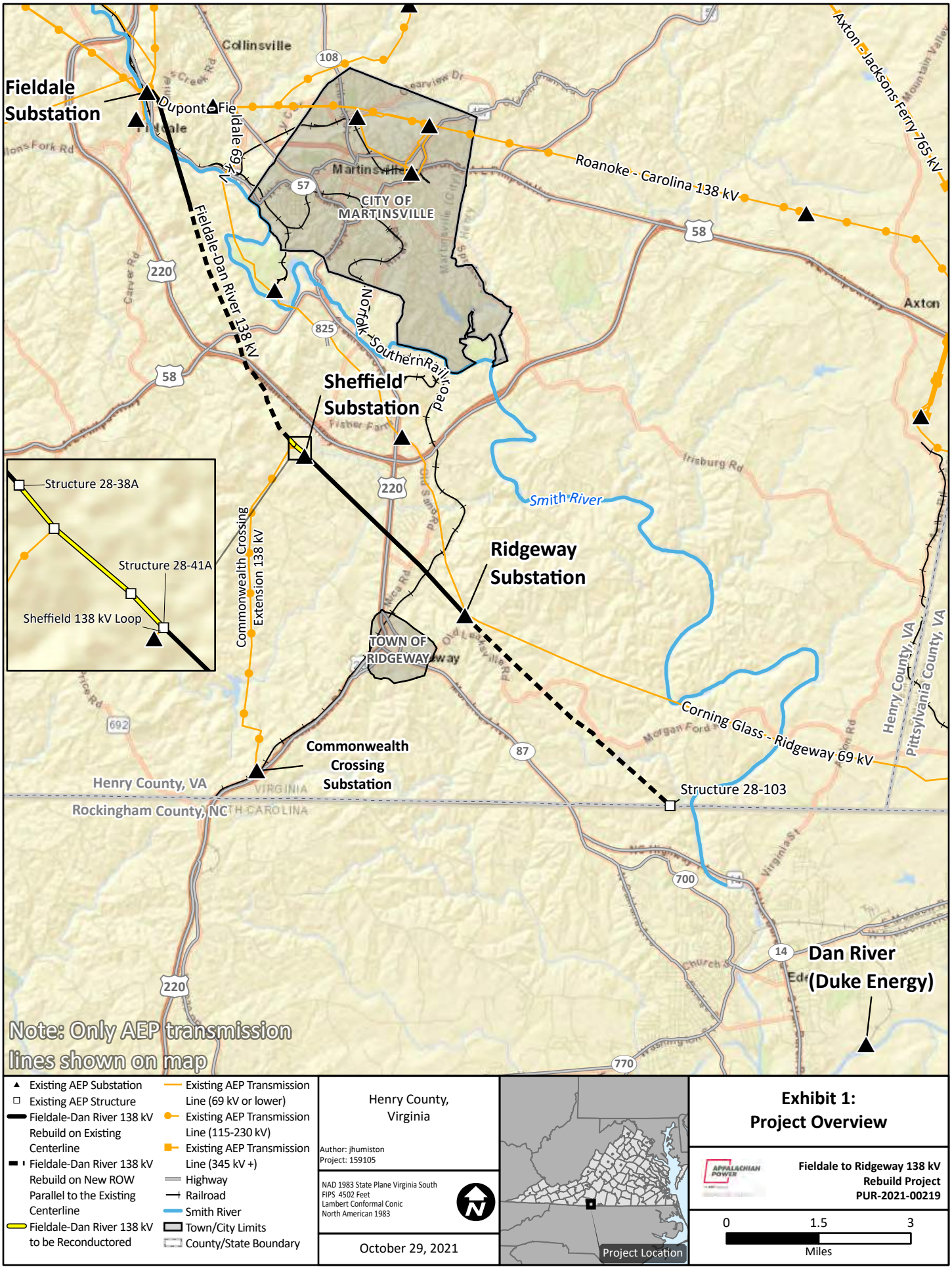
Local
Henry County, Board of Supervisors (Jim Adams, Chairman)*
Henry County, Board of Supervisors (Debra Buchanan, Vice Chair)
Henry County, County Administrator (Tim Hall)**
Henry County, Attorney (George Lyle)**

* The Company will provide access to an electronic copy of the Application and related materials to these officials or agencies.
** The Company will distribute a hard copy of the Application and related materials to these officials.

D. If the application is for a transmission line with a voltage of 138 kV or greater, provide a statement and any associated correspondence indicating that prior to the filing of the application with the SCC the Applicant has notified the chief administrative officer of every locality in which it plans to undertake construction of the proposed line of its intention to file such an application, and that the Applicant gave the locality a reasonable opportunity for consultation about the proposed line (similar to the requirements of § 15.2-2202 of the Code for electric transmission lines of 150 kV or more).

Response:
As detailed in Section III.B, the Company met with Henry County staff and updated local officials during the Project. The Company initially met in-person with the County Administrator and Director of Planning, Zoning, and Inspections on September 18, 2019 to introduce the Project and obtain information to aid the route planning process. The local officials were advised at that time of the Company's plans to file an application with the SCC for approval of the Project and were continually updated throughout the Project, most recently in November 2021. No concerns for the Project were noted by local staff in these discussions.

EXHIBIT 1: PROJECT AREA MAP



- Existing AEP Substation
- Existing AEP Structure
- Fieldale-Dan River 138 kV Rebuild on Existing Centerline
- Fieldale-Dan River 138 kV Rebuild on New ROW Parallel to the Existing Centerline
- Fieldale-Dan River 138 kV to be Reconductored
- Existing AEP Transmission Line (69 kV or lower)
- Existing AEP Transmission Line (115-230 kV)
- Existing AEP Transmission Line (345 kV +)
- Highway
- Railroad
- Smith River
- Town/City Limits
- County/State Boundary

Henry County, Virginia

Author: jhumiston
Project: 159105

NAD 1983 State Plane Virginia South FIPS 4502 Feet
Lambert Conformal Conic
North American 1983

October 29, 2021

Exhibit 1: Project Overview

Fieldale to Ridgeway 138 kV Rebuild Project
PUR-2021-00219

0 1.5 3
Miles

EXHIBIT 2: AEP TRANSMISSION PLANNING CRITERIA AND GUIDELINES FOR END-OF-LIFE AND OTHER ASSET MANAGEMENT NEEDS

AEP Transmission Planning Criteria and Guidelines for End-Of-Life and Other Asset Management Needs

December 2020

Document Control

Document Review and Approval

Action	Name(s)	Title
Prepared by:	Jomar M. Perez	Manager, Asset Performance and Renewal
Approved by:	Nicolas Koehler	Director, East Transmission Planning
Approved by:	Wayman L. Smith	Director, West Transmission Planning
Approved by:	Kamran Ali	Managing Director, Transmission Planning

Review Cycle

Quarterly	Semi-annual	Annual	As Needed
			X

Revision History

Version	Revision Date	Changes	Comments
1.0	01/04/2017	N/A	1st Release
2.0	1/18/2018	Format Update	2nd Release
3.0	11/09/2018	Content Additions	3rd Release
4.0	12/14/2020	End-Of-Life Criteria	4th Release

Table of Contents

1.0 Introduction

The American Electric Power (AEP) transmission system consists today of approximately 40,000 miles of transmission lines, 3,600 stations, 5,000 power transformers, 8,000 circuit breakers, and operating voltages between 23 kV and 765 kV in three different RTOs – the Electric Reliability Council of Texas (ERCOT), the PJM Interconnection (PJM), and the Southwest Power Pool (SPP), connecting over 30 different electric utilities while providing service to over 5.4 million customers in 11 different states.

AEP's interconnected transmission system was established in 1911 and is comprised of a very large and diverse combination of line, station, and telecommunication assets, each with its own unique installation date, design specifications, and operating history. As the transmission owner, it is AEP's obligation and responsibility to manage and maintain this diverse set of assets to provide for a safe, adequate, reliable, flexible, efficient, cost-effective and resilient transmission system that meets the needs of all customers while complying with Federal, State, RTO and industry standards. This requires, among other considerations, that AEP determine when the useful life of these transmission assets is coming to an end and when the capability of those assets no longer meets current needs, so that appropriate improvements can be deployed. AEP refers to these issues as transmission owner identified needs that address condition, performance and risk. AEP identifies these needs through the transmission planning criteria and guidelines outlined in this document. Specifically, this document constitutes the AEP transmission planning criteria and guidelines for End-Of-Life and other asset management needs as required in the FERC-approved Attachment M-3 to the PJM Tariff. AEP does not address any End-Of-Life or other asset management needs through the baseline planning criteria AEP files with its FERC Form 715.

AEP's transmission owner identified needs must be addressed to achieve AEP's obligations and responsibilities. Meeting these obligations requires that AEP ensures the transmission system can deliver electricity to all points of consumption in the quantity and quality expected by customers, while reducing the magnitude and duration of disruptive events. Given these considerations, criteria and guidelines are necessary to identify and quantify needs associated with transmission facilities comprising AEP's system. AEP identifies the needs and the solutions necessary to address those needs on a continuous basis using an in-depth understanding of the condition of its assets, and their

associated operational performance and risk, while exercising engineering judgment coupled with Good Utility Practices [1].

Whereas the End-Of-Life needs, as defined in the FERC-approved Attachment M-3 to the PJM Tariff, are limited to transmission facilities rated above 100 kV, these criteria and guidelines apply to all transmission voltages that comprise the AEP transmission system, including those defined as End-Of-Life needs in the FERC-approved Attachment M-3 to the PJM Tariff. In addition, projections of candidate End-Of-Life needs that result from the process outlined in these AEP criteria and guidelines will be provided to PJM in accordance with the provisions in the FERC-approved Attachment M-3 to the PJM Tariff. Current End-Of-Life and other asset management needs will be vetted with stakeholders in accordance with the provisions in the FERC-approved Attachment M-3 to the PJM Tariff.

Addressing these owner identified transmission system asset management needs, as they pertain to condition, performance and risk, will result in the following benefits to customers:

- Safe operation of the electric grid.
- Reduction in frequency of outage interruptions.
- Reduction in duration of outage interruptions.
- Improvement in service reliability and adequacy to customers.
- Reduction of risk of service disruptions (improved resilience) associated with man-made and environmental threats.
- Proactive correction of reliability constraints that stem from asset failures.
- Effective utilization of resources to provide efficient and cost-effective service to customers.

2.0 Process Overview

AEP's transmission owner needs identification criteria and guidelines are used for projects that address equipment material conditions, performance, and risk. AEP uses the three-step process shown in Figure 1 and discussed in detail in this document to determine the best solutions to address the transmission owner identified needs and meet AEP's obligations and responsibilities. This process is completed on an annual basis. In developing the most efficient and cost-effective solutions, AEP's long-term strategy is to pursue holistic transmission solutions in order to reduce the overall AEP transmission system needs.

Figure 1 – AEP Process for Identifying and Addressing Transmission Asset Condition, Performance and Risk Needs

3.0 Step 1: Needs Identification

Needs Identification is the first step in the process of determining system and asset improvements that help meet AEP's obligations and responsibilities. AEP gathers information from many internal and external sources to identify assets with needs. A collective evaluation of these inputs is conducted and considered, and thus, individual thresholds do not apply. In addition, factors can change over time. A sampling of the inputs and data sources is listed below in Table 1.

Table 1 – Inputs Considered by AEP to Identify Transmission System Needs

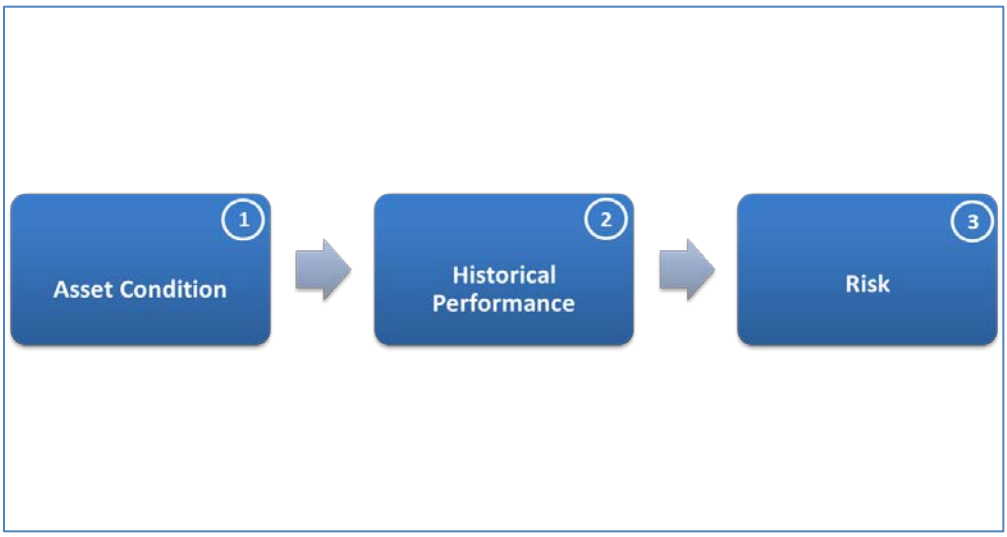
Internal, External, or Both	Inputs	Examples
Internal	Reports on asset conditions	Transmission line and station equipment deterioration identified during routine inspections (pole rot, steel rusting or cracking)
	Capabilities and abnormal conditions	Relay misoperations; Voltage unbalance
	Legacy system configurations	Ground switch protection schemes for transformers;; Transmission Line Taps without switches (hard taps); Equipment without vendor support
	Outage duration and frequency	Outages resulting from equipment failures, misoperations, or inadequate lightning protection
	Operations and maintenance costs	Costs to operate and maintain equipment
External	Regional Transmission Operator (RTO) or Independent System Operator (ISO) issued notices	Post Contingency Local Load Relief Warnings (PCLLRWs) issued by the RTO that can lead to customer load impacts
	Stakeholder input	Input received through stakeholder meetings, such as PJM's Sub Regional RTEP Committee (SRRTEP) meetings or through the AEP hosted Annual Stakeholder Summits
	Customer feedback	Voltage sag issues to customer delivery points due to poor sectionalizing; frequent outages to facilities directly affecting customers
	State and Federal policies, standards, or guidelines	NERC standards for dynamic disturbance recording
Both	Environmental and community impacts	Equipment oil/gas leaks; facilities currently installed at or near national parks, national forests, or metropolitan areas
	Standards and Guidelines	Minimum Design Standards, Radial Lines, Three Terminal Lines, Overlapping Zones of Protection
	Safety risks and concerns	Station and Line equipment that does not meet ground clearances; Facilities identified as being in flood zones; New Occupational Safety and Hazards Administration (OSHA) regulations

These inputs are reviewed and analyzed to identify the transmission assets that are exhibiting unacceptable condition, performance and risk, and thus, must be addressed through the FERC-approved Attachment M-3 planning process.

3.1 Methodology and Process Overview

The AEP transmission system is composed of a very large number of assets that provide specific functionality and must work in conjunction with each other in the operation of the grid. These assets have been deployed over a long period of time using engineering principles, design standards, safety codes, and Good Utility Practices that were applicable at the time of installation and have been exposed to varying operating conditions over their life. The Needs Identification methodology is shown below in Figure 2. AEP addresses the identified needs considering factors including severity of the asset condition and overall system impacts. These are subsequently evaluated versus constraints such as outage availability, siting requirements, availability of labor and material, constructability, and available capital funding in determining the timing and scope of mitigation.

Figure 2 – Needs Identification Methodology



It is AEP's strategy and goal to develop and provide the more efficient, cost-effective, safe, reliable, resilient, and holistic long-term solutions for the identified needs.

3.2 Asset Condition (Factor 1)

The Asset Condition assessment gathers a standard set of physical characteristics associated with an asset or a group of assets. The set of data points recorded is determined based on the asset type and class. Information assembled during the Asset Condition assessment is used to show the historical

deterioration, current condition, and future expectation of the asset or group of assets on the AEP system.

AEP annually assembles a list of reported condition issues for all of its assets in its system. A detailed follow-up review is conducted to determine if a transmission asset is in need of upgrade and/or replacement. Additionally, this Asset Condition review is used to determine an adequate scope of work required to mitigate the risk associated with a facility's performance and its identified issues. This level of risk is determined through the Future Risk assessment (Factor 3).

Beyond physical condition, AEP's ability to restore the asset in case of a failure is also considered. This is referred to as the future probability of failure adder. Typically, assets that are no longer supported by manufacturers or lack available spare parts are assigned a higher probability of failure adder.

To perform condition assessments, AEP classifies its Transmission assets in two main categories: Transmission Lines and Substations.

3.2.1 Transmission Line Considerations

Design Portion

A. Age (Original Installation Date)
B. Structure Type (Wood, Steel, Lattice)
C. Conductor Type (Size, Material & Stranding)
D. Static Wire Type (Size & Material)
E. Foundation Type (Grillage, Direct Embed, Caisson, Guyed V, Drilled Pier etc.)
F. Insulator Type (Material)
G. Shielding and Grounding Design Criteria (Ground Rod, Counterpoise, "Butt Wrap" etc.)
H. Electrical Configuration
    a. Three Terminal Lines
    b. Radial Facilities
I. NESC Standards Compliance
    a. Structural Strength (NESC 250B, 250C & 250D Compliance)
    b. Clearances (TLES-047 Compliance)

J. Easement Adequacy (Width, Encroachments, Type; etc.)

Physical Condition

A. Open Conditions (existing and unaddressed physical conditions associated with a Transmission Line component)
B. Closed Conditions (previously addressed physical conditions associated with a Transmission Line component)
C. Emergency Fixes (History of emergency fixes)
D. Accessibility (Identified areas of difficult access)

3.2.2 Substation Considerations

A. Transformers
    a. Manufacturer
    b. Manufacturing Date
    c. In Service Date
    d. Load Tap Changer Type & Operation History (if applicable)
    e. Dissolved Gas Analysis
    f. Bushing Power Factor
    g. Through Fault Events (Duval Triangles)
    h. Moisture Content (Oil)
    i. Oil Interfacial Tension
    j. Dielectric Strength
    k. Maintenance History
    l. Malfunction Records

B. Circuit Breakers
    a. Manufacturer & Type
    b. Manufacturing Date
    c. In Service Date
    d. Interrupting Medium
    e. Fault Operations
    f. Switched Operations

g. Spare Part Availability
h. Maintenance History
i. Malfunction Records
j. Breaker Type Population

C. Secondary/Auxiliary Substation Equipment*

a. Station Batteries
b. Control House
c. Station Security
d. Station Structures
e. Capacitor Banks
f. Bus, Cable and Insulators
g. Disconnect Switches
h. Station Configuration
i. Station Service
j. Relay Types
k. RTU Types
l. Voltage Sensing Devices

**AEP substation inspections include assessments of secondary/ancillary equipment. If needed, upgrades to these components are typically included in the scope of projects addressing major equipment and may not necessarily drive stand-alone projects.*

3.3 Historical Performance (Factor 2)

AEP's Historical Performance assessment quantifies how an asset or a group of assets has historically impacted the Transmission system's reliability and Transmission connected customers, helps identify the primary contributing factors to a facility's performance, and baselines the outage probability used in our Future Risk analysis. The metrics used as part of this historical performance assessment include:

A. Forced Outage Rates
B. Manual Outage Rates
C. Outage Durations (Forced Outage Duration in Hours)
D. System Average Interruption Indices (T-SAIDI, T-SAIFI, T-SAIFI-S, T-MAIFI)

E. Customer Minutes of Interruption (CMI)

F. Customer Average Interruption Indices (IEEE SAIDI, CAIDI & SAIFI)

G. Number of Customers Interrupted (CI)

AEP utilizes this standard set of metrics as a means to quantify the historical performance of an asset. These historical performance metrics allow AEP to further investigate assets that have historically impacted customers the most.

Due to the vast size of the AEP operating territory covering 11 states, AEP segments its needs into seven distinct operating company regions and six voltage classes. This segmentation ensures that variations in geography with respect to vegetation, weather patterns, and terrain can be accounted for within the process of identifying needs for each operating company area. In addition to customers of AEP operating companies, consideration for retail customers that are served at non-AEP wholesale customer service points is also included. In order to account for customers served behind wholesale meter points, AEP gathers information from the parent wholesale provider or in its absence, applies a surrogate customers per MW ratio to estimate the number of customers served by a wholesale power provider's delivery point. This customer count is used to calculate the individual metrics above.

AEP's standard approach is to annually review the historical performance of its assets based on a rolling three-year average, but in some cases AEP may extend the review period beyond three years. AEP classifies all transmission asset outage causes into the following five categories to conduct this review: Transmission Line Component Failure, Substation Component Failure, Vegetation (AEP), Vegetation (Non-AEP), and External Factors. Each transmission asset and its associated performance is quantified and compared against corresponding system totals to determine its percentage contribution to aggregated system performance. An evaluation of outage rates is also performed for Transmission line assets. The observed performance of the assets in any of these categories can point to a need that may need to be addressed.

3.4 Future Risk (Factor 3)

AEP reviews the associated risk exposure (future risk) inherent with each identified asset to determine an asset's level of risk. This risk exposure is quantified assuming the probability of an outage scenario

and is based on the reported condition of the asset and the severity of that condition and what the impact could be to customers or to the operation of AEP's Transmission system. Some of the key items to assess these impacts included in the risk criteria are:

A. Number of Customers Served
B. Load Served
C. Operational Risks
    a. Post Contingency Load Loss Relief Warnings (PCLLRW's)
    b. History of Load Shed Events
    c. Stations in Black Start Paths

In addition to the future risk calculation performed through this process, AEP is systematically reviewing its system to identify and remediate equipment and practices that have resulted in operational, restoration, environmental, or safety issues in the past that cannot be directly quantified, but that remain as acknowledged risks in the AEP Transmission system. These include:

A. Wood pole construction
B. Pilot wire protection schemes
C. Oil circuit breakers
D. Air Blast circuit breakers
E. Pipe type oil filled cables
F. Electromechanical relays
G. Legacy system configurations
    a. Missing or inadequate line switches (e.g., hard-taps)
    b. Missing or inadequate transformer/bus protection
    c. Three-terminal lines
    d. Overlapping zones of protection
H. Non-Standard Voltage Classes
I. Poor Lightning & Grounding Performance
J. Radial Facilities
K. Public vulnerability

These items as described above are reviewed on a case by case basis and considered when holistic system solutions are being developed.

4.0 Step 2: Solution Development

The development of solutions for the identified needs considers a holistic view of all of the needs in which several solution options are developed and scoped. AEP applies the appropriate industry standards, engineering judgment, and Good Utility Practices to develop these solution options. AEP solicits customer and external stakeholder input on potential solutions through the Annual Stakeholder Summits hosted by AEP and also through the PJM Project Submission process. This ensures that input from external stakeholders on identified needs can be received and considered as part of the solution development process.

Solution options consider many factors including, but not limited to, environmental conditions, community impacts, land availability, permitting requirements, customer needs, system needs, and asset conditions in ultimately identifying the best solution to address the identified need. Once the selected solution for a need or group of needs is defined, it is reviewed using the current RTO provided power-flow, short circuit, and stability system models (as needed) to ensure that the proposed solution does not adversely impact or create baseline planning criteria violations on the transmission grid. Finally, AEP reviews its existing portfolio of baseline planning criteria driven reliability projects and evaluates opportunities to combine or complement existing baseline planning criteria driven reliability projects with the transmission owner needs driven solutions developed through this process. This step ultimately results in the implementation of the more efficient, cost-effective, and holistic long-term solutions. Stand-alone projects are created to implement the proposed solution where transmission owner needs driven solutions cannot be integrated into existing projects.

5.0 Step 3: Solution Scheduling

Once solutions are developed to address the identified needs, the scheduling of the solutions will take place. As mentioned in the previous section, if opportunities exist to combine or complement existing baseline planning criteria driven reliability projects with the needs driven solutions developed

through this process, the scheduling will be aligned to the extent possible. In all other situations, AEP will schedule the implementation of the identified solutions in consideration of various factors including severity of the asset condition, overall system impacts, outage availability, siting requirements, availability of labor and material, constructability, and available capital funding. AEP uses its discretion and engineering judgment to determine suitable timelines for project execution.

6.0 Conclusion

This document outlines AEP's criteria and guidelines for transmission owner identified needs that address equipment material conditions, performance, and risk. It outlines the sources and methods considered by AEP to identify assets with needs on a continuous basis and it outlines how solutions are developed and scheduled. AEP will review and modify these criteria and guidelines as appropriate based upon our continuing experience with the methodology, acquisition of data sources, deployment of improved performance statistics and the receipt of stakeholder input in order to provide a safe, adequate, reliable, flexible, efficient, cost-effective and resilient transmission system that meets the evolving needs of all of the customers it serves.

7.0 References

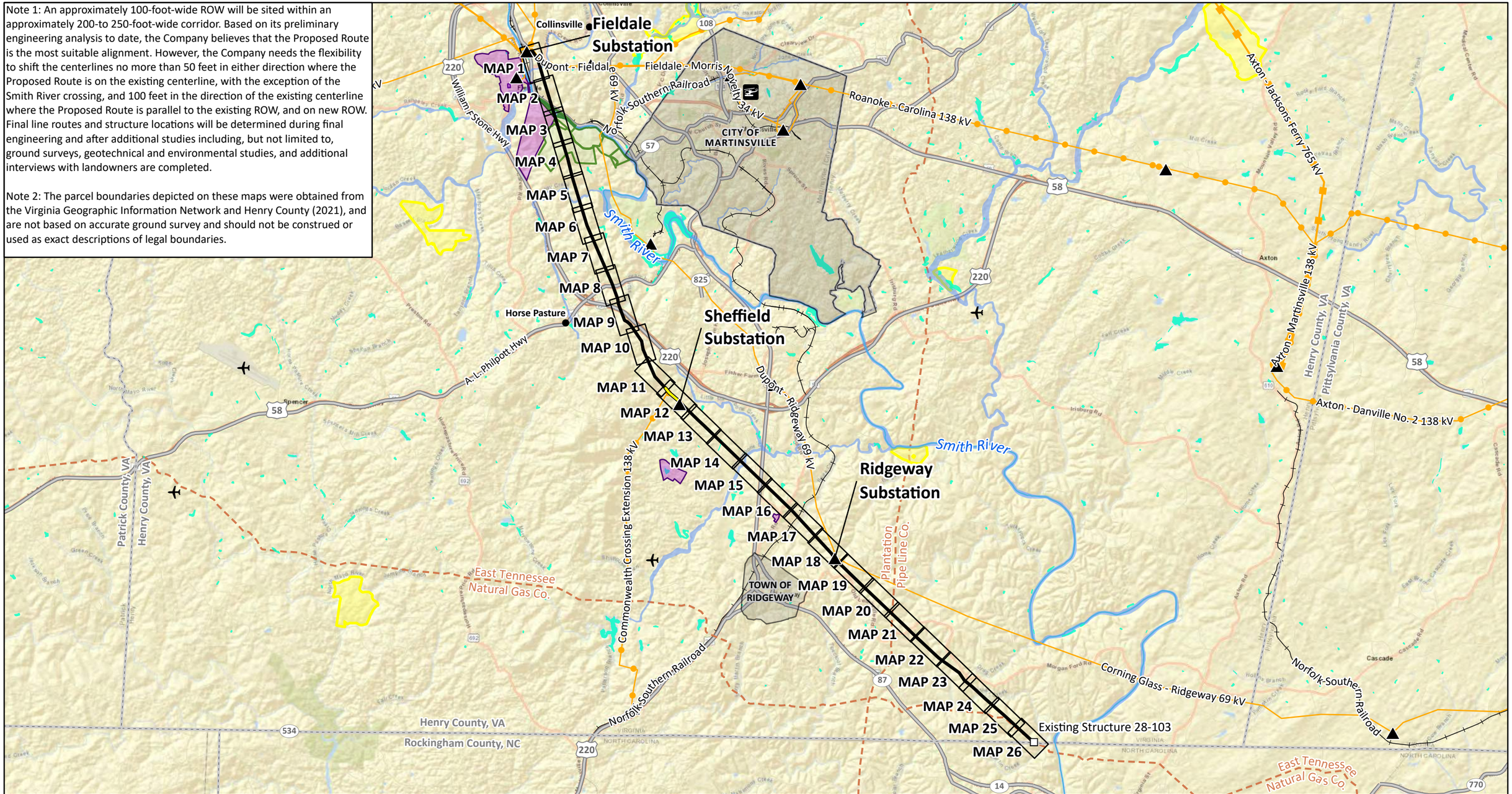
[1] FERC Pro Forma Open Access Transmission Tariff, Section 1.14, Definition of "Good Utility Practice".
Link: https://www.ferc.gov/legal/maj-ord-reg/land-docs/rm95-8-0aa.txt

[2] AEP Transmission Planning Documents and Transmission Guidelines.
Link: http://www.aep.com/about/codeofconduct/OASIS/TransmissionStudies/

EXHIBIT 3: GIS CONSTRAINTS MAP

Note 1: An approximately 100-foot-wide ROW will be sited within an approximately 200-to 250-foot-wide corridor. Based on its preliminary engineering analysis to date, the Company believes that the Proposed Route is the most suitable alignment. However, the Company needs the flexibility to shift the centerlines no more than 50 feet in either direction where the Proposed Route is on the existing centerline, with the exception of the Smith River crossing, and 100 feet in the direction of the existing centerline where the Proposed Route is parallel to the existing ROW, and on new ROW. Final line routes and structure locations will be determined during final engineering and after additional studies including, but not limited to, ground surveys, geotechnical and environmental studies, and additional interviews with landowners are completed.

Note 2: The parcel boundaries depicted on these maps were obtained from the Virginia Geographic Information Network and Henry County (2021), and are not based on accurate ground survey and should not be construed or used as exact descriptions of legal boundaries.



- Existing AEP Substation
- Fieldale-Dan River 138 kV Line Proposed Route
- 138 kV to be Reconductored
- Existing AEP Transmission Line (69 kV or lower)
- Existing AEP Transmission Line (115-230 kV)
- Existing AEP Transmission Line (345 kV +)
- Airport
- Helipad
- Pipeline
- Railroad
- Highway
- Stream (NHD)
- NWI Wetland
- 100-year Floodplain
- Fieldale Trail and River Access Easement
- NRHP Resource (Eligible and Listing)
- VOF-Easement
- Town/City Limits
- County/State Boundary
- Map Tile

Henry County, Virginia

NAD 1983 State Plane Virginia South FIPS 4502 Feet
Lambert Conformal Conic
North American 1983

November 16, 2021

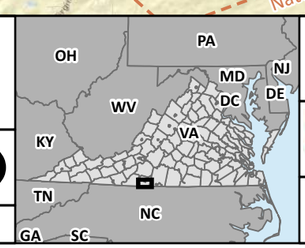


Exhibit 3: GIS Constraints Map INDEX

APPALACHIAN POWER

Fieldale to Ridgeway 138 kV Rebuild Project

0 1.5 3
Miles

See Notes 1 and 2 on Index Map.

Ex. Str. 28-1
Ex. Height 50'

Ex. Str. 28-2
Ex. Height 54'

Ex. Str. 28-3
Ex. Height 65'

Ex. Str. 28-4
Ex. Height 62'

Prop. Str. 28-1A
Prop. Height 64'

Prop. Str. 28-2A
Prop. Height 82'

Prop. Str. 28-3A
Prop. Height 82'

Roanoke - Carolina 138 kV

Dupont - Fieldale 69 kV

Fieldale - West Bassett No. 1 69 kV

Fieldale - Morris Novelty 34 kV

Fieldale - Stuart 69 kV

Fieldale - West Bassett No. 2 69 kV

Fieldale - Fieldcrest Mills 69 kV

Fieldale Substation

57

APPALACHIAN DR

LONGVIEW DR

DANIELS CREEK RD

Norfolk Southern Railroad

Norfolk Southern Railroad

Smith River

Daniels Creek

Fieldale

MAP 2

Existing Structures: 28-1 to 28-4
Proposed Structures: 28-1A to 28-3A

- Existing AEP Substation
- Proposed AEP Structure
- Existing AEP Structure to be Removed
- Fieldale-Dan River 138 kV Line Proposed Route
- Railroad
- State Route
- Road
- River (NHD)
- Stream (NHD)
- NWI Wetland
- Floodplain (FEMA)
- NRHP Resource (Eligible and Listing)
- Proposed ROW (100')
- Filing Corridor
- Parcel Boundary (within Filing Corridor)
- Map Tile

Henry County, Virginia

NAD 1983 State Plane Virginia South
FIPS 4502 Feet
Lambert Conformal Conic
North American 1983

November 17, 2021

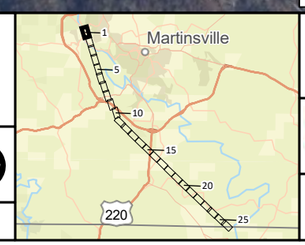


Exhibit 3: GIS Constraints Map
Map 1 of 26
Proposed Route

APPALACHIAN POWER

Fieldale to Ridgeway 138 kV Rebuild Project

0 200 400
Feet

See Notes 1 and 2 on Index Map.

Note 3: The Expanded Corridor will afford the Company the flexibility for further discussions with affected landowners, additional engineering, and the increased ROW width at the Smith River.

Existing Structures: 28-5 to 28-7
Proposed Structures: 28-4A to 28-6A

- Proposed AEP Structure
- Existing AEP Structure to be Removed
- Fieldale-Dan River 138 kV Line Proposed Route
- Residential Structure (within Filing Corridor)
- Nonresidential Structure (within Filing Corridor)
- Railroad
- State Route
- Road
- River (NHD)
- Stream (NHD)
- Floodplain (FEMA)
- Fieldale Trail and River Access Easement
- NRHP Resource (Eligible and Listing)
- Proposed ROW (100')
- Filing Corridor
- Parcel Boundary (within Filing Corridor)
- Map Tile

Henry County, Virginia

NAD 1983 State Plane Virginia South
FIPS 4502 Feet
Lambert Conformal Conic
North American 1983

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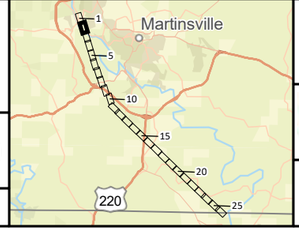

Exhibit 3: GIS Constraints Map
Map 2 of 26
Proposed Route

APPALACHIAN POWER

Fieldale to Ridgeway 138 kV Rebuild Project

0 200 400
Feet

See Notes 1 and 2 on Index Map.

Note 3: The Expanded Corridor will afford the Company the flexibility for further discussions with affected landowners, additional engineering, and the increased ROW width at the Smith River.

Existing Structures: 28-8 to 28-10
Proposed Structures: 28-7A to 28-9A

- Proposed AEP Structure
- Existing AEP Structure to be Removed
- Fieldale-Dan River 138 kV Line Proposed Route
- Railroad
- State Route
- Road
- River (NHD)
- Stream (NHD)
- Waterbody (NHD)
- Floodplain (FEMA)
- Fieldale Trail and River Access Easement
- NRHP Resource (Eligible and Listing)
- Proposed ROW (100')
- Filing Corridor
- Parcel Boundary (within Filing Corridor)
- Map Tile

Henry County, Virginia

NAD 1983 State Plane Virginia South FIPS 4502 Feet
Lambert Conformal Conic
North American 1983

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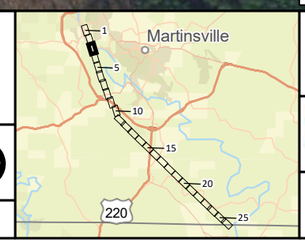


Exhibit 3: GIS Constraints Map
Map 3 of 26
Proposed Route

APPALACHIAN POWER

Fieldale to Ridgeway 138 kV Rebuild Project

0 200 400
Feet

See Notes 1 and 2 on Index Map.

Ex. Str. 28-10
Ex. Height 51'

Ex. Str. 28-11
Ex. Height 56'

Ex. Str. 28-12
Ex. Height 62'

MAP 3

MAP 5

Prop. Str. 28-9A
Prop. Height 55'

Prop. Str. 28-10A
Prop. Height 73'

Fieldale Trail
and River
Access Easement

Prop. Str. 28-11A
Prop. Height 73'

Prop. Str. 28-12A
Prop. Height 68'

Existing Structures: 28-10 to 28-12
Proposed Structures: 28-9A to 28-12A

- Proposed AEP Structure
- Existing AEP Structure to be Removed
- Existing Transmission Line to be Retired
- Fieldale-Dan River 138 kV Line Proposed Route
- Stream (NHD)
- Fieldale Trail and River Access Easement
- Proposed ROW (100')
- Filing Corridor
- Parcel Boundary (within Filing Corridor)
- Map Tile

Henry County,
Virginia

NAD 1983 State Plane Virginia South
FIPS 4502 Feet
Lambert Conformal Conic
North American 1983

November 17, 2021

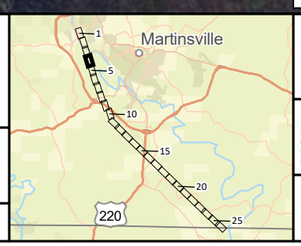


Exhibit 3: GIS Constraints Map
Map 4 of 26
Proposed Route

APPALACHIAN POWER

Fieldale to Ridgeway 138 kV Rebuild Project

0 200 400
Feet

See Notes 1 and 2 on Index Map.

MAP 4

MAP 6

Ex. Str. 28-13
Ex. Height 70'

Ex. Str. 28-14
Ex. Height 52'

Ex. Str. 28-15
Ex. Height 50'

Ex. Str. 28-16
Ex. Height 54'

Ex. Str. 28-17
Ex. Height 51'

Prop. Str. 28-13A
Prop. Height 73'

Prop. Str. 28-14A
Prop. Height 64'

Prop. Str. 28-15A
Prop. Height 64'

Prop. Str. 28-16A
Prop. Height 82'

Grassy Creek

Existing Structures: 28-13 to 28-17
Proposed Structures: 28-13A to 28-16A

- Proposed AEP Structure
- Existing AEP Structure to be Removed
- Existing Transmission Line to be Retired
- Fieldale-Dan River 138 kV Line Proposed Route
- Stream (NHD)
- Floodplain (FEMA)
- Proposed ROW (100')
- Filing Corridor
- Parcel Boundary (within Filing Corridor)
- Map Tile

Henry County, Virginia

NAD 1983 State Plane Virginia South FIPS 4502 Feet
Lambert Conformal Conic
North American 1983

November 17, 2021

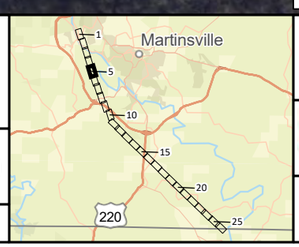


Exhibit 3: GIS Constraints Map
Map 5 of 26
Proposed Route

APPALACHIAN POWER

Fieldale to Ridgeway 138 kV Rebuild Project

0 200 400
Feet

See Notes 1 and 2 on Index Map.

Ex. Str. 28-17
Ex. Height 51'

Ex. Str. 28-18
Ex. Height 52'

Ex. Str. 28-19
Ex. Height 57'

Ex. Str. 28-20
Ex. Height 51'

Prop. Str. 28-16A
Prop. Height 82'

Prop. Str. 28-17A
Prop. Height 55'

Prop. Str. 28-18A
Prop. Height 64'

Prop. Str. 28-19A
Prop. Height 59'

MAP 5

MAP 7

Existing Structures: 28-17 to 28-20
Proposed Structures: 28-16A to 28-19A

- Proposed AEP Structure
- Existing AEP Structure to be Removed
- Existing Transmission Line to be Retired
- Fieldale-Dan River 138 kV Line Proposed Route
- Stream (NHD)
- Proposed ROW (100')
- Filing Corridor
- Parcel Boundary (within Filing Corridor)
- Map Tile

Henry County, Virginia

NAD 1983 State Plane Virginia South
FIPS 4502 Feet
Lambert Conformal Conic
North American 1983

November 17, 2021

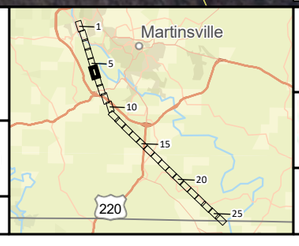


Exhibit 3: GIS Constraints Map
Map 6 of 26
Proposed Route

APPALACHIAN POWER

Fieldale to Ridgeway 138 kV Rebuild Project

0 200 400
Feet

See Notes 1 and 2 on Index Map.

Existing Structures: 28-20 to 28-24
Proposed Structures: 28-19A to 28-23A

- Proposed AEP Structure
- Existing AEP Structure to be Removed
- Existing Transmission Line to be Retired
- Fieldale-Dan River 138 kV Line Proposed Route
- Road
- Proposed ROW (100')
- Filing Corridor
- Parcel Boundary (within Filing Corridor)
- Map Tile

Henry County, Virginia

NAD 1983 State Plane Virginia South
FIPS 4502 Feet
Lambert Conformal Conic
North American 1983

November 17, 2021

Exhibit 3: GIS Constraints Map
Map 7 of 26
Proposed Route

APPALACHIAN POWER

Fieldale to Ridgeway 138 kV Rebuild Project

0 200 400
Feet

See Notes 1 and 2 on Index Map.

MAP 7

LOOKOUT MOUNTAIN RD

Ex. Str. 28-24
Ex. Height 51'

Ex. Str. 28-25
Ex. Height 47'

Ex. Str. 28-26
Ex. Height 51'

Ex. Str. 28-27
Ex. Height 69'

Prop. Str. 28-23A
Prop. Height 50'

Prop. Str. 28-24A
Prop. Height 50'

Prop. Str. 28-25A
Prop. Height 59'

Prop. Str. 28-26A
Prop. Height 59'

Prop. Str. 28-27A
Prop. Height 55'

Prop. Str. 28-28A
Prop. Height 59'

MAP 7

MAP 6

ALPHILPOTT HWY

58

Existing Structures: 28-24 to 28-27
Proposed Structures: 28-23A to 28-28A

- Proposed AEP Structure
- Existing AEP Structure to be Removed
- Existing Transmission Line to be Retired
- Fieldale-Dan River 138 kV Line Proposed Route
- U.S. Route
- Road
- Stream (NHD)
- Proposed ROW (100')
- Filing Corridor
- Parcel Boundary (within Filing Corridor)
- Map Tile

Henry County, Virginia

NAD 1983 State Plane Virginia South
FIPS 4502 Feet
Lambert Conformal Conic
North American 1983

November 17, 2021

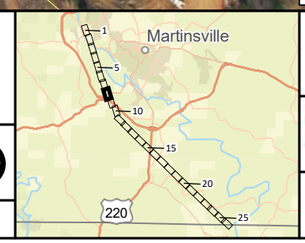


Exhibit 3: GIS Constraints Map
Map 8 of 26
Proposed Route

APPALACHIAN POWER

Fieldale to Ridgeway 138 kV Rebuild Project

0 200 400
Feet

See Notes 1 and 2 on Index Map.

Preston Branch
DUG MOUNTAIN RD
MAP 8
MAP 8
WILLIAM-F-STONE-HWY
220
MAP 10
CAMERON RD
PRESTON FARM RD
220

Ex. Str. 28-27
Ex. Height 69'

Ex. Str. 28A-27A
Ex. Height 60'

Ex. Str. 28A-28
Ex. Height 56'

Ex. Str. 28A-29
Ex. Height 49'

Prop. Str. 28-27A
Prop. Height 55'

Prop. Str. 28-28A
Prop. Height 59'

Prop. Str. 28-29A
Prop. Height 64'

Prop. Str. 28-30A
Prop. Height 64'

Prop. Str. 28-31A
Prop. Height 77'

Prop. Str. 28-32A
Prop. Height 64'

Existing Structures: 28-27 to 28A-27A
Proposed Structures: 28-27A to 28-32A

- Proposed AEP Structure
- Existing Collocation Structure
- Existing AEP Structure to be Removed
- Existing Transmission Line to be Retired
- Fieldale-Dan River 138 kV Line Proposed Route
- U.S. Route
- Road
- Stream (NHD)
- Proposed ROW (100')
- Filing Corridor
- Parcel Boundary (within Filing Corridor)
- Map Tile

Henry County, Virginia

NAD 1983 State Plane Virginia South FIPS 4502 Feet
Lambert Conformal Conic
North American 1983

November 17, 2021

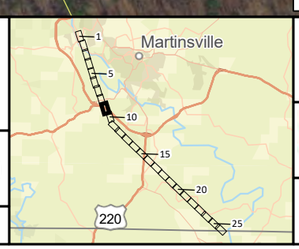


Exhibit 3: GIS Constraints Map
Map 9 of 26
Proposed Route

APPALACHIAN POWER

Fieldale to Ridgeway 138 kV Rebuild Project

0 200 400
Feet

See Notes 1 and 2 on Index Map.

Note 3: The Expanded Corridor will afford the Company the flexibility for further discussions with affected landowners, additional engineering, and the increased ROW width at the Smith River.

Existing Structures: 28-30 to 28-33
Proposed Structures: 28-33A to 28-37A

- Proposed AEP Structure
- Existing AEP Structure to be Removed
- Existing Transmission Line to be Retired
- Fieldale-Dan River 138 kV Line Proposed Route
- Nonresidential Structure (within Filing Corridor)
- U.S. Route
- Road
- Stream (NHD)
- Proposed ROW (100')
- Filing Corridor
- Parcel Boundary (within Filing Corridor)
- Map Tile

Henry County, Virginia

NAD 1983 State Plane Virginia South
FIPS 4502 Feet
Lambert Conformal Conic
North American 1983

November 17, 2021

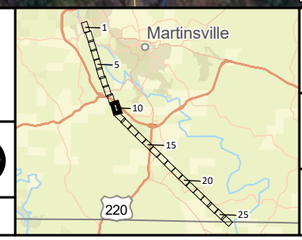


Exhibit 3: GIS Constraints Map
Map 10 of 26
Proposed Route

APPALACHIAN POWER

Fieldale to Ridgeway 138 kV Rebuild Project

0 200 400
Feet

See Notes 1 and 2 on Index Map.

Prop. Str. 28-38B
Prop. Height 59'

Prop. Str. 28-39B
Prop. Height 73'

Prop. Str. 28-40B
Prop. Height 73'

Prop. Str. 28-41A
Prop. Height 50'

Ex. Str. 28-34
Ex. Height 56'

Ex. Str. 28-35
Ex. Height 68'

Ex. Str. 28-36
Ex. Height 59'

Ex. Str. 28-37
Ex. Height 52'

Ex. Str. 28-38A
Ex. Height 64'
See Note 4

MAP 10

MAP 12

City of Danville Pinnacles Hydro - Danville 69 kV

Existing Structures: 28-34 to 28-38A
Proposed Structures: 28-38B to 28-41A

- Proposed AEP Structure
- Existing AEP Structure
- Existing AEP Structure to be Removed
- Existing Transmission Line to be Retired
- Fieldale-Dan River 138 kV Line Proposed Route
- 138 kV to be Reconductored
- Existing (City of Danville) Transmission Line (69 kV)
- Proposed ROW (100')
- Filing Corridor
- Parcel Boundary (within Filing Corridor)
- Map Tile

Henry County, Virginia

NAD 1983 State Plane Virginia South FIPS 4502 Feet
Lambert Conformal Conic
North American 1983

November 17, 2021

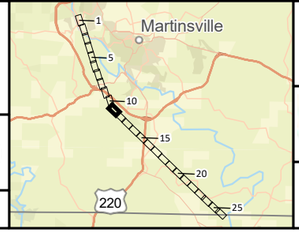


Exhibit 3: GIS Constraints Map
Map 11 of 26
Proposed Route

APPALACHIAN POWER

Fieldale to Ridgeway 138 kV Rebuild Project

0 200 400
Feet

See Notes 1 and 2 on Index Map.

Note 4: Existing structures 28-38A, 28-39A, and 28-40A were replaced in 2019 and were designed with enough capacity to allow new conductor and shield wire to be installed as part of this Project without replacing the structures.

Existing Structures: 28-38A to 28-42
Proposed Structures: 28-42A to 28-43A

- Existing AEP Substation
- Proposed AEP Structure
- Existing AEP Structure
- Existing AEP Structure to be Removed
- Existing Transmission Line to be Retired
- Fieldale-Dan River 138 kV Line Proposed Route
- 138 kV to be Reconductored
- Place of Worship
- Cemetery
- Stream (NHD)
- Proposed ROW (100')
- Filing Corridor
- Parcel Boundary (within Filing Corridor)
- Map Tile

Henry County, Virginia

NAD 1983 State Plane Virginia South FIPS 4502 Feet
Lambert Conformal Conic
North American 1983

November 17, 2021

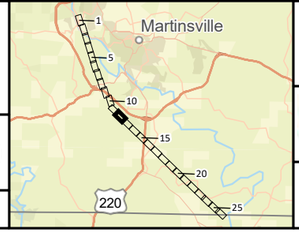


Exhibit 3: GIS Constraints Map
Map 12 of 26
Proposed Route

APPALACHIAN POWER

Fieldale to Ridgeway 138 kV Rebuild Project

0 200 400
Feet

See Notes 1 and 2 on Index Map.

Note 5: Three residences have encroached on the existing 100-foot-wide transmission line ROW between the Sheffield and Ridgeway substations. Based on preliminary engineering analysis, the Company expects the Project can be designed and constructed as to avoid the affected buildings in the conductor zone. Accordingly, and subject to completion of final engineering and ROW negotiations with affected landowners, the Company does not expect that any residences located within the ROW will need to be removed to accommodate the rebuilt line.

Existing Structures: 28-43 to 28-46
Proposed Structures: 28-44A to 28-47A

- Proposed AEP Structure
- Existing AEP Structure to be Removed
- Fieldale-Dan River 138 kV Line Proposed Route
- Residential Structure (within Filing Corridor)
- Residential Structure (within ROW)
- Nonresidential Structure (within Filing Corridor)
- Road
- Stream (NHD)
- Proposed ROW (100')
- Filing Corridor
- Parcel Boundary (within Filing Corridor)
- Map Tile

Henry County, Virginia

NAD 1983 State Plane Virginia South
FIPS 4502 Feet
Lambert Conformal Conic
North American 1983

November 17, 2021

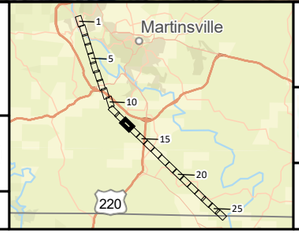
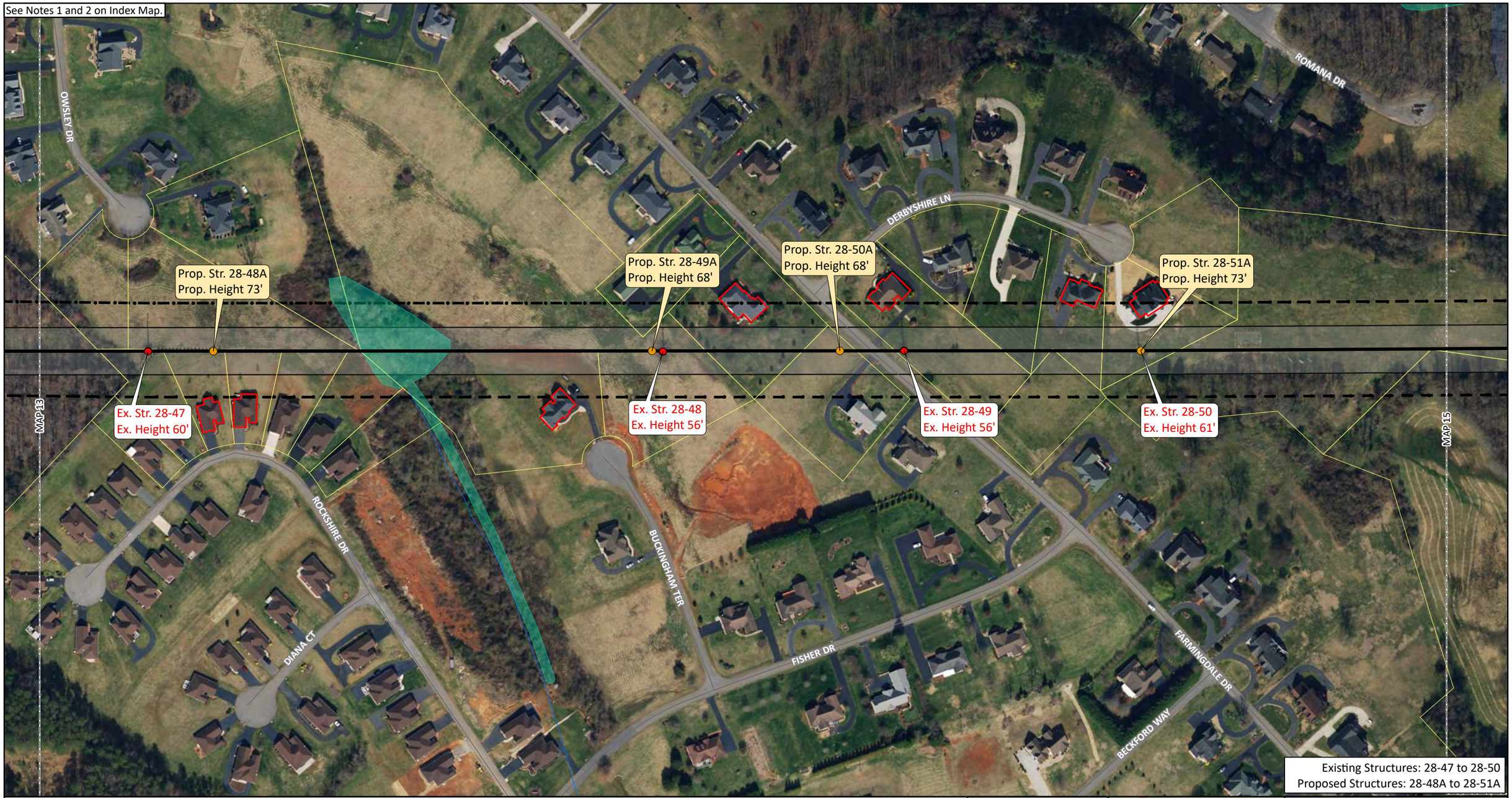


Exhibit 3: GIS Constraints Map
Map 13 of 26
Proposed Route

APPALACHIAN POWER

Fieldale to Ridgeway 138 kV Rebuild Project

0 200 400
Feet



- Proposed AEP Structure
- Existing AEP Structure to be Removed
- Fieldale-Dan River 138 kV Line Proposed Route
- Residential Structure (within Filing Corridor)
- Road
- Stream (NHD)
- NWI Wetland
- Floodplain (FEMA)
- Proposed ROW (100')
- Filing Corridor
- Parcel Boundary (within Filing Corridor)
- Map Tile

Henry County, Virginia

NAD 1983 State Plane Virginia South
FIPS 4502 Feet
Lambert Conformal Conic
North American 1983

November 17, 2021

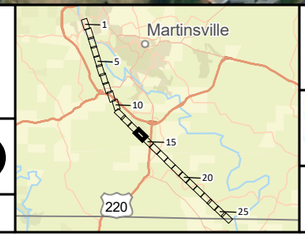


Exhibit 3: GIS Constraints Map
Map 14 of 26
Proposed Route

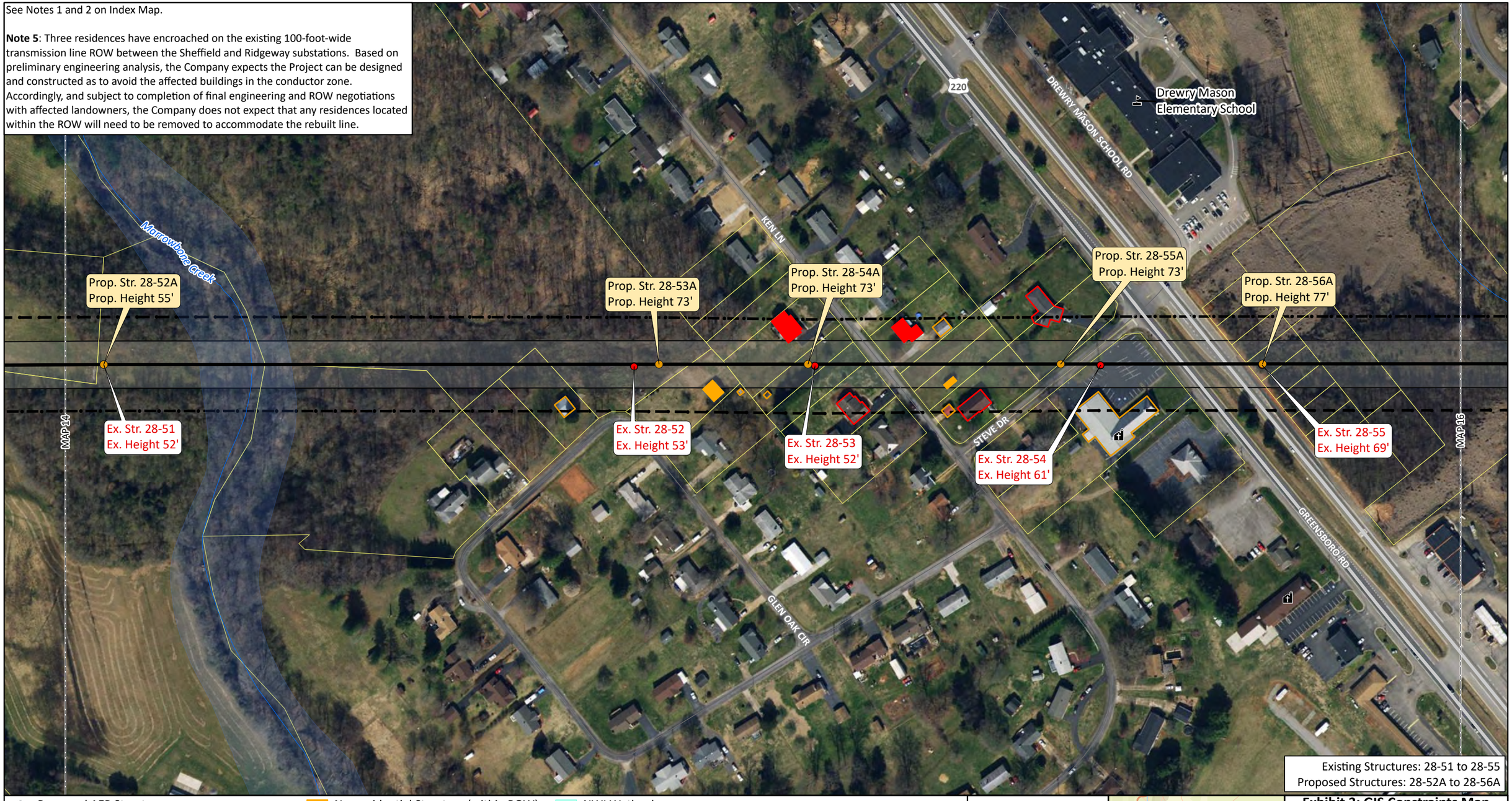
APPALACHIAN POWER

Fieldale to Ridgeway 138 kV Rebuild Project

0 200 400
Feet

See Notes 1 and 2 on Index Map.

Note 5: Three residences have encroached on the existing 100-foot-wide transmission line ROW between the Sheffield and Ridgeway substations. Based on preliminary engineering analysis, the Company expects the Project can be designed and constructed as to avoid the affected buildings in the conductor zone. Accordingly, and subject to completion of final engineering and ROW negotiations with affected landowners, the Company does not expect that any residences located within the ROW will need to be removed to accommodate the rebuilt line.



Existing Structures: 28-51 to 28-55
Proposed Structures: 28-52A to 28-56A

- Proposed AEP Structure
- Existing AEP Structure to be Removed
- Fieldale-Dan River 138 kV Line Proposed Route
- Residential Structure (within Filing Corridor)
- Residential Structure (within ROW)
- Nonresidential Structure (within Filing Corridor)
- Nonresidential Structure (within ROW)
- School
- Place of Worship
- U.S. Route
- Road
- Stream (NHD)
- NWI Wetland
- Floodplain (FEMA)
- Proposed ROW (100')
- Filing Corridor
- Parcel Boundary (within Filing Corridor)
- Map Tile

Henry County, Virginia

NAD 1983 State Plane Virginia South
FIPS 4502 Feet
Lambert Conformal Conic
North American 1983

November 17, 2021

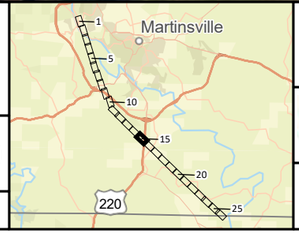


Exhibit 3: GIS Constraints Map
Map 15 of 26
Proposed Route

APPALACHIAN POWER

Fieldale to Ridgeway 138 kV Rebuild Project

0 200 400
Feet

Existing Structures: 28-57 to 28-60
Proposed Structures: 28-57A to 28-60A

- Proposed AEP Structure
- Existing AEP Structure to be Removed
- Fieldale-Dan River 138 kV Line Proposed Route
- Residential Structure (within Filing Corridor)
- Nonresidential Structure (within ROW)
- Place of Worship
- U.S. Route
- Road
- Stream (NHD)
- Proposed ROW (100')
- Filing Corridor
- Parcel Boundary (within Filing Corridor)
- Map Tile

Henry County, Virginia

NAD 1983 State Plane Virginia South
FIPS 4502 Feet
Lambert Conformal Conic
North American 1983

November 17, 2021

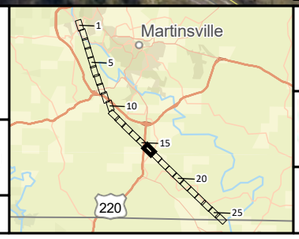


Exhibit 3: GIS Constraints Map
Map 16 of 26
Proposed Route

APPALACHIAN POWER

Fieldale to Ridgeway 138 kV Rebuild Project

0 200 400
Feet

Existing Structures: 28-61 to 28-64
Proposed Structures: 28-61A to 28-64A

- Proposed AEP Structure
- Existing AEP Structure to be Removed
- Fieldale-Dan River 138 kV Line Proposed Route
- Nonresidential Structure (within Filing Corridor)
- Railroad
- Road
- Stream (NHD)
- Proposed ROW (100')
- Filing Corridor
- Parcel Boundary (within Filing Corridor)
- Map Tile

Henry County, Virginia

NAD 1983 State Plane Virginia South
FIPS 4502 Feet
Lambert Conformal Conic
North American 1983

November 17, 2021

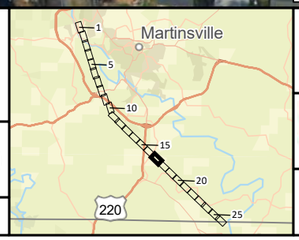


Exhibit 3: GIS Constraints Map
Map 17 of 26
Proposed Route

APPALACHIAN POWER

Fieldale to Ridgeway 138 kV Rebuild Project

0 200 400
Feet

See Notes 1 and 2 on Index Map.

Prop. Str. 28-65A
Prop. Height 64'

Prop. Str. 28-66A
Prop. Height 64'

Prop. Str. 28-67A
Prop. Height 55'

Prop. Str. 28-68A
Prop. Height 59'

Ex. Str. 28-65
Ex. Height 61'

Ex. Str. 28-66
Ex. Height 51'

Ex. Str. 28-67
Ex. Height 47'

Ex. Str. 28-68
Ex. Height 52'

Dupont - Ridgeway 69 kV

Corning Glass - Ridgeway 69 kV

OLD MILL RD

ROOSEVELT DR

MAP 17

MAP 19

Ridgeway Substation

Existing Structures: 28-65 to 28-68
Proposed Structures: 28-65A to 28-68A

- Existing AEP Substation
- Proposed AEP Structure
- Existing AEP Structure to be Removed
- Existing Transmission Line to be Retired
- Fieldale-Dan River 138 kV Line Proposed Route
- Cemetery
- Road
- Stream (NHD)
- Proposed ROW (100')
- Filing Corridor
- Parcel Boundary (within Filing Corridor)
- Map Tile

Henry County, Virginia

NAD 1983 State Plane Virginia South
FIPS 4502 Feet
Lambert Conformal Conic
North American 1983

November 17, 2021

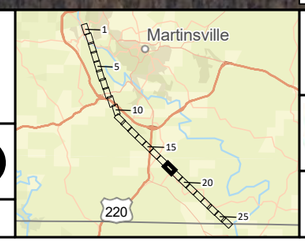


Exhibit 3: GIS Constraints Map
Map 18 of 26
Proposed Route

APPALACHIAN POWER

Fieldale to Ridgeway 138 kV Rebuild Project

0 200 400
Feet

See Notes 1 and 2 on Index Map.

Corning Glass - Ridgeway 69 kV

MITCHELL RD

MAP 18

MAP 20

Ex. Str. 28-70
Ex. Height 43'

Ex. Str. 28-71
Ex. Height 47'

Ex. Str. 28-72
Ex. Height 56'

Ex. Str. 28-73
Ex. Height 52'

Ex. Str. 28-74
Ex. Height 46'

Ex. Str. 28-75
Ex. Height 49'

Ex. Str. 28-76
Ex. Height 59'

Flanigan Branch

Prop. Str. 28-69A
Prop. Height 50'

Prop. Str. 28-70A
Prop. Height 59'

Prop. Str. 28-71A
Prop. Height 64'

Prop. Str. 28-72A
Prop. Height 64'

Prop. Str. 28-73A
Prop. Height 64'

Prop. Str. 28-74A
Prop. Height 68'

OLD LEAKSVILLE RD

OLD MILL RD

Existing Structures: 28-70 to 76
Proposed Structures: 28-69A to 28-74A

- Proposed AEP Structure
- Existing AEP Structure to be Removed
- Existing Transmission Line to be Retired
- Fieldale-Dan River 138 kV Line Proposed Route
- Residential Structure (within Filing Corridor)
- Nonresidential Structure (within Filing Corridor)
- Nonresidential Structure (within ROW)
- Road
- Stream (NHD)
- Proposed ROW (100')
- Filing Corridor
- Parcel Boundary (within Filing Corridor)
- Map Tile

Henry County, Virginia

NAD 1983 State Plane Virginia South FIPS 4502 Feet
Lambert Conformal Conic
North American 1983

November 17, 2021

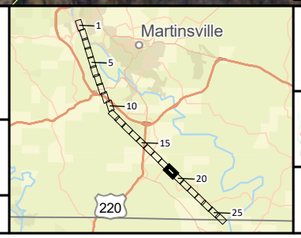


Exhibit 3: GIS Constraints Map
Map 19 of 26
Proposed Route

APPALACHIAN POWER

Fieldale to Ridgeway 138 kV Rebuild Project

0 200 400
Feet

See Notes 1 and 2 on Index Map.

MAP 19

MAP 21

FLANIGAN BRANCH RD

OLD LEAKSVILLE RD

Flanigan Branch

Plantation Pipe Line Co.

Ex. Str. 28-77
Ex. Height 61'

Ex. Str. 28-78
Ex. Height 65'

Ex. Str. 28-79
Ex. Height 65'

Prop. Str. 28-75A
Prop. Height 55'

Prop. Str. 28-76A
Prop. Height 64'

Prop. Str. 28-77A
Prop. Height 59'

Prop. Str. 28-78A
Prop. Height 55'

Prop. Str. 28-79A
Prop. Height 77'

Existing Structures: 28-77 to 28-79
Proposed Structures: 28-75A to 28-79A

- Proposed AEP Structure
- Existing AEP Structure to be Removed
- Existing Transmission Line to be Retired
- Fieldale-Dan River 138 kV Line Proposed Route
- Nonresidential Structure (within Filing Corridor)
- Nonresidential Structure (within ROW)
- Cemetery
- Road
- Stream (NHD)
- Proposed ROW (100')
- Filing Corridor
- Parcel Boundary (within Filing Corridor)
- Map Tile

Henry County, Virginia

NAD 1983 State Plane Virginia South FIPS 4502 Feet
Lambert Conformal Conic
North American 1983

November 17, 2021

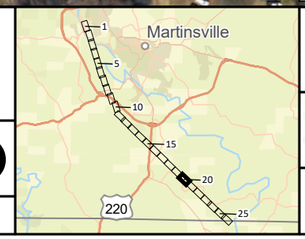


Exhibit 3: GIS Constraints Map
Map 20 of 26
Proposed Route

APPALACHIAN POWER

Fieldale to Ridgeway 138 kV Rebuild Project

0 200 400
Feet

See Notes 1 and 2 on Index Map.

Existing Structures: 28-80 to 28-83
Proposed Structures: 28-80A to 28-82A

- Proposed AEP Structure
- Existing AEP Structure to be Removed
- Existing Transmission Line to be Retired
- Fieldale-Dan River 138 kV Line Proposed Route
- Residential Structure (within Filing Corridor)
- Road
- Stream (NHD)
- Proposed ROW (100')
- Filing Corridor
- Parcel Boundary (within Filing Corridor)
- Map Tile

Henry County, Virginia

NAD 1983 State Plane Virginia South
FIPS 4502 Feet
Lambert Conformal Conic
North American 1983

November 17, 2021

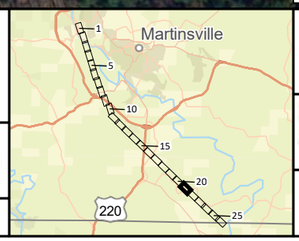


Exhibit 3: GIS Constraints Map
Map 21 of 26
Proposed Route

APPALACHIAN POWER

Fieldale to Ridgeway 138 kV Rebuild Project

0 200 400
Feet

See Notes 1 and 2 on Index Map.

MORGAN FORD RD

MAP 21

MAP 23

Ex. Str. 28-84
Ex. Height 56'

Ex. Str. 28-85
Ex. Height 52'

Ex. Str. 28-86
Ex. Height 52'

Ex. Str. 28-87
Ex. Height 47'

Prop. Str. 28-83A
Prop. Height 77'

Prop. Str. 28-84A
Prop. Height 73'

Prop. Str. 28-85A
Prop. Height 77'

Existing Structures: 28-84 to 28-87
Proposed Structures: 28-83A to 28-85A

- Proposed AEP Structure
- Existing AEP Structure to be Removed
- Existing Transmission Line to be Retired
- Fieldale-Dan River 138 kV Line Proposed Route
- Nonresidential Structure (within ROW)
- Cemetery
- Road
- Stream (NHD)
- Proposed ROW (100')
- Filing Corridor
- Parcel Boundary (within Filing Corridor)
- Map Tile

Henry County,
Virginia

NAD 1983 State Plane Virginia South
FIPS 4502 Feet
Lambert Conformal Conic
North American 1983

November 17, 2021

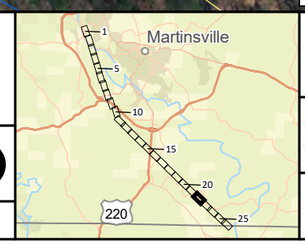


Exhibit 3: GIS Constraints Map
Map 22 of 26
Proposed Route

APPALACHIAN POWER

Fieldale to Ridgeway 138 kV Rebuild Project

0 200 400
Feet

See Notes 1 and 2 on Index Map.

Note 3: The Expanded Corridor will afford the Company the flexibility for further discussions with affected landowners, additional engineering, and the increased ROW width at the Smith River.

Existing Structures: 28-88 to 28-91
Proposed Structures: 28-86A to 28-90A

- Proposed AEP Structure
- Existing AEP Structure to be Removed
- Existing Transmission Line to be Retired
- Fieldale-Dan River 138 kV Line Proposed Route
- Nonresidential Structure (within Filing Corridor)
- Nonresidential Structure (within ROW)
- Cemetery
- Road
- Proposed ROW (100')
- Filing Corridor
- Parcel Boundary (within Filing Corridor)
- Map Tile

Henry County, Virginia

NAD 1983 State Plane Virginia South FIPS 4502 Feet
Lambert Conformal Conic
North American 1983

November 17, 2021

Exhibit 3: GIS Constraints Map
Map 23 of 26
Proposed Route

APPALACHIAN POWER

Fieldale to Ridgeway 138 kV Rebuild Project

0 200 400
Feet

See Notes 1 and 2 on Index Map.

MORGAN FORD RD

MAP 23

MAP 25

Stuart Creek

Prop. Str. 28-91A
Prop. Height 82'

Prop. Str. 28-92A
Prop. Height 59'

Prop. Str. 28-93A
Prop. Height 77'

Prop. Str. 28-94A
Prop. Height 68'

Ex. Str. 28-92
Ex. Height 63'

Ex. Str. 28-93
Ex. Height 56'

Ex. Str. 28-94
Ex. Height 56'

Ex. Str. 28-95
Ex. Height 47'

Existing Structures: 28-92 to 28-95
Proposed Structures: 28-91A to 28-94A

- Proposed AEP Structure
- Existing AEP Structure to be Removed
- Existing Transmission Line to be Retired
- Fieldale-Dan River 138 kV Line Proposed Route
- Road
- Stream (NHD)
- Proposed ROW (100')
- Filing Corridor
- Parcel Boundary (within Filing Corridor)
- Map Tile

Henry County, Virginia

NAD 1983 State Plane Virginia South
FIPS 4502 Feet
Lambert Conformal Conic
North American 1983

November 17, 2021

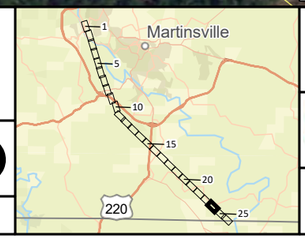


Exhibit 3: GIS Constraints Map
Map 24 of 26
Proposed Route

APPALACHIAN POWER

Fieldale to Ridgeway 138 kV Rebuild Project

0 200 400
Feet

See Notes 1 and 2 on Index Map.

Existing Structures: 28-96 to 28-100
Proposed Structures: 28-95A to 28-98A

- Proposed AEP Structure
- Existing AEP Structure to be Removed
- Existing Transmission Line to be Retired
- Fieldale-Dan River 138 kV Line Proposed Route
- Residential Structure (within Filing Corridor)
- Nonresidential Structure (within Filing Corridor)
- Nonresidential Structure (within ROW)
- Stream (NHD)
- Proposed ROW (100')
- Filing Corridor
- Parcel Boundary (within Filing Corridor)
- Map Tile

Henry County, Virginia

NAD 1983 State Plane Virginia South
FIPS 4502 Feet
Lambert Conformal Conic
North American 1983

November 17, 2021

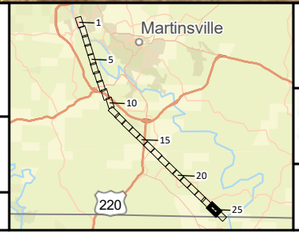


Exhibit 3: GIS Constraints Map
Map 25 of 26
Proposed Route

APPALACHIAN POWER

Fieldale to Ridgeway 138 kV Rebuild Project

0 200 400
Feet

- Proposed AEP Structure
- Existing AEP Structure to be Removed
- Existing Transmission Line to be Retired
- Fieldale-Dan River 138 kV Line Proposed Route
- Stream (NHD)
- Proposed ROW (100')
- Filing Corridor
- Parcel Boundary (within Filing Corridor)
- Map Tile
- County/State Boundary

Henry County,
Virginia

NAD 1983 State Plane Virginia South
FIPS 4502 Feet
Lambert Conformal Conic
North American 1983

November 17, 2021

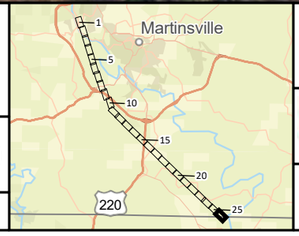


Exhibit 3: GIS Constraints Map
Map 26 of 26
Proposed Route

APPALACHIAN POWER

Fieldale to Ridgeway 138 kV Rebuild Project

0 200 400
Feet