March 7, 2016

Joel H. Peck, Clerk
State Corporation Commission
Document Control Center
Tyler Building
1300 East Main Street
Richmond, VA 23219


Dear Mr. Peck:

On behalf of Appalachian Power Company (the “Company”), I enclose for filing an original and fifteen copies of the Company’s two volume Application for approval and certification of the South Abingdon Extension 138 kV Transmission Line Project, including direct testimony, Response to Guidelines, Route Development Report, DEQ Supplement and related tables, exhibits, attachments and maps.

Under separate cover, we have delivered to the Commission Staff today a CD-ROM containing an electronic copy of the Application, direct testimony, Response to Guidelines, Route Development Report, DEQ Supplement, related tables, exhibits, attachments and maps (including the digital geographic information system map required by Virginia Code §56-46.1), and three copies of the Virginia Department of Transportation county road map for Washington County, in response to Section II.A.9. of the Commission Staff’s “Guidelines of Minimum Requirements for Transmission Line Applications Filed under Virginia Code Section 56-46.1 and The Utility Facilities Act” (the “Guidelines”). A reduced copy of the highway map is included as Exhibit 3 to the Application.

Members of the public may inspect a copy of the Application and related materials at the location listed in the response to Section V.B. of the Guidelines, as well as on the Internet at: www.appalachianpower.com/Abingdon.

Sincerely,

George J. A. Clemo

GJAC:sg
Enclosures

c: Mr. William F. Stephens, SCC Division of Energy Regulation (w/encl., 3 copies of highway maps, and CD-ROM)
William H. Chambliss, Esq., SCC General Counsel (w/encl.)
Bettina Sullivan, Department of Environmental Quality (w/5 CD-ROMs)
APPLICATION FOR APPROVAL AND CERTIFICATION OF ELECTRICAL TRANSMISSION LINE

South Abingdon 138 kV Extension Transmission Line Project

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Application, Testimony & Response to Guidelines

March, 2016
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## Glossary of Terms & Abbreviations

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<tr>
<th>Abbreviation</th>
<th>Definition</th>
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<tr>
<td>ACSR</td>
<td>Aluminum Conductor Steel Reinforced</td>
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<tr>
<td>ACSS</td>
<td>Aluminum Conductor Steel Supported</td>
</tr>
<tr>
<td>AEP</td>
<td>American Electric Power Company, Inc. (parent company of Appalachian)</td>
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<tr>
<td>AEPSC</td>
<td>American Electric Power Service Corporation</td>
</tr>
<tr>
<td>Appalachian</td>
<td>Appalachian Power Company (a unit of AEP)</td>
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<tr>
<td>APE</td>
<td>Area of Potential Effect</td>
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<tr>
<td>Application</td>
<td>Collectively refers to the application requesting Commission approval for the proposed Project, together with all of the supporting testimony, Response to Guidelines, DEQ Supplement, tables, exhibits, attachments, figures and maps, etc.</td>
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<tr>
<td>Approx.</td>
<td>Approximately</td>
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<tr>
<td>BMP</td>
<td>Best Management Practice</td>
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<tr>
<td>Circuit</td>
<td>An electrical connection between two substations located along a “Line” route. A transmission line sometimes holds two circuits (double-circuit line).</td>
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<tr>
<td>cmil</td>
<td>Circular mil (conductor size)</td>
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<tr>
<td>Commission</td>
<td>Virginia State Corporation Commission</td>
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<tr>
<td>Company</td>
<td>Appalachian Power Company (a unit of AEP)</td>
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<tr>
<td>CPCN</td>
<td>Certificate of Public Convenience and Necessity</td>
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<tr>
<td>DEQ</td>
<td>Virginia Department of Environmental Quality</td>
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<tr>
<td>DEQ Supplement</td>
<td>The analysis included in Volume 2 of this application which addresses the environmental and historic features associated with the Project.</td>
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<tr>
<td>EDR</td>
<td>Environmental Data Review, Inc.</td>
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<tr>
<td>EHV</td>
<td>Extra High Voltage</td>
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<tr>
<td>ELF</td>
<td>Extremely Low Frequency</td>
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<tr>
<td>EMF</td>
<td>Electric and Magnetic Fields</td>
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<tr>
<td>EPRI</td>
<td>Electric Power Research Institute</td>
</tr>
<tr>
<td>FAA</td>
<td>Federal Aviation Administration</td>
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<tr>
<td>FERC</td>
<td>Federal Energy Regulatory Commission</td>
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<tr>
<td>GESCS</td>
<td>General Erosion and Sediment Control Specifications</td>
</tr>
<tr>
<td>GIS</td>
<td>Geographic Information System</td>
</tr>
<tr>
<td>HV</td>
<td>High Voltage</td>
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<tr>
<td>ICNIRP</td>
<td>International Commission on Non-ionizing Radiation Protection</td>
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<tr>
<td>IEEE</td>
<td>Institute of Electrical and Electronics Engineers</td>
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<tr>
<td>kV</td>
<td>Kilovolt (1,000 volts)</td>
</tr>
<tr>
<td>kV/m</td>
<td>Kilovolt/Meter (a unit of measurement for electric fields)</td>
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<tr>
<td>Line</td>
<td>Transmission Line or Power Line</td>
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<tr>
<td>mG</td>
<td>Milligauss (a unit of measurement for magnetic fields)</td>
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<tr>
<td>MVA</td>
<td>Mega Volt Ampere</td>
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<tr>
<td>MW</td>
<td>Megawatts</td>
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<tr>
<td>MOA or MOU</td>
<td>Memorandum of Agreement or Understanding</td>
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<tr>
<td>NEPA</td>
<td>National Environmental Policy Act</td>
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<tr>
<td>NERC</td>
<td>North American Electric Reliability Corporation</td>
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<td>NESC</td>
<td>National Electrical Safety Code</td>
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<tr>
<td>NRHP</td>
<td>National Register of Historic Places</td>
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<tr>
<td>OATT</td>
<td>PJM Open Access Transmission Tariff</td>
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<tr>
<td>OPGW</td>
<td>Optical Ground Wire</td>
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## Glossary of Terms & Abbreviations

<table>
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<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>OWWP</td>
<td>DEQ Office of Wetlands &amp; Water Protection</td>
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<td>PJM</td>
<td>PJM Interconnection, L.L.C. - the RTO that coordinates the movement of wholesale electricity in parts of the Northeast, Mid-Atlantic and Midwest.</td>
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<tr>
<td>Project</td>
<td>The approximately 3.8 mile South Abingdon 138 kV Extension Transmission Line, the South Abingdon Substation and associated substation improvements.</td>
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<tr>
<td>ROW</td>
<td>Right-of-Way (Typically, the ROW will be 100 feet wide. However, the ROW could be more than 100 feet wide in a few locations, as needed to accommodate guy wires and to ensure compliance with safety requirements in certain conductor blow-out conditions.)</td>
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<tr>
<td>ROWs</td>
<td>Rights-of-Way</td>
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<tr>
<td>RTO</td>
<td>Regional Transmission Organization</td>
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<tr>
<td>SCC</td>
<td>Virginia State Corporation Commission</td>
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<tr>
<td>SUP</td>
<td>Special Use Permit</td>
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<tr>
<td>USEPA</td>
<td>United States Environmental Protection Agency</td>
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<tr>
<td>USFWS</td>
<td>U.S. Fish and Wildlife Service</td>
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<tr>
<td>USFS</td>
<td>United States Forest Service</td>
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<tr>
<td>USGS</td>
<td>United States Geological Survey</td>
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<tr>
<td>VDCR</td>
<td>Virginia Department of Conservation and Recreation</td>
</tr>
<tr>
<td>VDGIF</td>
<td>Virginia Department of Game &amp; Inland Fisheries</td>
</tr>
<tr>
<td>VDH</td>
<td>Virginia Department of Health</td>
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<tr>
<td>VDHR</td>
<td>Virginia Department of Historic Resources</td>
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<tr>
<td>VDMME</td>
<td>Virginia Department of Mines, Minerals and Energy</td>
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<tr>
<td>VDOA</td>
<td>Virginia Department of Aviation</td>
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<tr>
<td>VDOF</td>
<td>Virginia Department of Forestry</td>
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<tr>
<td>VDOT</td>
<td>Virginia Department of Transportation</td>
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<tr>
<td>VLR</td>
<td>Virginia Landmarks Register</td>
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<tr>
<td>VMRC</td>
<td>Virginia Marine Resources Commission</td>
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<tr>
<td>VNHP</td>
<td>Virginia Natural Heritage Program</td>
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<tr>
<td>VOF</td>
<td>Virginia Outdoors Foundation</td>
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<tr>
<td>WHO</td>
<td>World Health Organization</td>
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</table>
Appalachian Power Company (Appalachian or the Company), a unit of American Electric Power Company, Inc. (AEP), is proposing to construct a new approximately 3.8 mile 138 kV transmission line, build a new South Abingdon Substation and make associated improvements at three existing substations in the Abingdon–Washington County area (the “Project”). The Project directly addresses local reliability concerns arising from the increasing power demand from recent and planned residential, business/commercial and medical development in the area. The proposed in-service date for the Project is December 1, 2017, with most of the construction expected to take place in 2017.

The Project will connect the existing Saltville-Kingsport 138 kV transmission line and the proposed South Abingdon Substation and is estimated to cost approximately $30 million. The Project will be constructed on a new right-of-way, primarily using low reflective steel monopoles that range in height from 80 feet to 125 feet. The new right-of-way will be approximately 100 feet wide, except in one location near the Virginia Highlands Airport, where it may be up to 125 feet wide.

The Company contracted POWER Engineers, Inc. (POWER) to assist with the route development and selection process and prepare a Route Development Report (RDR). Following extensive outreach, public input and analysis, three alternative routes were developed. The Company supports POWER’s conclusion that the Preferred Route (Alternative C) is the superior route. As supported by the RDR, it reasonably avoids or minimizes adverse impacts on people and the scenic assets, historic districts and environment of the area concerned. The RDR, included in Volume 2 of the Application, provides a detailed description and comparison of the alternative routes.
APPLICATION OF
APPALACHIAN POWER COMPANY CASE NO. PUE-2016-00011

for Approval and Certification of the South Abingdon
138 kV Extension Transmission Line 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 ensure adequate and reliable electric service and to accommodate
future growth, the Company proposes to construct, own, operate and maintain the South
Abingdon 138 kV Extension Transmission Line Project, to be located partly in Washington
County and partly in the Town of Abingdon, Virginia. This project consists generally of the
construction of a new 138 kV transmission line on new right-of-way (“ROW”) approximately
3.8 miles long between a tap point on the Company’s existing Saltville-Kingsport 138 kV
transmission line (approximately one third of a mile southwest of the Company’s existing
Abingdon Substation) and a new South Abingdon Substation to be constructed on Vances Mill
Road in Washington County as part of the project, together with associated improvements to be
made at three existing substations in the Abingdon area, including buswork, switches and related
equipment (all of the foregoing collectively, the “Project”).
3. The Project will maintain reliability for Appalachian’s customers in the southern part of the Town of Abingdon and the adjacent areas of Washington County (the “Project area”) in light of (a) existing and projected load growth due to recent and planned residential, business/commercial and medical development in the Project area, and (b) the significant increase in the winter peak load experienced in the Project area due to the extremely low temperatures of the winter of 2014-2015 (sometimes referred to as the “polar vortex”).

4. In support of this application, the Company is filing the testimony of:
   
   (a) Timothy H. Hall as to the need for the Project;
   (b) James K. Bledsoe with regard to the engineering characteristics of the transmission line and substations associated with the Project;
   (c) Richard Gutman regarding electric and magnetic field levels associated with the Project; and
   (d) Jaime T. Newell as to route development and certain environmental matters associated with the Project.

5. The Company is also filing (a) a Response to Guidelines, responding to the “Guidelines of Minimum Requirements for Transmission Line Application Filed under Virginia Code Section 56-46.1 and The Utility Facilities Act” issued by the Commission’s Division of Energy Regulation on May 10, 1991; (b) a Route Development Report (“RDR”) and a DEQ Supplement prepared by the Company’s environmental consultant, POWER Engineers, Inc.; and (c) related tables, exhibits, attachments and maps (including a digital geographic information system (“GIS”) map (“GIS Constraints Map”) and GIS shapefiles of the Project on CD-ROM).

6. The Company’s testimony, Response to Guidelines, RDR, DEQ 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 preferred route for the new transmission line 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 is essential to support ongoing economic development within Washington County and the Town of Abingdon.

7. The proposed in-service date for the Project is December 1, 2017. If the Commission approves the Project, the Company estimates that it will need approximately 12 months after entry of the Commission’s final approving order for engineering, design, right-of-way 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 be given as required by Virginia Code § 56-46.1 and the Utility Facilities Act, Virginia Code § 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 §§ 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 new
transmission line 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 § 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

By: _________________
Of Counsel

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Counsel for Appalachian Power Company
DIRECT TESTIMONY OF
TIMOTHY H. HALL
FOR APPALACHIAN POWER COMPANY
IN VIRGINIA S.C.C. CASE NO. PUE-2016-00011
**SUMMARY OF DIRECT TESTIMONY OF TIMOTHY H. HALL**

My direct testimony supports Appalachian’s Application and Response to Guidelines. I sponsor Section I of the Response to Guidelines (Necessity for the Project), including the associated figures and tables. I also sponsor Exhibit 4 to the Application. The Project is needed to maintain reliability for Appalachian’s customers in southern Abingdon and adjacent areas of Washington County, enabling Appalachian to provide adequate and reliable service to its customers, and supporting existing and projected load growth in the area as a result of recent and planned residential, business/commercial and medical development in the area, particularly in winter conditions. The Project will add a robust new 138 kV source at an optimal location to support new distribution circuits, improving distribution system reliability for existing and future customers. Section I of the Response to Guidelines provides further detail regarding the need for the Project.
Q: PLEASE STATE YOUR NAME, ADDRESS AND PRESENT POSITION.

A: My name is Timothy H. Hall. My business address is Appalachian Power Company, 40 Franklin Road, Roanoke, VA 24011. I am currently employed by Appalachian Power Company ("Appalachian" or "Company") as an Engineer Senior within the Distribution System Planning Section.

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

A: In 1990, I received a Bachelor of Science degree in Electrical Engineering from the West Virginia Institute of Technology, Montgomery, West Virginia. I joined Appalachian in 1990 as an Electrical Engineer in the Distribution Region Support Section in Charleston, West Virginia. In 1996, I transferred to Appalachian’s Distribution System Planning Organization (formerly called General Office Engineering Support) in Roanoke, Virginia. I was promoted to Lead Engineer in 2012, and then to Engineer Senior in 2014, which is the position I hold at present. In this position, I am responsible for the distribution planning activities for the Appalachian distribution system facilities (4 kV through 34.5 kV) in Virginia, Tennessee, and a small portion of West Virginia. In all, I have over 25 years of experience related to the planning of electrical distribution systems.

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
(the "Application") to this Commission for approval and certification of the proposed
South Abingdon 138 kV Extension Transmission Line Project, consisting of a new 3.8
mile long 138 kV transmission line, a new South Abingdon Substation and associated
improvements at the Company's Abingdon, Hillman Highway and Wolf Hills Substations
(collectively, the "Project"). In this connection, I am sponsoring a portion of the
Response to Guidelines (the "Response to Guidelines") filed by Appalachian together
with the Application in response to the Commission Staff's "Guidelines of Minimum
Requirements for Transmission Line Applications Filed Under Virginia Code Section 56-
46.1 and The Utility Facilities Act."

Q: MR. HALL, WHICH OF THE SPECIFIC MATERIALS INCLUDED IN THE
RESPONSE TO GUIDELINES ARE YOU SPONSORING?
A: I am responsible for Section I, Necessity for the Project, and its figures and tables.
Additionally, I am sponsoring Exhibit 4 to the Application.

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 Project is needed to maintain reliability for Appalachian's customers in the southern
part of the Town of Abingdon and the adjacent areas of Washington County (the "Project
area") in light of existing and projected load growth in the area due to recent and planned
residential, business/commercial and medical development in the Project area, the effects
of which have been magnified by the extremely low temperatures of the winter of 2014-2015 (sometimes referred to as the "polar vortex"). The Project will establish a robust new 138 kV source (the proposed South Abingdon Substation) at an optimal location in the Project area to support several new distribution circuits. The new distribution circuits will result in shorter circuit lengths and lighter circuit loading for several existing heavily loaded distribution circuits serving the area. This will reduce exposure and provide additional transfer opportunities, thereby improving overall distribution system reliability. Accordingly, the Project will address Appalachian’s obligation under Virginia law to provide adequate and reliable service to customers within its service territory.

Section I of the Response to Guidelines describes the need for the Project in detail, including alternatives that were considered.

Q: DOES THIS CONCLUDE YOUR TESTIMONY?

A: Yes.
DIRECT TESTIMONY OF
J. KELLY BLEDSOE, P.E.
FOR APPALACHIAN POWER COMPANY
IN VIRGINIA S.C.C. CASE NO. PUE-2016-00011
SUMMARY OF DIRECT TESTIMONY OF J. KELLY BLEDSOE, P.E.

My direct testimony supports Appalachian’s Application and Response to Guidelines in connection with the South Abingdon 138 kV Extension Transmission Line Project (the "Project"). I sponsor the description of the transmission line, substation and other engineering components of the Project in Sections II and V (but not Sections II.A.2 and II.A.7) of the Response to Guidelines. I also sponsor Exhibits 2, 3, and 6 through 10 to the Application. Finally, I sponsor the county highway maps for Washington County provided in hard copy and electronically with the Application, as well as the GIS shapefiles submitted to the Commission with the Application. The Project consists generally of (a) the new 3.8 mile South Abingdon 138 kV Extension transmission line, (b) the new South Abingdon Substation, and (c) associated improvements at three existing substations. Based on preliminary engineering, the Company anticipates primarily using 138 kV double circuit steel monopoles with davit arms approximately 80 to 125 feet tall. The Company may use several H-frame structures approximately 60 to 80 feet tall if necessary to lower the overall height of the line where it runs in close proximity to the Virginia Highlands Airport. Those H-frame structures may need to be marked or lit depending on FAA recommendations. There would be approximately 40 total transmission line structures associated with the Preferred Route. The proposed South Abingdon Substation will operate at 138/12 kV, with a fenced portion of approximately 300’ by 240’. The substation will be located in an optimal location, on a 20.7 acre parcel that the Company owns. The benefits of the substation location are described in more detail in Section I of the Response to Guidelines. The technical features of the new substation are described in detail in Section II.C of the Response to Guidelines. The Washington County Planning Commission and Board of Supervisors have approved the proposed substation as being substantially in accord with the County’s comprehensive plan. No zoning approvals required. The Preferred Route generally runs north to south through some of the last remaining undeveloped windows in the Project area, avoiding residences and land use conflicts to the extent practical. The Application seeks approval of a 500-foot corridor in which a 100-foot ROW will be located. The corridor is necessary to allow the flexibility to address issues that become evident only after completion of final engineering, ground surveys and interviews with landowners. The corridor width is expanded to as much as approximately 1,100 feet in two limited areas that require greater flexibility. Undergrounding all or part of the transmission line is not a reasonable alternative. The Preferred Route has been carefully chosen to avoid or minimize visibility from populated areas, scenic roadways and other scenic resources as much as possible. Visibility of the line will be further minimized by the use of a low-reflective finish on the transmission structures and non-specular conductors. The construction of the Project (including preliminary and related activities) will take approximately 12 months after approval of the Project by the Commission, with a desired in-service date of December 1, 2017.
DIRECT TESTIMONY OF
J. KELLY BLEDSOE, P.E.
FOR APPALACHIAN POWER COMPANY
IN VIRGINIA S.C.C. CASE NO. PUE-2016-00011

Q. PLEASE STATE YOUR NAME, POSITION AND BUSINESS ADDRESS.
A. My name is J. Kelly Bledsoe. I am 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 1800 Loch Haven Drive, Meters & Stores Bldg., Roanoke, Virginia 24019.

Q. PLEASE REVIEW YOUR EDUCATIONAL BACKGROUND AND YOUR WORK EXPERIENCE.
A. In 1990, I received a Bachelor of Science degree in Civil Engineering from Virginia Military Institute. I am a licensed professional engineer in the Commonwealth of Virginia. I joined the Company in 1990 as a Civil Engineer. I was promoted to the position of Engineering Supervisor with AEPSC in 2010, and to my current position with AEPSC in 2014.

I am responsible for coordinating and directing the engineering for the AEP transmission system (including transmission lines operating at voltages from 34.5 kV through 765 kV) in Virginia, West Virginia, Tennessee and Kentucky.

Q. MR. BLEDSOE, WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?
A. The purpose of my testimony is to support certain aspects in Appalachian’s application (the “Application”) to this Commission for approval and certification of the proposed South Abingdon 138 kV Extension Transmission Line Project (the "Project"). In this connection, I am sponsoring various sections of the Response to Guidelines (the "Response to Guidelines") filed by the Company together with the Application in response to the Commission Staff's "Guidelines of Minimum Requirements for Transmission Line Applications Filed Under Virginia Code Section 56-46.1 and The Utility Facilities Act.”

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

A. As Manager, Transmission Line Engineering, my primary duties involve the oversight of the engineering, logistical, and other technical requirements associated with the construction of 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, substation and other engineering components of the Project set forth in the Response to Guidelines, Sections II and V, excluding Section II.A.2 and Section II.A.7; (2) Exhibits 2, 3 and 6 through 10 to the Application; (3) three hard copies of the county highway maps for Washington County showing the Project (also on CD-ROM submitted to the Commission with the Application); and (4) GIS shapefiles of the Project on CD-ROM submitted 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 THE PROJECT.

A. The Project consists generally of (a) the new approximately 3.8 mile South Abingdon 138 kV Extension transmission line, (b) the new South Abingdon Substation, and (c) associated improvements at three existing substations.

Q. PLEASE SUMMARIZE THE DESIGN AND OPERATIONAL FEATURES OF THE PROJECT.

A. As described in detail in Section II.B of the Response to Guidelines, the proposed South Abingdon 138 kV Extension transmission line will be a double circuit three-phase design and have a nominal phase-to-phase voltage of 138 kV. The proposed line will tap into the Abingdon-Wolf Hills 138 kV circuit (located on Appalachian’s existing Saltville-Kingsport 138 kV transmission line) approximately one third of a mile southwest of the Company's existing Abingdon Substation. The line will loop through the proposed South Abingdon Substation to provide a new 138 kV source that will address the area’s distribution load growth and reliability issues described in the direct testimony of Company witness Hall and in Section I of the Response to Guidelines.

Q. WHAT STRUCTURE TYPES WILL BE USED IN CONNECTION WITH THE CONSTRUCTION OF THE PROPOSED TRANSMISSION LINE?

A. 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 138 kV double circuit steel monopoles with davit arms in connection with the construction of the Project. The anticipated approximate monopole structure heights range from 80 to 125 feet with an average height of approximately 105 feet. At one location, the Company may use several H-frame structures as necessary to lower the overall height of the line where it runs in close proximity to the Virginia Highlands Airport. The anticipated approximate H-frame structure heights range from 60 to 80 feet with an average height of approximately 70 feet. The H-frame structures may need to be marked or lit depending on FAA recommendations. For additional details, see Section II.B of the Response to Guidelines and Exhibit 6 filed with the Application.

Q. APPROXIMATELY HOW MANY TRANSMISSION LINE STRUCTURES WILL THE PROJECT REQUIRE?

A. There would be approximately 42 total transmission line structures associated with the Preferred Route. That total is a rough approximation based on average structure spans.

Q. PLEASE DESCRIBE THE PROPOSED SOUTH ABINGDON SUBSTATION.

A. The fenced portion of the proposed 138/12 kV substation is approximately 300’ by 240’ and will be located on a 20.7 acre parcel that the Company owns. This property was formerly the Abingdon Stockyard Exchange. The substation’s optimal location and benefits are described in Section I of the Response to Guidelines, and Section II.C of the Response to Guidelines describes the technical features of the new substation in further detail.
Q. HAS THE COMPANY RECEIVED ANY LOCAL APPROVALS FOR THE NEW SUBSTATION?

A. Yes. The Washington County Planning Commission and Board of Supervisors have approved the proposed substation as being substantially in accord with the County’s comprehensive plan pursuant to Va. Code § 15.2-2232 (see Exhibit 10). No zoning approvals (e.g., special use permit or exception) are required. Washington County has confirmed that an electric substation is permitted as of right in this Agricultural-2 zoned area.

Q. PLEASE DESCRIBE THE COMPANY’S ROLE IN THE ROUTE DEVELOPMENT PROCESS.

A. First, Appalachian retained POWER Engineers, Inc. (“POWER”) to (a) develop and evaluate study segments and route alternatives for the Project, and (b) select a Preferred Route that reasonably minimizes adverse impact on environmental resources and is consistent with the Project’s technical requirements. Second, the Company assisted the POWER team in developing the routing and technical criteria listed in the Route Development Report (“RDR”) included in Volume 2 of the Application (see also Section II.A.7 of the Response to Guidelines). Third, Company representatives participated in numerous stakeholder meetings with government officials, businesses and landowners. Lastly, Company engineers conducted extensive desktop reviews and field reviews of the proposed routes to validate feasibility from an engineering standpoint.

Q. DID THE COMPANY CONSIDER PUBLIC AND STAKEHOLDER INPUT DURING ROUTE DEVELOPMENT?
A. Yes. Public participation and stakeholder input was very important. To this end, Appalachian held a public open house concerning the Project on September 24, 2015 (see Exhibit 9). The open house was preceded by an extensive public notification campaign. Approximately 115 participants attended the open house. At the open house, representatives of Appalachian and POWER provided information on the Project, were available to answer questions, and collected comments. Additionally, the public was able to comment electronically and obtain additional information regarding the Project through Appalachian’s Project website (www.AppalachianPower.com/Abingdon).

Further, the Company and/or POWER met with interested landowners privately at their request. Lastly, the Company and/or POWER made contacts with federal, state and local government agency representatives to solicit input. The resulting input was used by POWER where appropriate to develop, analyze and modify the study segments and route alternatives.

Q. WHAT IS THE COMPANY’S OPINION ON THE PREFERRED ROUTE IDENTIFIED IN THE RDR?

A. The Company supports POWER’s conclusion that the Preferred Route is the superior route. As supported by the RDR, it reasonably avoids or minimizes adverse impacts on people and the scenic assets, historic districts and environment of the area concerned. See POWER’s RDR, included in Volume 2 of the Application, for a detailed description and comparison of the alternative routes.

The Preferred Route generally runs north to south through some of the last remaining undeveloped windows in this area, avoiding residences and land use conflicts.
to the extent practical. Development in the study area is quickly expanding and is the Project driver as described in Section I of the Response to Guidelines. In summary, Appalachian reasonably expects that it will be able to acquire right-of-way ("ROW"), engineer, build, operate, and maintain the proposed Project along the Preferred Route efficiently and effectively, while minimizing adverse impacts on the environment.

Q. WHY IS THE COMPANY SUBMITTING A 500-FOOT CORRIDOR IN WHICH A 100-FOOT ROW WILL BE LOCATED?

A. The Company needs the flexibility to shift the centerline of the 100-foot ROW for the transmission line up to 200 feet in either direction from the centerline shown in the Application (see the GIS Constraints Map, Exhibit 5) as necessary to address issues that become evident only after completion of final engineering, ground survey and interviews with landowners. Nonetheless, the Company believes the centerline shown in the Application, is the most suitable alignment based upon preliminary analysis. The Company will provide notice to potentially affected landowners within the 500-foot corridor as required by the Commission and applicable law.

Q. WHY DOES THE PREFERRED ROUTE INCORPORATE TWO EXPANSIONS OF THE 500-FOOT CORRIDOR - AS SHOWN ON EXHIBIT 5 IN VOLUME 1 OF THE APPLICATION (THE "EXPANDED CORRIDOR")?

A. Just south of the tap point for the new line, the 500-foot wide corridor expands to a maximum width of approximately 1,100 feet near Woodland Hills Road (see Exhibit 5). The Expanded Corridor in this location will afford the Company the flexibility to work with the owners of the two large fields to the south and north of Woodland Hills Road to
the extent practical and to conduct surveys and field studies in order to avoid or minimize impacts on environmental resources.

At another location, near the southern terminus of the proposed line, the Preferred Route runs adjacent to the southern boundary of the Abingdon Quarry for approximately 0.4 miles before turning southward, spanning Vances Mill Road and entering the proposed South Abingdon Substation. The 500-foot corridor expands to the south in this area to an approximate width of up to 850 feet. The Expanded Corridor at this location will afford the Company the flexibility to avoid conflicts with Abingdon Quarry’s future mining plans and minimize environmental impacts along the small stream paralleling Vances Mill Road. Nonetheless, based upon preliminary discussions with Abingdon Quarry representatives, the Company believes the centerline shown for the Expanded Corridor in this location in the Application is the most suitable alignment.

Q. **HOW WIDE IS THE PROPOSED 138 KV LINE ROW?**

A. As is typical for 138 kV transmission lines, the ROW will be approximately 100 feet wide where monopole structures are used. In one place where H-frame structures may be used, the ROW will be approximately 125 feet wide if those structures are used.

Q. **ARE THERE ANY DWELLINGS IN THE PROPOSED ROW?**

A. No.

Q. **PLEASE DESCRIBE ANY OTHER WORK RELATED TO THE CONSTRUCTION OF THE 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 access roads and
laydown yards cannot be determined until after final line design, environmental studies and subsequent field reconnaissance by the Company’s construction representatives and land agents.

Q. IS PLACING ALL OR PART OF THE TRANSMISSION LINE 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, as supported by the RDR, the Preferred Route reasonably avoids or minimizes adverse impacts on people and the scenic assets, historic districts and environment of the area concerned.

Q. WHAT LOW-COST AND EFFECTIVE MEANS WILL THE COMPANY EMPLOY TO IMPROVE THE AESTHETICS OF THE PROPOSED TRANSMISSION LINE IN ACCORDANCE WITH § 10 OF HOUSE BILL 1319?

A. As detailed in the RDR, POWER has carefully chosen the location for the Preferred Route to avoid or minimize visibility from populated areas, scenic roadways and other scenic resources as much as possible. Also, the Company plans to use a low-reflective finish on its steel structures and non-specular conductors to reduce visual presence. The foregoing measures are a low-cost and effective means of improving the aesthetics of the proposed transmission line.

Q. PLEASE DESCRIBE THE GENERAL CONSTRUCTION ACTIVITIES FOR THE PROJECT.
A. Project construction activities will include the installation and maintenance of soil erosion and sedimentation control measures, access road construction, foundation, structure 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 storm water pollution prevention plan will be developed and implemented under the state’s “General Permit for Discharges of Stormwater from Construction Activities.”

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

A. The desired in-service date for the Project is December 1, 2017. Upon approval of the Project, the Company estimates that it will need approximately 12 months for engineering, design, ROW acquisition, permitting, material procurement, outage coordination and construction to place the line in service.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.
DIRECT TESTIMONY OF
RICHARD GUTMAN
FOR APPALACHIAN POWER COMPANY
IN VIRGINIA S.C.C. CASE NO. PUE-2016-00011
SUMMARY OF DIRECT TESTIMONY OF RICHARD GUTMAN, P.E.

My direct testimony supports Appalachian’s Application and Response to Guidelines. I sponsor Section IV of the Response to Guidelines (Health Aspects of EMF). The maximum electric and magnetic field levels expected to occur at the right-of-way (“ROW”) edge of the proposed South Abingdon 138 kV Extension Transmission Line (the “Project”) are 0.1 kV/m and 12.2 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 IEEE Standard C95.6™-2002, which sets the safety levels with respect to human exposure to electromagnetic fields. The proposed configuration is a double-circuit monopole design with “superbundle” phase arrangement, which is an optimal configuration that will minimize combined EMF exposure from the two circuits of the new line. Appalachian considered the presence and proximity of dwellings, schools, hospitals, and other community facilities 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.
Q: PLEASE STATE YOUR NAME, PRESENT POSITION AND BUSINESS ADDRESS.

A: My name is Richard Gutman. I am Staff Engineer, Advanced Transmission Studies & Technologies 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 700 Morrison Road, Gahanna, OH 43230.

Q: PLEASE SUMMARIZE YOUR EDUCATIONAL BACKGROUND AND WORK EXPERIENCE.

A: I received a Bachelor of Science degree (with Magna Cum Laude honors) and a Master of Science degree, both in Electrical Engineering, from the Polytechnic Institute of New York, New York, and a Master of Business Administration degree (with Weidler Scholar Distinction) from The Ohio State University, Columbus, Ohio. Also, I completed the Electric Power Systems Engineering course of study at Power Technologies, Inc., Schenectady, New York, and the AEP/OSU Management Development Program at The Ohio State University. I am a member of Tau Beta Pi engineering, Phi Kappa Phi interdisciplinary, and Beta Gamma Sigma business honor societies, a member of the New York Academy of Sciences, a life senior member of the Institute of Electrical and
Electronics Engineers (“IEEE”), and a licensed professional engineer in the States of Ohio and New York. I serve as an advisor on the EMF/RF Area Council of the Electric Power Research Institute (“EPRI”), received EPRI's Innovators Award for advancing new technologies, and have authored/co-authored over 20 technical papers on power systems. I hold seven patents internationally, with three issued by the United States Patent and Trademark Office for a new high-capacity, high-efficiency extra high voltage (“EHV”) transmission line design. I joined AEPSC in 1968 as an engineering assistant; was promoted to the position of Assistant Head of Technical & Special Studies in 1980; to Manager of Special Transmission Studies in 1985; to Manager of EHV & Interconnection Planning in 1988; to Manager of System Dynamics Analysis in 1992; and to Staff Engineer, Advanced Transmission Studies & Technologies in 2005.

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 South Abingdon 138 kV Extension Transmission Line Project (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 (“Response to Guidelines”) filed by the Company together with its application in response to the Commission Staff’s “Guidelines of Minimum Requirements for Transmission Line Applications Filed Under Virginia Code Section 56-46.1 and The Utility Facilities Act.”
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 of a power line; their strength is dependent upon the voltage level of the line, the physical characteristics of the line, and the distance from the line to the observation point at which the field strength is measured. These fields commonly are measured in kilovolts per meter (“kV/m”). Magnetic fields are created by the flow of electric current in a conductor. The strength of a magnetic field 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 field strength is measured. These fields are 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 Hz, or 60 cycles per second.

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

A: I have over 45 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. The highlights of my
EMF-related experience include conducting EMF studies for AEP’s Wyoming-Jacksons
Ferry 765 kV Project, representing AEP on EMF matters before the Nuclear Regulatory
Commission in connection with AEP’s Cook Nuclear Plant license renewal, and
sponsoring EMF materials for inclusion in AEP’s other applications filed with state
regulatory commissions.

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

A: As set forth in Section IV.A of the Response to Guidelines, the maximum electric and
magnetic field levels expected to occur at the right-of-way (“ROW”) edge of the
proposed South Abingdon 138 kV Extension Transmission Line are 0.1 kV/m and 12.2
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 electric and
magnetic field 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\textsuperscript{TM}-2002, which sets the safety levels with
respect to human exposure to electromagnetic fields.
Q: IS THE PROPOSED LINE CONFIGURATION FOR THE PROJECT A PRUDENT CHOICE TO REDUCE EMF LEVELS?

A: Yes. From an EMF perspective, the Company’s proposed configuration 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. The proposed configuration is a double-circuit monopole design with phase arrangement known as “superbundle” (phases 1-2-3/1-2-3, top-to-bottom). This is an optimal configuration that will minimize combined EMF exposure from the two circuits of the new line because these circuits normally will carry power in opposite directions.

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 described in the direct testimony of Company witness Newell.

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.
DIRECT TESTIMONY OF
JAIME T. NEWELL
FOR APPALACHIAN POWER COMPANY
IN VIRGINIA S.C.C. CASE NO. PUE-2016-00011
SUMMARY OF DIRECT TESTIMONY OF JAIME T. NEWELL

My direct testimony supports the environmental analysis and route development components of Appalachian’s Application and Response to Guidelines, including specifically: (a) Exhibit 1 (the “General Location Map”) and Exhibit 5 (the “GIS Constraints Map”) of the Application; (b) Volume 2 of the Application, including the Route Development Report and its attachments, figures, and maps, and the DEQ Supplement and its attachments; (c) the information describing the Project in Sections II.A.2 and 7 of the Response to Guidelines; and (d) the information concerning scenic, environmental and historic features in Section III of the Response to Guidelines. I also describe the methods used by Appalachian’s consultant POWER Engineers, Inc. (“POWER”), by whom I am employed, in conducting the route development studies submitted in support of Appalachian’s Application, and discuss the preferred route and alternative routes considered for the Project. POWER employed a traditional and accepted methodology used by environmental consultants to identify optimal routes for new transmission lines. POWER’s analysis shows that Alternative Route C (the “Preferred Route”) is preferable to other alternatives, because it has a lesser impact on dwellings, is the most compatible with existing and future land use, has the least potential visual impact on residences, Virginia Highlands Community College and Heartwood Artisan Center, and has the least amount of archaeological resources in the right-of-way. The Preferred Route also best minimizes engineering and constructability concerns, and has reduced potential impacts to Virginia Highlands Airport, as compared to other alternatives. The Project is not anticipated to affect any federally or state protected species. In selecting the Preferred Route, using or paralleling existing right-of-way easements to the extent feasible was considered, although it was determined that there are no viable existing right-of-way easements to use or parallel.
DIRECT TESTIMONY OF
JAIME T. NEWELL
FOR APPALACHIAN POWER COMPANY
IN VIRGINIA S. C. C. CASE NO. PUE-2016-00011

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.
A. My name is Jaime T. Newell. My business address is 9475 W. Watergate Rd., McBain, MI 49657.

Q. BY WHOM ARE YOU EMPLOYED AND WHAT IS YOUR POSITION?
A. I serve as a Project Manager in the Environmental Management Division at POWER Engineers, Inc. (“POWER”).

Q. DOES POWER HAVE EXPERIENCE IN ENVIRONMENTAL ANALYSIS AND ROUTING TRANSMISSION LINES?
A. Yes. POWER was founded in 1976 and employs more than 2,100 employees nationwide and overseas. POWER is a leader in the energy infrastructure industry and has sited and engineered hundreds of miles of transmission lines in the United States. Further, POWER has previously provided written testimony to this Commission for two Appalachian Power Company (“Appalachian” or “Company”) projects, including the Huntington Court-Roanoke 138 kilovolt (“kV”) transmission line (SCC Case No. PUE-2008-00096) and the Matt Funk 138 kV transmission line (SCC Case No. PUE-2008-00079).

Q. MS. NEWELL, WHAT IS YOUR ROLE WITH APPALACHIAN’S PROPOSED SOUTH ABINGDON EXTENSION 138 KV TRANSMISSION LINE PROJECT (THE “PROJECT”)?
A. I am the Project Manager and provide management and oversight for the Project’s environmental analysis and route development components.
Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. The purpose of my testimony is to support the environmental analysis and route
development components of Appalachian’s application (the “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 Appalachian
together with the Application in response to the Commission Staff’s “Guidelines of
Minimum Requirements for Transmission Line Applications Filed under Virginia Code
Section 56-46.1 and The Utility Facilities Act,” as well as the Route Development Report
(the “RDR”) and Department of Environmental Quality Supplement (the “DEQ
Supplement”) filed with the Application. Additionally, I will summarize my experience
and the methods employed by POWER in conducting the route development studies and
will present the alternative routes considered and the preferred route selected for the
Project.

Q. WHICH SPECIFIC MATERIALS ARE YOU SPONSORING?

A. In Volume 1 of the Application, I am sponsoring Exhibit 1 (the “General Location Map”)
and Exhibit 5 (the “GIS Constraints Map”), as well as the information describing the
Project set forth in Sections II.A.2 and 7 of the Response to Guidelines; and the
information concerning scenic, environmental and historic features set forth in Section III
of the Response to Guidelines. In Volume 2 of the Application, I am responsible for the
DEQ Supplement and its attachments. Additionally, I am sponsoring the RDR and its
attachments, figures, tables, photographs and maps, all of which, together with the DEQ
Supplement, constitute Volume 2 of 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 SUMMARIZE YOUR EDUCATIONAL BACKGROUND AND WORK EXPERIENCE.

A. In 1998, I received a Bachelor of Science degree with a dual major in Environmental Studies and Geography with a focus in Environmental Resource Management from Western Michigan University. In 2003, I received a Masters of Environmental Planning from Arizona State University.

Throughout my 17 year career, I have supported a range of siting, environmental planning, and permitting projects focused on energy infrastructure. I have participated in environmental studies for four generation facilities and over 70 transmission line projects throughout the West, Midwest, and Mid-Atlantic, including West Virginia and Virginia.

In addition to my experience with energy infrastructure, I have also completed environmental inventory, impact assessment, modeling, and mitigation for land use planning and visual resources to support development or amending of resource management plans for federally-managed lands during compliance with the National Environmental Policy Act. Additionally, I served as a siting lead on numerous transmission line projects – see the following partial list of projects:

- Appalachian Power/American Electric Power, Bim Tap Relocation Project Alternatives Study. Project Manager for the route selection studies and permitting efforts associated with the 5.5 mile Bim Tap – Matts Creek 138 kV Relocation Project in Boone and Raleigh Counties, West Virginia.
• **Indiana & Michigan Power/American Electric Power, Melita Reliability Enhancement Project Alternatives Study.** Project Manager for the route selection studies and permitting efforts associated with approximately three miles of 69 kV transmission line in densely populated Fort Wayne, Indiana.

• **Arizona Public Service, West Valley-South and North Power Line and Substation Projects.** Assistant Project Manager and technical lead for preparation of two siting reports and Certificate of Environmental Compatibility applications before the Arizona Power Plant and Siting Committee for 230 kV transmission lines. Prepared expert witness testimony for regulatory proceedings in Arizona.

• **Clean Line Energy Partners, Centennial West High Voltage Direct Current ("HVDC") Transmission Line Project Siting Study.** Assistant Project Manager and technical lead for preparation of a siting study report for a 700-900 mile ±500 kV or ±600 kV HVDC Transmission Line crossing five states. Project scope included agency, public, and tribal participation, and alternatives development and environmental assessment.

**Q. SPECIFICALLY, HOW IS THIS PRIOR EXPERIENCE APPLICABLE TO THE CURRENT PROJECT?**

**A.** My prior experience in siting and permitting electrical facilities across various land use types such as developed (densely populated or planned for development) and undeveloped (agricultural, forested, or desert) provides extensive knowledge and understanding of routing opportunities and constraints. For example, the Melita Reliability Enhancement Project traversed a densely populated area within an established neighborhood similar to the Project area. In a densely populated area, public and agency
input is important throughout the routing process. Similar to the Melita Project, public and agency input on this Project was considered during the routing process in order to better understand the concerns along transportation corridors, existing and future land use, and other sensitive areas throughout the study area. An understanding of potential landowner and stakeholder concerns with routing, construction, and operation of electrical transmission line facilities allowed me to incorporate these types of concerns into the routing and technical criteria early in the process and aid in the development of viable study segments for the Project.

This experience has equipped me to determine the types of information required and analyses necessary to develop a transmission line route that best minimizes impacts to the natural environment; land use; and visual, recreational and cultural resources; while also considering engineering concerns and constructability issues, which is the primary objective for Appalachian’s Project.

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

A. POWER was retained by Appalachian to develop alternative routes for the proposed Project located in Washington County and the Town of Abingdon, Virginia. In this regard, as routing team Project Manager, my primary duties involved planning, organizing, coordinating and controlling activities related to (a) developing and evaluating study segments and alternative routes for the Project; (b) developing routing, technical, and evaluation criteria with which to develop, compare, and analyze alternative routes; and (c) selecting a preferred route that reasonably minimizes adverse impacts on
the scenic assets, historic districts and environment of the Project area, and is consistent
with Project routing and technical criteria.

Q. WHO WAS ON THE ROUTING OR PROJECT TEAM?

A. A multi-disciplinary team, consisting of an assemblage of both POWER and Appalachian
employees, supported the route development and selection process (the “Project Team”).
The Project Team members encompassed a variety of disciplines including
environmental resources, geographic information systems (“GIS”), public outreach,
routing and siting, cultural resources, visual resources, right-of-way, transmission line
engineering, and substation engineering. Attachment 1 to the RDR (in Volume 2 of the
Application) includes a list of Project Team members and Section 2.2 of the RDR
describes the Project Team.

Q. PLEASE DESCRIBE THE METHODOLOGY EMPLOYED BY POWER TO
CONDUCT THE ENVIRONMENTAL ANALYSIS AND ALTERNATIVE ROUTE
DEVELOPMENT FOR THE PROJECT.

A. The methodology employed by POWER is summarized in Section II.A.7 of the Response
to Guidelines and is described in detail in the RDR. In general, POWER’s methodology
consisted of the following steps:

(1) Study Area Definition;

(2) Data Collection and Base Map Development;

(3) Development of Routing and Technical Criteria;

(4) Opportunities and Constraints Analysis;

(5) Identification and Development of Study Segments and Alternative Routes;

(6) Evaluation and Comparison of the Alternative Routes; and
Q. MS. NEWELL, IS THIS METHODOLOGY SIMILAR TO THAT EMPLOYED BY POWER IN OTHER SUCH STUDIES?
A. Yes. This is a traditional and accepted methodology employed by environmental consultants to identify optimal routes for new transmission lines, gas pipelines, and other linear utility corridors.

Q. WHAT FACTORS WERE ASSESSED IN CONNECTION WITH AVOIDING OR MINIMIZING ADVERSE ENVIRONMENTAL IMPACTS?
A. POWER assessed existing land use, including the presence and proximity of dwellings, schools, daycare centers, hospitals, other community facilities, businesses, commercial structures, churches, and airports. Future land use plans for residential, industrial, and commercial development were also considered. Additional factors included the presence and proximity of the following natural, visual, and cultural resources: karst features (e.g., caves, springs, sinkholes), wetlands, streams, forested areas, prime farmland and farmland of statewide importance, conservation lands, previously documented architectural and archaeological resources, rare or endangered species, and recreational and aesthetic resources such as scenic roadways, trails and parks. Lastly, engineering and constructability concerns were reviewed for each alternative route. The following routing criteria were developed at the start of the Project and considered for this effort:

- Avoid or minimize visibility from populated areas, scenic roadways, and designated scenic and recreational resources.
- Avoid or minimize conflict with existing and proposed future development and land uses.
• Minimize habitat fragmentation and impacts on designated areas of biodiversity concern.

• Maximize the separation distance from and/or minimize impact on dwellings, schools, daycare facilities, hospitals, and other community facilities.

• Maximize use or paralleling of existing rights-of-way.

• Minimize environmental impact and construction/maintenance costs by creating shorter, direct routes.

• Maximize the use of existing access roads where practicable.

Q. DID THE ROUTING TEAM CONSIDER ANY TECHNICAL CRITERIA IN THE ROUTING PROCESS?

A. Yes, the routing team considered the following technical criteria based on Appalachian’s standards, North American Electric Reliability Corporation standards, the National Electric Safety Code, and industry best practices for construction:

• Minimize crossing of Extra High Voltage (“EHV”) transmission lines and maintain the required centerline to centerline separations when paralleling EHV transmission lines.

• Avoid triple or quadruple circuit configurations.

• Avoid paralleling railroads.

• Avoid angles greater than 65 degrees.

• Minimize crossing steep slopes (> 20 percent).

• Maximize the use of existing access roads and the terrain.
• Use lower terrain features, when possible, to minimize potential impacts to
  approach zones associated with airports

Q. WHAT SOURCES WERE REVIEWED TO AVOID OR MINIMIZE ADVERSE
ENVIRONMENTAL IMPACTS?

A. A range of geographic information was acquired within the study area, as described in
  Section 2.4 of the RDR. Data was compiled from:

  • Publicly available published data, aerial photographs, United States Geological
    Survey maps, and GIS data repositories (including data from the Washington
    County GIS database and the Virginia Department of Historic Resources
    database).
  
  • Local, state, and federal planning documents.

  • Coordination with federal, state, and local regulatory agencies.

  • Field reviews from public roads and other public access points.

  • Input from the public through a public open house and meetings with local
    landowners.

Q. HOW WAS STAKEHOLDER INPUT OBTAINED AND USED?

A. Appalachian introduced the Project to the public on September 10, 2015 through a news
  release, newspaper advertisement, project website, and public map showing study
  segments. A public open house was held on September 24, 2015 from 5 p.m. to 8 p.m. at
  the Virginia Higher Education Center in Abingdon, Virginia. At the open house,
  representatives of Appalachian and POWER provided information on the Project and
  were available to answer questions and collect comments. Additionally, the public was
able to comment electronically and obtain additional information regarding the Project through a website after the public open house. As of February 18, 2016, approximately 50 comments have been received on the Project. The majority of the comments received from the public were related to future land use plans (residential and commercial), proximity to residences, visual impacts, and property value. After the open house, Appalachian met privately with several landowners at their request to discuss the Project and possible modifications to the study segments. Lastly, Appalachian and/or POWER sent consultation letters to over 60 federal, state, and local government agency representatives to solicit input. Information and stakeholder input collected informed the route development process by altering study segments based on landowner and stakeholder preferences. A detailed description of modifications made to the study segments during the alternative route development process can be found in Section 4.1 of the RDR. Public participation and stakeholder input is very important to Appalachian and the route development process.

Q. PLEASE DESCRIBE THE RESULTING ALTERNATIVE ROUTES.

A. Three alternative routes are described in detail in Section 4.2 of the RDR and can be seen in the RDR’s Map 6. They can be generally described as follows:

- **Alternative Route A** is approximately 3.6 miles long and commences at a proposed tap point on Appalachian’s existing Saltville-Kingsport 138 kV transmission line, approximately one third of a mile southwest of the existing Abingdon Substation. From the proposed tap point, Alternative Route A extends in a generally southward direction across primarily agricultural land and continues south across undeveloped land and west of
the Highlands residential subdivision. Alternative Route A continues south
crossing West Main Street, the entrance road to Virginia Highlands
Community College, and Interstate 81. Alternative Route A turns east, at
the northern extent of The Heritage at Abingdon (a proposed 140 unit
residential development). East of Stone Mill Road, Alternative A
continues along the edge of the Abingdon Quarry property and into the
proposed South Abingdon Substation.

- **Alternative Route B** is approximately 3.8 miles long and taps the existing
  Saltville-Kingsport 138 kV transmission line at the same location as
  Alternative Route A and follows the same route as Alternative Route A
  until a location approximately 150 feet north of Wyndale Road.
  Alternative Route B crosses Wyndale Road and continues in a westward
direction along the eastern side of the Washington County Fairgrounds
and farther from the Highlands residential subdivision. At this location,
Alternative Route B turns east across an open field to cross West Main
Street in a similar location to that of Alternative Route A. At West Main
Street, Alternative Route B turns south across the Virginia Highlands
Community College entrance road and thereafter follows the same route
into the proposed South Abingdon Substation as Alternative Route A.

- **Alternative Route C (the “Preferred Route”)** is approximately 3.8 miles
  long and taps the existing Saltville-Kingsport 138 kV transmission line at
  the same location as Alternative Routes A and B and is the same as
  Alternative Route B until a point at the eastern edge of the Washington
County Fairgrounds. Alternative Route C continues southeast to cross West Main Street between the Pioneer Chevrolet dealership and the Abingdon Bible Church. South of West Main Street, Alternative Route C crosses the Dutt & Wagner facility, a commercial and industrial land use, and Interstate 81. Alternative Route C continues southeast for approximately 0.5 mile and joins Alternative Routes A and B at a common location, just north of The Heritage at Abingdon (a proposed 140 unit residential development). Alternative Route C continues east across Stone Mill Road and into the proposed South Abingdon Substation along the same route as described under Alternative Routes A and B above.

Q. WHAT IS THE PREFERRED ROUTE?

A. Alternative Route C is the Preferred Route. See Exhibit 5 for detailed maps showing the Preferred Route.

Q. WHAT IS THE BASIS FOR THE PROJECT TEAM'S SELECTION OF ALTERNATIVE ROUTE C AS THE PREFERRED ROUTE?

A. Section 7.0 of the RDR explains in detail the basis for the recommendation and Table 6 in the RDR provides the evaluation criteria and quantitative results for the three alternative routes considered as part of the RDR. In summary, the Project Team recommended Alternative Route C as the Preferred Route because:

- **Residential Land Use**: The Preferred Route will impact the fewest dwellings within 50, 250, and 500 feet of the route centerline and is located in an area of higher commercial or industrial development as compared with Alternative Routes A and B. The Preferred Route has a total of 0, 5, and 17 residences,
respectively, within 50, 250, and 500 feet of the route centerline, as opposed to Alternative Routes A and B which have 0, 11, and 40 and 0, 6, and 23 dwellings, respectively, within 50, 250, and 500 feet of their centerlines.

- **Existing and Future Land Use:** The Preferred Route is the most compatible with existing and future land use. It crosses West Main Street in a more compatible land use area than the crossing location of Alternative Routes A or B. The Preferred Route would have the least impact on the future land use as presented by the Town of Abingdon Comprehensive Plan. It minimizes potential impacts to a future trail proposed by the Town near the Higher Education Center. The Preferred Route minimizes impacts to The Heritage at Abingdon (a proposed 140 unit residential development) and the expansion of the Abingdon Quarry, by locating on the outer edges of these two areas. On October 20, 2015, a letter was received from the Virginia Department of Transportation (“VDOT”) Planning and Investment Management Division, which indicated that the Project will have no effect on existing or proposed highway infrastructure, except during construction. The Company also met with VDOT on November 20, 2015, at which time VDOT officials indicated that they did not anticipate any conflicts from the alternative routes.

- **Visual and Recreational Resources:** Of the three alternative routes, the Preferred Route has the least potential visual impact on residences by creating the greatest distance from residential areas and is the alternative that is the farthest from Virginia Highlands Community College and its recreation facilities and the Heartwood Artisan Center. The Preferred Route passes through a more
commercial and industrial area west of downtown Abingdon, which has a lower
scenic integrity and fewer visual resource concerns than the crossing location of
Alternative Routes A and B.

- **Cultural Resources**: The Preferred Route has the least amount of archaeological
resources in the right-of-way. Two archaeological sites fall within the proposed
right-of-way; however, they have not been evaluated for the National Register of
Historic Places (‘NRHP’) and could be avoided through engineering and design.
There are no properties listed on the NRHP within one mile and no properties
determined eligible for the NRHP within 0.5 mile of the Preferred Route. All
alternatives cross the Overmountain Victory National Historic Trail, but the
crossings are at a location that is not publicly accessible. Appalachian and
POWER have submitted a Pre-Application Analysis for cultural resources to the
Virginia Department of Historic Resources (‘VDHR’) and received a response
dated February 12, 2016, that can be found as Attachment 2.1.2 of the DEQ
Supplement. Appalachian will continue to coordinate with VDHR and the
National Park Service after the State Corporation Commission renders its final
decision on the Project.

- **Engineering**: The Preferred Route best minimizes engineering and
constructability concerns due to the reduced number of heavy angles and reduced
potential impacts to the Virginia Highlands Airport as compared to the other
alternative routes. All alternative routes have the potential to be in an obstruction
zone for the Virginia Highlands Airport; however, the Preferred Route does not
penetrate the airport’s approach surface.
For these reasons and others described in the Application, Appalachian will be able to acquire right-of-way for, engineer, build, operate, and maintain the proposed Project along the Preferred Route efficiently and effectively, while minimizing overall environmental impacts.

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

A. No. Where applicable, 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 Appalachian and POWER.

Q. **AS REQUIRED UNDER VIRGINIA CODE § 56-46.1 C AND § 56-259 C, DID THE ROUTING TEAM CONSIDER UTILIZING EXISTING RIGHT-OF-WAY EASEMENTS TO THE EXTENT FEASIBLE?**

A. Yes. While maximizing the use or paralleling of existing rights-of-way is an important routing criterion, there were no viable existing right-of-way easements to use or parallel.

Q. **DOES THIS CONCLUDE YOUR TESTIMONY?**

A. Yes.
RESPONSE TO GUIDELINES

SECTION I. NECESSITY FOR THE PROPOSED PROJECT

A. Detail the engineering justifications for the proposed project (for example, provide narrative to support why the project is necessary to upgrade or replace an existing facility, to significantly increase system reliability, to connect a new generating station to the Company’s system, etc.). Detail the later plans for the proposed project, if appropriate.

Overview. Appalachian Power Company ("Appalachian" or the "Company") proposes to construct a new approximately 3.8 mile 138 kV transmission line (the “South Abingdon 138 kV Extension”), to be located partially in the Town of Abingdon and partially in Washington County, Virginia. The proposed transmission line will tap the existing Saltville-Kingsport 138 kV line (Abingdon-Wolf Hills 138 kV circuit) about one third of a mile southwest of the existing Abingdon Substation, traverse 3.8 miles southward, and loop into a new substation (the “South Abingdon Substation”) to be located in Washington County (see Exhibit 1 – General Location Maps). Certain associated improvements will also be required at the Company's Abingdon, Hillman Highway and Wolf Hills Substations (the proposed line, substation and associated improvements collectively, the “Project”).

The Project is needed to maintain reliability for Appalachian's customers in the southern part of the Town of Abingdon and the adjacent areas of Washington County (the "Project area") in light of existing and projected load growth due to recent and planned residential, business/commercial and medical development in the Project area, coupled with the extremely low temperatures of the winter of 2014-2015 (sometimes referred to as the "polar vortex"). The Project area is a winter peaking region. As described in more detail below, the 2013-2014 winter peak loading on transformer No. 2 at the Company’s Abingdon Substation matched that transformer's winter normal capability, and, but for an emergency temporary load transfer, the 2014-2015 winter peak loading (during the "polar vortex") would have overloaded that transformer. Continued electrical growth in this area is also projected to cause overloads on transformer No. 1 at the Company’s Hillman Highway Substation by winter 2022-2023.

The primary drivers of load growth in the Project area include residential development (The Heritage at Abingdon, a new 140 lot subdivision being developed on Stone Mill Road), business/commercial development (The Meadows near Exit 17 on I-81, the new Hilton Hotel and the new Wal-Mart near Exit 19 on I-81) and medical development (the new Johnston Memorial Hospital and associated offices/facilities east of Exit 19 on I-81). Figure 1 shows these primary load growth drivers (illustrated with green dots) and the present distribution system. Figure 2 shows the distribution system as it would be reconfigured after the proposed Project is placed in service.
The proposed substation and line will provide a new, robust 138 kV source at an optimal location, resulting in the following benefits: (i) load will be transferred to the new substation and away from several existing stressed distribution circuits and transformers (see Figure 1 – “Areas to be transferred to new South Abingdon Substation” outlined with a red polygon) and (ii) distribution system reliability will be increased by shortening the length and reducing the exposure of several existing distribution circuits. The following narrative provides additional detail on the need for the Project.

Figure 1
Present Distribution System and Optimal Location of Project
Transformer Overload. The Company’s Abingdon Substation transformer No. 2 serves residential and commercial customers in the Town of Abingdon and adjacent areas of Washington County (see Figure 1). Continued electrical growth in the surrounding area south of the Town of Abingdon (including The Heritage at Abingdon, a new 140 lot subdivision being developed on Stone Mill Road) is expected to increase the risk of overloads on the Abingdon Substation transformer No. 2 during winter peak load conditions.

The winter 2013-2014 peak loading on the Abingdon 138-12 kV, 22.4 MVA transformer No. 2 occurred on January 7, 2014 (when area temperatures dipped to -2º F), reaching 30.75 MVA, which matched its 30.75 MVA winter normal capability. A year later, during the winter of 2014-2015, in anticipation of temperatures forecast to be in the -10º F range for February 20, 2015, the Company performed a temporary/emergency load transfer from the Route 19 circuit on the Abingdon No. 2 transformer to the Oak Park
circuit on the Spring Creek No. 2 transformer on February 17, 2015. That temporary load transfer was not returned to normal until April 23, 2015. Without the transfer, the winter 2014-2015 peak loading on the Abingdon transformer No. 2, which occurred on February 20, 2015 (when temperatures reached -7º F), would have reached 31.20 MVA, which would have exceeded its 30.75 MVA winter normal capability by approximately 1 percent. Although this transfer successfully averted an expected overload on the Abingdon No. 2 transformer, it could only be implemented on a temporary basis because of the increased exposure it places on the Oak Park Industrial Park, which is served by the Spring Creek No. 2 transformer. Oak Park is home to AGC Flat Glass North America, which uses a manufacturing process that is sensitive to voltage sags and momentary outages. The winter 2017-2018 peak loading on the Abingdon transformer No. 2 is projected to reach 32.1 MVA (see Table I.B-1, located in Section I.B below), which will exceed its 30.75 MVA winter normal capability by approximately 4 percent. The proposed Project (which the Company desires to place in service by December 1, 2017) will reduce the projected winter peak loading on this transformer by 7.2 MVA beginning with the projected winter 2017-2018 peak, and thus will alleviate the projected overload for the ten year planning horizon through the winter of 2024-2025 (see Table I.B-1 below).

Transformer Loading. The Company’s Hillman Highway Substation 69-12 kV, 22.4 MVA transformer No. 1 serves residential, business, commercial and medical customers in the Town of Abingdon and adjacent areas of Washington County. Continued electrical growth in the Town of Abingdon and surrounding areas, and new service to a Wal-Mart store, a Hilton Hotel, and a new commercial development called “The Meadows” are expected to cause an overload on the Hillman Highway transformer No. 1.

The winter 2014-2015 peak loading on the Hillman Highway transformer No. 1 occurred on February 20, 2015, reaching 24.5 MVA, which is approximately 82 percent of its 30.00 MVA winter normal capability. The winter 2017-2018 peak loading on the Hillman Highway transformer No. 1 is projected to reach 28.7 MVA, which is approximately 96 percent of its 30.0 MVA winter normal capability. Although this loading level is within the 30.0 MVA normal winter capability of the transformer, this transformer serves the growing areas near the Interstate 81 Exits 17 and 19 (which include numerous proposed commercial developments). The addition of a single new commercial load could cause an overload on this transformer within this same time frame. As shown in Table 1.B-1 below, by winter 2022-2033, projected winter peak loading will cause an overload on this transformer. The proposed Project will reduce the projected winter peak loading on the Hillman Highway transformer No. 1 by 4.5 MVA beginning with the projected winter 2017-2018 peak, thus alleviating the transformer's vulnerability to overloading through the winter of 2024-2025 based on current load projections for the ten year planning horizon (see Table 1.B-1 below).

Reliability Concerns. The Abingdon transformer No. 2 serves approximately 3,200 customers, including the Wolf Creek Water Reclamation Facility, the historic Barter Theatre, the historic Martha Washington Inn, the federal courthouse, the Highlands
Community Services mental health center, Food City’s corporate headquarters, schools, town and county governmental and emergency services buildings, and multiple high-end residential neighborhoods. There is inadequate circuit and transformer capability between the Abingdon Substation and adjacent substations for full load recovery in the event of an outage of the Abingdon transformer No. 2 without the use of a mobile transformer, which typically takes 24 hours to install. The proposed new South Abingdon Substation will allow for full recovery of critical load centers (town and county administration and emergency buildings) during circuit or substation transformer contingency events. The shorter circuit lengths and lighter circuit loading resulting from the Project will also improve system reliability.

The Abingdon/Vances Mill 12 kV distribution circuit (which connects to the Abingdon transformer No. 2; see Figure 1, blue circuit) serves approximately 1,300 customers across 40.0 primary line miles with marginal contingency circuit ties with other 12 kV distribution circuits. The winter loading on the Abingdon/Vances Mill 12 kV circuit (not including the new 140 lot residential neighborhood being developed in the area served by that circuit) is projected to be 13.4 MVA by the winter of 2017-2018. Although this loading level is within the 17.1 MVA winter normal capability of the circuit, it will be well above 50% of the circuit breaker top phase current trip setting. Loading distribution circuits in excess of 50% of the breaker phase current trip setting, particularly in the winter, causes “cold load pick up” problems when restoring power after an outage, thereby greatly increasing outage recovery time. This phase trip setting cannot be raised high enough to maintain proper circuit coordination or mitigate the “cold load pickup” issue. Several large all-electric residential neighborhoods are approximately 4.0 line miles away from the Abingdon Substation at the southern end of the Vances Mill circuit, making those subdivisions highly susceptible to extended outages due to circuit exposure and to circuit coordination issues as load continues to grow. As shown on Figure 2 (Proposed Distribution System), three new distribution circuits will be created as a result of the Project, resulting in shorter circuit lengths, lighter circuit loading, reduced exposure, better transfer opportunities and improved system reliability.

The Hillman Highway transformer No. 1 serves approximately 2,500 customers, including the main feed for the new Johnston Memorial Hospital, multiple businesses near Interstate 81 Exits 17 and 19, the Glenrochie Country Club and golf community, Lowes, schools, a nursing home, and the Wellmont Health System Outpatient Campus. There is inadequate circuit and transformer capability between the Hillman Highway Substation and adjacent substations for full load recovery in the event of an outage of the Hillman Highway transformer No. 1 without the use of a mobile transformer, which typically takes 24 hours to install. The proposed new South Abingdon Substation will allow for full recovery of critical load centers during circuit or substation transformer contingency events. The shorter circuit lengths and lighter circuit loading resulting from the Project will also improve system reliability.

The Hillman Highway/Cummings Street 12 kV distribution circuit (which connects to the Hillman Highway transformer No. 1; see Figures 1 and 2, red circuit) serves
approximately 718 customers (and will soon serve a new Hilton Hotel, and a new commercial development called “The Meadows”) across 28.4 primary line miles with marginal contingency circuit ties with other 12 kV distribution circuits. The winter loading on the Hillman Highway/Cummings Street 12 kV circuit (including the new commercial loads to come on line soon) is projected to be 11.3 MVA by the winter of 2017-2018. Although this loading level is within the 12.6 MVA winter capability of the circuit, it will be well above 50% of the circuit breaker top phase current trip setting. Loading distribution circuits in excess of 50% of the breaker phase current trip setting, particularly in the winter, causes “cold load pick up” problems when restoring power after an outage, thereby greatly increasing outage recovery time. This phase trip setting cannot be raised high enough to maintain proper circuit coordination or mitigate the “cold load pickup” issue. As shown on Figure 2 (Proposed Distribution System), three new distribution circuits will be created as a result of the Project – resulting in shorter circuit lengths, lighter circuit loading, reduced exposure, better transfer opportunities and improved system reliability.

The Hillman Highway/Bethel 12 kV distribution circuit (which connects to the Hillman Highway transformer No. 1 and is shown in pink on Figures 1 and 2) serves approximately 541 customers, including the main feed for the new Johnston Memorial Hospital and will soon serve a new Wal-Mart, across 10.1 primary line miles with marginal contingency circuit ties with other 12 kV distribution circuits. The line exposure to this circuit was purposely minimized to reduce the exposure to the hospital. The winter loading on the Hillman Highway/Bethel 12 kV circuit (including the new commercial load to come on line soon) is projected to be 7.3 MVA by the winter of 2017-2018. Although this loading level is within the 12.6 MVA winter capability of the circuit, this circuit is poised for future commercial growth due its proximity to Exit 19 and US Route 11. The proposed Project will not reduce load on the Hillman Highway/Bethel circuit, but it will increase circuit reliability by reducing load on the Hillman Highway transformer No. 1 and create the ability to shift load if load on the Bethel circuit becomes a concern.

Identification of Optimal Location. The Company worked with Washington County economic development officials to quantify new load projections (see Table 1.B-1, located in Section I.B below). Electric load growth in this area is primarily driven by the presence of the Johnston Memorial Hospital and the existing and proposed business and residential neighborhood developments. Accordingly, to address the projected overloads and potential reliability concerns, the optimal location for the proposed Project is between the existing Abingdon and Hillman Highway Substations (south of Interstate 81) and within three miles of the Company’s existing 138 kV transmission line and adjacent to existing main line distribution circuitry that serves the area now. Figure 1 shows the existing transmission and distribution facilities in relation to the identified optimal location. The proposed substation location is in an optimal location for the following reasons:
The location is in close proximity to the existing and proposed residential neighborhood developments driving the electric load growth and related potential reliability concerns.

The location is near existing distribution circuitry and between existing substations (in this case, the Abingdon and Hillman Highway Substations, see Figure 1).

The location alleviates a projected overload on one or more distribution transformers and/or circuits.

The location provides significant reliability benefit to two or more distribution transformers and/or circuits.

The location provides significant contingency benefit to two or more distribution transformers and/or circuits.

The location minimizes the total circuit exposure between substations and the end of the distribution circuits.

Furthermore, the location (the former Abingdon Stockyard Exchange) is suitable for an electric substation:

An electric substation is a permitted use as of right in this zoned Agricultural-2 area.

The adjacent properties are compatible land uses: the property to the east is zoned M-2 and is an asphalt spoil/recycling site; the property to the west is zoned A-2 and is the existing sewage treatment plant for the Town of Abingdon; and the properties to the north are zoned A-2 and M-2. No residences are adjacent to the site.

The large 20.7 acre site provides substantial existing buffer yards and screening.

The original property owner was a willing seller and Appalachian Power Company has acquired the property for the construction of the substation.

The existing stockyard buildings on the site are being demolished.

The initial field studies have been completed including archaeological, wetland, and geotechnical. No adverse impacts on natural, scenic and cultural resources were identified.

The Washington County Planning Commission, Planning Department, and Board of Supervisors have verified the proposed substation is consistent with the County’s comprehensive plan and zoning (see Exhibit 10).

The Project is expected to be adequate to address the projected transformer overloads and potential reliability concerns for the foreseeable future by providing adequate transformer and circuit capacity.

B. Describe the present system and detail how the proposed project will effectively satisfy present and future demand requirements. Provide pertinent load growth data (at least five years of historical and ten years of projected loads where applicable). Provide all assumptions inherent within the projected data and why existing right-of-way cannot adequately serve the needs for the Company if that is
the case. Indicate when the existing system is projected to be inadequate. If the existing system is, or will at some future time be inadequate in a contingency situation, describe this critical contingency. Detail what might cause such situation. Where appropriate, provide historical incidence of similar situations which would be avoided by the proposed construction.

The proposed substation will be located at an optimal location (as described above) and on Company-owned property (Appalachian has already purchased the 20.7 acre property and is in the process of removing the existing stockyard buildings), which is within three miles of the Company’s existing Saltville-Kingsport 138 kV line. The Project will tap this existing transmission line (Abingdon-Wolf Hills 138 kV circuit), which has adequate capacity to serve the proposed substation load for both normal and contingency loading for the foreseeable future.

The present electric distribution system includes the Abingdon Substation 138-12 kV, 22.4 MVA transformer No. 2, which connects to three 12 kV distribution circuits, and the Hillman Highway Substation 69-12 kV, 22.4 MVA transformer No. 1, which connects to three 12 kV distribution circuits, all of which in turn serve a combination of residential, business/commercial and governmental customers. These six circuits serve load centers primarily in the Town of Abingdon and areas immediately beyond the Town limits.

The area to be served by the proposed Project is presently served by the Abingdon Substation and one of its radial 12 kV distribution circuits (Vances Mill), and by the Hillman Highway Substation and one of its radial 12 kV distribution circuits (Cummings Street). As depicted on Figures 1 and 2, this Project primarily benefits the Abingdon/Vances Mill and Hillman Highway/Cummings Street distribution circuits. Electric load growth in this area is driven mostly by the Johnston Memorial Hospital, the new Wal-Mart, the new Hilton Hotel, a new 140 unit residential development (The Heritage at Abingdon) and the new commercial development called “The Meadows,” which will include a Food City Grocery store and other retail shops. Accordingly, the optimal location for the proposed Project is between the existing Abingdon and Hillman Highway Substations (west of Virginia State Route 75-Cummings Street) and approximately three miles south of the Company’s existing 138 kV transmission line and adjacent to the main line distribution circuitry which serves the area at the current time.

Historical and projected winter peak loads for the Abingdon transformer No. 2 and its supported circuits and the Hillman Highway transformer No. 1 and its supported circuits are shown below in Table I.B-1. The table shows the actual winter peak load for the previous five years and the projected winter peak load for the next ten years for these transformers and the circuits they serve. The Abingdon transformer No. 2 load peaked at 30.75 MVA on January 7, 2014. Without considering any significant new block load additions (such as a new big box retail store or a hotel), the load on this transformer is expected to continue to grow at a steady rate of 0.3 MVA per year for the next ten years, primarily due to the recently announced The Heritage at Abingdon140 lot sub-division being developed on Stone Mill Road. The Hillman Highway transformer No. 1 load
peaked at 24.5 MVA on February 20, 2015. Apart from significant new block load additions, the load on this transformer is expected to continue to grow at a steady rate of 0.3 MVA per year for the next 10 years. Three new developments were recently announced that will all be in service by December 2016: a new Wal-Mart Super Center (+ 1.5 MVA), Hilton Inn (+ 0.3 MVA), and a new commercial development called “The Meadows” that involves a new Food City grocery store plus some outparcels (+ 1.5 MVA).

The historical annual peak load growth rate was calculated using a linear regression analysis on the five (5) most recent seasonal peaks (2010-2015), which were adjusted in the calculation to account for any permanent load transfers. The annual growth rate is adjusted if necessary to account for (i) weather variations (e.g., mild winter or summer), which can skew load growth calculations; (ii) recent data (1 to 2 years), which provide a better indication of future trends; and (iii) input from meetings with Appalachian field operations, engineering, and customer services to create a reasonable projected annual growth rate for each substation and circuit. The ten (10) year projected winter peak loadings for the transformer and circuits were derived by taking the most recent winter peak and adding the adjusted annual growth rate to each year. Finally, these projected loadings were adjusted for any known large (i.e., greater than the typical load that comprises the annual growth rate) single customer load additions over the next ten (10) years.

The noticeable increase in historical peak loads from winter 2010-2011 to the present is due to the following factors:

(i) The winters of 2010-2011, 2011-2012 and 2012-2013 were unseasonably mild and the winters of 2013-2014 and 2014-2015 were unseasonably cold.

(ii) The saturation of electric heat in this region is rather high due to the lack of distributed natural gas. The electrical loads in this region are influenced by and react to temperature swings; therefore, during extreme cold, the higher peak loads we see are a result of this high saturation of electric heat.

(iii) The Abingdon area is winter critical and it is not unusual for the winter peak loads to be double that of the summer peak loads.

(iv) Load has grown and continues to grow at a steady pace in the residential and commercial sectors.
Abingdon and Hillman Highway Winter Peak Load History and Projections (MVA)

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(1) Projected peak if emergency load transfer had not been performed to avoid an expected overload.
(2) Peak before load transfer to new Arrowhead Station.
(3) Projected peak due to new commercial load being developed in addition to normal growth.

The Abingdon transformer No. 2 serves approximately 3,200 customers, including the Wolf Creek Water Reclamation Facility, the historic Barter Theatre, the historic Martha Washington Inn, the federal courthouse, the highland community services mental health center, Food City’s corporate headquarters, schools, town and county governmental and emergency services buildings, and multiple high-end residential neighborhoods. There is inadequate circuit and transformer capability between Abingdon and adjacent substations for full recovery in the event of an outage of this transformer without the use of a mobile transformer, which typically takes 24 hours to install. Thus, using the actual winter peak loading for the 2014-15 winter as an example, the total winter emergency capacity available during peak conditions (capability minus historical peak load) between substations with circuit ties to Abingdon Substation is 18.7 MVA, which means the remaining 12.5 MVA of the 2014-2015 peak load (31.2 MVA) would have been out in the event of an outage of the Abingdon transformer No. 2.

The Hillman Highway transformer No. 1 serves 2,500 customers, including the main feed for the new Johnston Memorial Hospital, multiple businesses at exits 17 and 19 off Interstate 81, the Glenrochie Country Club and golf community, Lowes, schools, a nursing home, and the Wellmont Health System Outpatient Campus. Under present peak conditions there is adequate circuit and transformer capability between Hillman Highway and adjacent substations for full recovery in the event of an outage of this transformer up to and including winter 2015-2016. However, under projected conditions beyond winter 2016-2017, there is inadequate circuit and transformer capability between Hillman Highway and adjacent substations for full recovery in the event of a transformer outage without the use of a mobile transformer, which typically takes 24 hours to install. Thus, using projected winter 2016-2017 peak loading as an example, the total winter emergency capacity available during peak conditions (capability minus historical peak load) between substations with circuit ties to Hillman Highway Substation is 25.4 MVA, which means the remaining 3.0 MVA of the projected 2016-2017 peak load (28.4 MVA) would be out in the event of an outage of the Hillman Highway transformer No. 1.

Appalachian’s reliability strategy is designed to proactively address key issues to improve the reliability of the distribution system. The Company realizes that heavily loaded and radially fed circuits negatively impact reliability. One of the Company’s adopted reliability strategies is to re-engineer and improve the capacity and switching
capability of radial distribution circuits. The Company’s strategy specifically addresses circuits like the Abingdon/Vances Mill and the Hillman Highway/Cummings Street circuits. The construction of the proposed Project and associated distribution improvements supports Appalachian’s reliability strategy. The shorter circuit lengths and lighter circuit loading provided by the two new distribution circuits that the Project will create will reduce exposure, improve capacity, and provide transfer opportunities, which will improve overall system reliability.

The proposed South Abingdon Substation will serve approximately 1,200 customers currently served by the Abingdon and Hillman Highway Substations. This project will reduce the number of customers served by the Abingdon No. 2 transformer by approximately 800 customers and the Hillman Highway No. 1 transformer by approximately 400 customers.

The Abingdon/Green Springs 34.5 kV circuit serves 1800 residential, commercial and industrial customers across 105 line miles with only one circuit tie to another 34.5 kV circuit, the Abingdon/Bristol Road 34.5 kV circuit. The winter loading on the Abingdon/Green Springs 34.5 kV circuit reached a new peak of 16.8 MVA on February 20, 2015 for its current configuration. The Green Springs circuit previously served all of the Bristol Road circuit until it was split in 2004 due to an overload. The main line of the Green Springs circuit will run directly beside the proposed South Abingdon Substation. For many years, the Company has wanted to have an additional 34.5 kV source in Abingdon besides the Abingdon Substation. Once loading and/or reliability concerns with the Green Springs circuit justify it, a 138-34.5 kV transformer can easily be installed at the proposed substation to reduce loading and exposure on the Abingdon/Green Springs circuit. The proposed South Abingdon 138 kV Substation design will be adequate to accommodate additional transformer capacity in the future and is expected to be adequate to serve the new residential and commercial load growth in the surrounding area for the foreseeable future.

C. Describe the feasible alternatives, if any, for meeting the identified need without constructing the proposed project. Explain why these alternatives were rejected.

The Company considered a number of transmission alternatives and distribution alternatives to the Project.

Transmission Alternatives.

The proposed transmission line taps into the Abingdon-Wolf Hills 138 kV circuit, located on Appalachian’s existing Saltville-Kingsport 138 kV transmission line (which has adequate capacity to serve the proposed substation load for both normal and contingency loading for the foreseeable future), and loops this 138 kV source through the proposed South Abingdon Substation to address the area’s distribution load growth and reliability issues. During the planning stage, three other potential transmission sources were considered and rejected – see Figure 3 below (the Preferred Route is shown in a red
hatched line, the alternatives are red lines with arrows).

An alternative consisting of a 138 kV transmission line beginning at Appalachian’s Spring Creek Substation and ending at the proposed South Abingdon Substation was rejected due to proximity to the Virginia Highlands Airport and the length of this line. A route from Spring Creek to South Abingdon would have to avoid the airport’s approach zones, resulting in a line route approximately 5 to 6 miles long.

A second alternative consisting of a 138 kV transmission line beginning at Appalachian’s Wolf Hills Substation and ending at the proposed South Abingdon Substation would be approximately 8 to 9 miles long and was rejected due to its excessive length. In general, the proposed line length increases the further southwest the tap location or substation connection point.

A third alternative consisting of a 69 kV transmission line beginning at Appalachian’s Arrowhead Substation and ending at the proposed South Abingdon Substation would be approximately 6 to 7 miles long. Additionally, the 69 kV system does not have the capacity as provided by the proposed Project’s Abingdon-Wolf Hills 138 kV circuit source.

As compared to these transmission alternatives, the proposed Project involves the shortest length of new line (3.8 miles), minimizes environmental impacts and is the superior transmission alternative.
Distribution Alternatives.

The first distribution alternative that was considered was the installation of a 138 – 12 kV, 25 MVA transformer at Abingdon Substation and the construction of circuitry to split up the heavily loaded Vances Mill circuit connected to the Abingdon No. 2 transformer and the Cummings Street circuit connected to the Hillman Highway No.1 transformer. Although this alternative would alleviate the projected overload on the Abingdon No. 2 transformer, it was not selected because of the difficulty of extending circuitry to where it is needed. Abingdon Substation is rather congested as it has four transformers, three 138 kV transmission line exits, one 69 kV transmission line exit, three 34.5 kV distribution line exits and three 12 kV distribution line exits. Adding circuits from Abingdon Substation would prove to be a very difficult task because of this congestion and the construction would be lengthy and expensive. Because this also does nothing to reduce line exposure to customers in the Vances Mill Road area, or on the end of the Hillman Highway/Cummings Street circuit, this alternative would not provide the circuit reliability and contingency benefit that the proposed Project in its optimal location is expected to provide. With the expected load growth from the new 140 lot subdivision along Stone Mill Road, as well as the commercial growth near Interstate 81 Exit 17 along Virginia State Route 75 (Cummings Street), additional circuits are needed in the optimal load center area. The proposed Project addresses this need and thus provides a greater reliability benefit than this alternative.

The second distribution alternative that was considered was to convert a portion of the Abingdon/Vances Mill 12 kV circuit to 34.5 kV and transfer it to the Abingdon/Bristol Road 34.5 kV circuit. This alternative would be cost intensive because of the large amount of underground cable and pad-mount transformers that would need to be replaced. Although this alternative would alleviate the projected overload on the Abingdon No. 2 transformer, it was not selected because (i) of the high cost to convert from 12 kV to 34.5 kV; (ii) it adds line exposure to customers on both circuits; (iii) of construction outage restrictions; and (iv) it does nothing to address the heavy loading on the Hillman Highway/Cummings Street circuit. Additionally, this alternative would not provide the substation and circuit reliability and contingency benefits that the proposed Project and its optimal location are expected to provide. Load will continue to grow in the Interstate 81 Exit 17 area served from the Hillman Highway/Cummings Street circuit now. Additional substation transformer and circuit capacity will eventually be required to serve this area as a result of this projected load growth. Therefore, this conversion alternative would only provide a temporary solution and the Project would still be needed at some point in the future.

The last distribution alternative that was considered was to add a second 12 kV breaker on the transformer No. 2 bus at nearby Spring Creek Substation (see the Present Transmission System map, Exhibit 4), install a second circuit exit to create a new circuit and perform a permanent load transfer from the Abingdon/Route 19 circuit to this newly created circuit from the Spring Creek Substation. The Spring Creek Substation is located 3.6 miles south-west of the Abingdon Substation. This alternative would require minimal
line work to create 0.35 miles of new double distribution circuit construction through the Oak Park Industrial Park in order to reconfigure the area circuitry and relieve load on the Abingdon Substation. Although this alternative would alleviate the projected overload on the Abingdon No. 2 transformer, it was not selected because it would not address the heavy loading on the Abingdon/Vances Mill or the Hillman Highway/Cummings Street circuits. This alternative would not provide the substation and circuit reliability and contingency benefit that the proposed Project and its optimal location are expected to provide. Additionally, adding a second circuit to the Spring Creek Substation transformer No.2 is expected to eventually be necessary to serve only the industrial customers in the Oak Park Industrial Park as load develops in that industrial park. The Spring Creek alternative would only provide a temporary solution and the Project would still be needed at some point in the future. By the time the capacity of this alternative would be exhausted, the area around the proposed South Abingdon Substation site is likely to be more congested with development, thus making construction of new transmission and substation facilities in this optimal location more difficult. This alternative would do nothing to improve the reliability of the existing radial distribution circuits that serve the Vances Mill and Cummings Street areas in the Town of Abingdon.

The proposed Project is the best distribution alternative. It reduces overall distribution circuit exposure in the Project area by 5.9 miles, the combined substation transformer load (Abingdon transformer No. 2 and Hillman Highway transformer No. 1) by 22%, and the combined load of the distribution circuits supported by those transformers by 56%.

D. Describe any lines or facilities which will be removed, replaced, or taken out of service upon completion of the proposed project.

No lines or facilities will be removed, replaced, or taken out of service upon completion of the proposed Project.

E. Provide a system map of suitable scale showing the location and voltage of the Company’s transmission lines, substations, generating facilities, etc., which 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.

Exhibit 4 shows the present regional area system, including transmission lines, circuits, substations, and generation facilities. The nearest Company-owned generating facility is located at Clinch River Station, which is approximately 21 miles north-west of the proposed project on the 138 kV Broadford – Wolf Hills double circuit transmission line. Additionally, Exhibits 3 and 5 show the existing transmission facilities in relation to the proposed Project.

Furthermore, Figures 1 and 2, in the response to Section I.A above, show the existing and proposed transmission and distribution facilities. The proposed substation is in an optimal location between the existing Abingdon and Hillman Highway Substations to address the
projected overload and potential reliability concerns. The Project primarily benefits the colored distribution circuits on Figures 1 and 2. The colored circuits are Abingdon/Vances Mill (blue), and the Hillman Highway/Cummings Street (red). Long term, the Project will benefit the Abingdon/Green Springs circuit (green).

Figure 4 below shows the simplified one-line diagram of the proposed Project.

![Figure 4](image)

**Figure 4**
Simplified One-line Diagram of the Proposed Transmission Line and Substation

In addition to the proposed new transmission line and South Abingdon Substation, the Project also includes the associated improvements to the Company's Abingdon and Wolf Hills Substations located in Washington County, and the Company's Hillman Highway Substation located in the Town of Abingdon (see Exhibit 4). These associated substation improvements are minor and are described in Section II.C.

F. **Provide the desired in-service date of the proposed project and the estimated construction time.**
The desired in-service date for the Project is December 1, 2017. Upon issuance of an SCC order approving the Project, the Company estimates that it will need approximately 12 months for engineering, design, ROW acquisition, permitting, material procurement, outage coordination and construction to place the line in service.

G. Provide the estimated cost of the project.

The total Project costs are estimated to be approximately $30 million.

H. 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 Federal Energy Regulatory Commission (FERC) order, provide the QF or docket number, the dates of all certification or recertification orders, and the citation to FERC Reports, if available;
   b. For self-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.

Not applicable.

I. Describe the new 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.

The closest existing Company generating facility is the Clinch River Station, which is approximately 21 miles northwest of the proposed project on the 138 kV Broadford-Wolf Hills double circuit transmission line (see Exhibit 4). The closest independently owned generating facility is the Wolf Hills, LLC generating facility, which is on the Saltville-Kingsport 138 kV transmission line approximately 7 miles southwest of the Company's Abingdon Substation. The proposed substation will provide for three new 12 kV distribution circuits (see Figure 2). One of these new circuits will require an extension of approximately 2,300 feet of new double circuit overhead distribution line from the new
substation’s 12 kV bus to an existing overhead distribution circuit. One circuit will serve the area west of the new substation along Washington County Route 680 (Vances Mill Rd) and the second circuit will serve a portion south of the Town of Abingdon along Washington County Route 794 (Stone Mill Road). The third circuit will serve existing overhead distribution circuitry running east of the new substation along Washington County Route 680 (Vances Mill Rd) over to and including a portion of Virginia State Route 75 (Cummings Street). This circuit will serve an area south of the Town of Abingdon toward the Exit 17 area of Interstate 81.
SECTION II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way (“ROW”)

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

   The proposed South Abingdon 138 kV Extension transmission line will be approximately 3.8 miles long.

2. Provide a map of suitable scale showing the route of the proposed line and its relation to: the facilities of other public utilities which could influence the route selection, highways, streets, parks and recreational areas, scenic and historic areas, schools, convalescent centers, hospitals, airports and other notable structures close to the proposed project. Indicate the existing facilities which the line is proposed to follow, such as existing right-of-way (ROW), railroad tracks, etc.;

   General location mapping of the Project is provided as Exhibits 1, 2 and 3. More detailed GIS constraints mapping illustrating the Project, and various resources and sensitive features in the vicinity of the Project, is included as Exhibit 5 and electronically on CD-ROM. Furthermore, the Route Development Report (“RDR”) (located in Volume 2 of the Application) includes additional maps and description.

3. Provide a drawing(s) of the ROW cross section showing typical transmission line structure placements referenced to the edge of the right-of-way. This drawing should include:

   a. ROW width for each cross section drawing;
   b. Lateral distance between the conductors and edge of ROW; and
   c. Existing utility facilities on the ROW;

   See Exhibit 6.

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

   The proposed approximately 3.8 mile Preferred Route will require new ROW easements. The ROW easement will typically be approximately 100 feet wide, although in one limited area near the Virginia Highlands Airport, the ROW may need to be up to 125 feet wide. Additionally, some new third-party access road easements may be required. Portions of the proposed ROW may cross existing distribution easements, which will need to be modified and expanded for a
transmission line ROW. The proposed South Abingdon Substation will be located on a 20.7 acre parcel owned in fee simple by Appalachian.

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

The following are Appalachian’s typical transmission 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 AEP and NESC safety clearances.

**ROW Clearing**

a. In areas with 100 feet or more 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; and
- where wire setup areas and other work areas are required.

b. In locations with less than 100’ 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, Appalachian 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.
- 100 feet of water supply wells.
- 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, standards established by the International Society of Arboriculture, the American Standards Institute, and the Tree Care Industry Association will be used.

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, Appalachian will dispose of them in a suitable location.

h. The disposal by Appalachian 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:

   (1) 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.

   (2) 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.

   (3) Let Lay - 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 lies 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. Appalachian 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, Appalachian 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 1cm) that result in soil moisture capacity occurring above field capacity.
   - Buffer zones will be maintained around streams, ponds, karst features, springs, wetlands, and water supply wells in accordance and compliance with herbicide label directions.
• In areas within the boundaries of any karst feature and any channelized drainageway (perennial or intermittent) draining to a karst feature, wetland-approved herbicides shall be used in accordance with label and manufacturer directions.

Long-term Right-of-Way Maintenance Plan
Appalachian 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, Appalachian 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, Appalachian will utilize selective clearing methods to retain low-growth shrubs and other compatible vegetation. The following is a partial list of compatible tree species typically allowed within Appalachian’s transmission line ROW:

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<th>COMMON NAME</th>
<th>BOTANICAL NAME</th>
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<td>Amur Maple</td>
<td>Acer ginnala</td>
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<tr>
<td>Japanese Maple</td>
<td>Acer palmatum</td>
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<tr>
<td>Serviceberry</td>
<td>Amelanchier arborea or canadensis</td>
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<tr>
<td>Redbud</td>
<td>Cercis canadensis</td>
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<tr>
<td>Fringetree</td>
<td>Chionanthus retusus or virginicus</td>
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<td>Pink Dogwood</td>
<td>Cornus florida &quot;Rubra&quot;</td>
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<td>Dogwood</td>
<td>Cornus florida &quot;White&quot;</td>
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<td>Kousa Dogwood</td>
<td>Cornus kousa</td>
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<td>Washington Hawthorn</td>
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<td>Saucer Magnolia</td>
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<td>Japanese Weeping Cherry</td>
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<td>Cleveland Select Flowering Pear</td>
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<td>Pyramidal Arborvitae</td>
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<td>Littleleaf Linden</td>
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<tr>
<td>Leatherleaf Viburnum</td>
<td>Viburnum rhytidophyllum</td>
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6. **Indicate the permitted uses of the ROW;**

The property owner will retain the right to use the easement area for grazing, pasture lands, gardens, cultivated fields, driveways, parking, and bike and walking paths or any other use that is not inconsistent with Appalachian’s right to construct, operate, maintain or remove its electric transmission line. Appalachian will retain the right to clear and keep the easement area clear of buildings and/or other obstructions together with the right to clear any woody vegetation which may endanger the safe operation of the electric transmission line.

7. **Describe the Company's route selection procedures. Detail alternative routes considered. Describe the Company's efforts in considering these alternatives. Detail why the proposed route was selected and other alternatives were rejected;**

The *Route Development Report* (“RDR”), prepared by POWER Engineers, Inc. (“POWER”) and included in Volume 2 of this Application, discusses the Preferred Route selection process for the Project. A brief summary is included below, and an in-depth discussion of this process can be found in the RDR. The resulting Preferred Route consist of several study segments, which POWER identified, evaluated and compiled, as detailed in the RDR. Generally, the selection of the Preferred Route involved the following steps:

a) **Study Area Definition**

The Project study area sets initial boundaries for the data collection process and was defined to include feasible geographically diverse areas for the location of the Project between the defined endpoints. Appalachian defined the endpoints as a tap point on the Saltville-Kingsport 138 kV transmission line (the northern endpoint) and the proposed South Abingdon Substation site (southern endpoint). The study area is further defined based on the identification and characterization of existing land use and identification of areas of potential routing opportunities and constraints located within the study area. Porterfield Highway (US Route 19/Alternative 58) and Cummings Street were identified as the eastern boundaries of the study area. Extending the study area farther to the east of these roads did not provide any viable locations for crossing West Main Street (U.S. Route 11) due to the extensive development in the Town of Abingdon. The western border of the study area is limited by the Virginia Highlands Airport. The southern extent of the study area was drawn to encompass an area that was large enough to accommodate routing options, while small enough to create a focused segment network for connecting the Project endpoints.

b) **Data Collection and Base Map Development**

A range of geographic information was acquired within the Project study area, as described in Section 2.4 and 3.0 of the RDR. Data was compiled from:
• Data collection from publicly available published data, aerial photographs, USGS maps, and GIS data repositories (including data from the Washington County GIS database and the Virginia Department of Historic Resources database).
• Local, state, and federal planning documents
• Coordination with regulatory agencies, including federal, state, and local officials.
• Field reviews from public roads and other public access points.
• Input from the public through the public open house and meetings with local landowners.

Key relevant features in the compiled geographic data are presented in a GIS Constraints Map (Exhibit 5).

c) Development of Routing and Technical Criteria
Following the establishment of the study area, the Company and POWER developed routing and technical criteria. These criteria can be found in Section 2.5 of the RDR. To aid in the development of viable study segments and ultimately the selection of the Preferred Route, the Company and POWER used and referenced general siting criteria, consisting of both routing criteria and technical criteria.

d) Opportunities and Constraints Analysis
After collecting data and developing routing and technical criteria, the Company and POWER conducted an opportunities and constraints analysis to develop the Project’s preliminary study segments for the Project.

The study area was limited in available opportunities, as there were no north-south existing linear transmission line facilities. Opportunities were limited to roadways including, Porterfield Highway and Stone Mill Road. In some areas where parcels were larger, paralleling parcel boundaries was considered as an opportunity feature within the study area. The main constraints for the Project are existing and future residential and commercial development along major roadways.

e) Identification and Development of Study Segments and Alternative Routes

Using the information gathered, the Company and POWER developed an array of preliminary study segments for the Project. Study segments are portions of a route between interconnecting nodes that are combined to form full routes, which connect Project endpoints. The preliminary study segments were field reviewed from publicly accessible locations to document existing land uses, visual resources, wildlife and habitat, wetland and water resources, constructability concerns and requirements, and other evaluation criteria.
Several modifications, additions, and eliminations of the study segments resulted from the field reviews and discussions with local agencies. Table 1 in the RDR shows a summary of study segments that were removed from further review and which segments were carried forward and presented at the public open house. After the public open house, study segments were further refined or eliminated. The remaining study segments were assembled into full alternative routes for comparison.

Three alternative routes were identified for the Project. The alternative routes are described in Section 4.2 of the RDR and presented on Map 6 of the RDR.

f) Evaluation and Comparison of the Alternative Routes
The alternative routes were compared with respect to the siting and evaluation criteria, stakeholder and public input, and the potential to impact soils and geological resources, water resources, vegetation, wildlife, sensitive species, land use, visual and recreational resources, cultural resources, and engineering and constructability.

The following is a summary comparison of the alternative routes. Specific details of the alternative route comparison are found in Section 6 of the RDR.

Summary Comparison of Alternative Routes

Alternative Route A

Advantages:
- Shortest route
- Lowest acreage of tree clearing within the right-of-way (similar to Alternative B)
- Crosses the smallest area of prime farmland

Disadvantages:
- Highest percentage of total length crossing steep slopes (> 20%)
- Highest number of line angles greater than 30 degrees (same as Alternative Route B)
- Highest number of archaeological sites within the right-of-way
- The highest number of dwellings within 250 and 500 feet of the centerline
- Greatest potential for visual impacts due to the proximity to viewers from residential areas, Virginia Highlands Community College and Heartwood Artisan Center
- Larger impact on recreational resources
- Highest number of structures (barns, outbuildings, sheds, garages, and silos) within the right-of-way
- Larger impact to future land use on the north side of West Main Street
- Penetrates the airport approach surface of Virginia Highlands Airport
- Crosses the highest number of NHD streams

**Alternative Route B**

*Advantages:*

- Smallest number of archaeological resources in the right-of-way (same as Alternative Route C)
- Lowest percentage of total length crossing steep slopes (> 20%)
- Crosses the lowest number of NHD streams (same as Alternative Route C)

*Disadvantages:*

- Longest route (similar to Alternative Route C)
- Highest number of line angles greater than 30 degrees (same as Alternative Route A)
- Larger visual impact due to the proximity to viewers from residential areas, Virginia Highlands Community College and Heartwood Artisan Center
- Larger impact on recreational resources
- Crosses the most acres of karst topography

**Alternative Route C**

*Advantages:*

- Lowest number of dwellings within 250 and 500 feet of the centerline
- Smallest number of line angles greater than 30 degrees
- Most compatible with existing and future land use
- Does not penetrate the approach surface to Virginia Highlands Airport
- Lowest number of archaeological resources in the right-of-way (same as Alternative Route B)
- Minimizes to the greatest extent overall visual impacts to recreational resources
- Fewest engineering and constructability concerns
- Crosses the fewest number of NHD streams (same as Alternative Route B)
- Crosses the fewest acres of karst topography
Disadvantages:

- Requires the highest acreage of tree clearing within the right-of-way
- Requires the largest number of linear infrastructure crossings (roads and highways)

g) Identification of the Preferred Route

Based on a qualitative and quantitative review of the evaluation criteria and information received at the public meeting and through agency consultation, the Company and POWER selected Alternative Route C as the Preferred Route for the Project (see Exhibit 5).

The Preferred Route minimizes impacts to existing and future residential development by reducing the number of dwellings in proximity to the centerline and maximizes the crossing of compatible commercial/industrial land uses. The corridor utilizes crossings of major roadways primarily with existing industrial and commercial development – further minimizing impacts to existing land uses. The Preferred Route meets the goals of the Project and best minimizes impacts on people and scenic, environmental and historic resources.


Protecting environmental resources such as natural, historic, scenic, and recreation values is of high importance to Appalachian. The siting and construction 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 procedures used for this Project, see the RDR and the DEQ Supplement prepared by Appalachian's environmental and routing consultant, POWER Engineers, Inc., included in Volume 2 of this Application. Additionally, see Section III of this Response to Guidelines. For a summary of the route development process, see Section II.A.7 above.
9. 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) advise of each electric utility affected; (2) whether any affected electric utility objects to such construction and (3) the length of line(s) proposed to be located in the service area of an electric utility other than the applicant;

Approximately 2.6 miles of the proposed transmission line is located in Washington County and approximately 1.2 miles is located in the Town of Abingdon. See Exhibits 1 through 3 and Exhibit 5.

No portion of the Project will be located outside of Appalachian’s certificated service territory.

b. Provide three (3) copies of the Virginia Department of Transportation "General Highway Map" of 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 showing the line outside of the applicant's certificated service area, have the appropriate individual of the affected electric utility sign if his/her company is not opposed to the proposed construction.

Three copies of the county highway maps for Washington County are being provided separately to the Commission Staff with this application. Reduced copies of these maps are provided as Exhibit 3. The maps include the proposed Project and Appalachian’s existing transmission facilities.

B. Line Design and Operational Features

1. Detail number of circuits and their design voltage and transfer capabilities;

The proposed South Abingdon 138 kV Extension will be a double circuit transmission line (Abingdon – South Abingdon 138 kV circuit and South Abingdon – Wolf Hills 138 kV circuit) with a three-phase design and a nominal phase-to-phase voltage of 138 kV. The maximum load transfer capability of both circuits is 413 MVA (summer emergency rating) and 464 MVA (winter emergency rating). See the one-line diagram located in Section I.E (Figure 4).
2. **Detail number, size(s), type(s), and typical configurations of conductors;**

   Each of the two proposed three-phase 138 kV circuits will consist of three non-specular 1,033,500 emil ACSR (Aluminum Conductors Steel Reinforced) “Curlew” conductors with 54/7 stranding (1.245” diameter) with one conductor per phase. The conductors will be arranged in a vertical configuration. See Exhibit 6 for proposed conductor configurations and phase separations.

   The structures will typically use one (1) 0.646” diameter optical ground wire “OPGW” for lightning protection and utility operations. The OPGW is composed of aluminum clad steel strands surrounding a stainless steel tube containing fiber optic strands used for utility operations and communication. See Exhibit 6 for the typical configurations of the proposed ground wires. Additionally, see further detail and description of the structures in the following Section II.B.3.

3. **With regard to the proposed supporting structures over each portion of the ROW provide:**

   a. **types of structures;**

   Structure types will be determined during final engineering, which includes ground survey and geotechnical studies. Nevertheless, based on preliminary engineering, the Company anticipates using primarily 138 kV double circuit steel monopoles with davit arms in connection with the construction of the Project (see Exhibit 6). The anticipated approximate structure heights range from 80 to 125 feet tall with an average height of approximately 105 feet.

   Approximately two structures, consisting of two H-Frames each, may be necessary to reduce structure height in proximity to the Virginia Highlands Airport depending on FAA recommendations (see Exhibit 6). These structures may need to be marked or lit, depending on FAA recommendations. The anticipated approximate heights of the H-frame structures range from 60 to 80 feet tall with an average height of approximately 70 feet.

   The Company estimates that there will be approximately 40 monopole structures and approximately 2 H-frame structures (each consisting of 2 H-frames) associated with the construction of the South Abingdon 138 kV Extension transmission line.
b. through j. description of proposed structures:

<table>
<thead>
<tr>
<th>a. types of structures:</th>
<th>Monopole with Davit Arms (Double Circuit)</th>
<th>H-Frame¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>b-1. length of ROW with each type of structure;</td>
<td>Approximately 3.8 miles</td>
<td>Approximately 0.2 miles</td>
</tr>
<tr>
<td>b-2. estimated number of structures:</td>
<td>Approximately 40</td>
<td>Approximately 2 (consisting of two H-Frames each)</td>
</tr>
<tr>
<td>b-3. typical width of ROW:</td>
<td>100'</td>
<td>125'</td>
</tr>
<tr>
<td>c. material for typical structure (steel, oxidizing steel, etc.):</td>
<td>Low Reflective Finish (galvanized steel with a dulled finish or weathering steel)</td>
<td>Low Reflective Finish (galvanized steel with a dulled finish or weathering steel)</td>
</tr>
<tr>
<td>d. foundation material:</td>
<td>The majority will be direct embedded (10-foot average depth)</td>
<td>The majority will be direct embedded (12-foot average depth)</td>
</tr>
<tr>
<td>e. width at cross arms of typical structure:</td>
<td>Structure width is approximately 22.0'</td>
<td>Approximately 32.0'</td>
</tr>
<tr>
<td>f. width at base of typical structures:</td>
<td>Average 3.5' diameter pole</td>
<td>15.5' Average 2.5' diameter poles</td>
</tr>
<tr>
<td>g. typical span length:</td>
<td>500'</td>
<td>600'</td>
</tr>
<tr>
<td>h-1. approximate average height of structures (above ground):</td>
<td>105'</td>
<td>70'</td>
</tr>
<tr>
<td>h-2. approximate typical structure height range (above ground):</td>
<td>60' to 125'</td>
<td>60' to 80'</td>
</tr>
<tr>
<td>i. a schematic drawing of each typical structure:</td>
<td>See Exhibit 6</td>
<td>See Exhibit 6</td>
</tr>
<tr>
<td>j. minimum conductor-to-ground clearances under maximum operating conditions:</td>
<td>22.0'</td>
<td>22.6'</td>
</tr>
</tbody>
</table>

Note: Totals and figures are approximations based on best available data until a detailed design has been finalized.

¹Approximately two structures consisting of two H-Frames each may be necessary to reduce structure height in proximity of the Virginia Highlands Airport depending on FAA recommendations.
4. **Describe why the proposed structure type(s) was selected for this line.**

The proposed 138 kV double circuit steel monopole structure selected for the Project was based on the terrain, land use within the project corridor, and the number of circuits required. The monopole structure is applicable for areas that require short spans, numerous turning angles, and condensed footprints in order to reduce impacts on existing land use. The Project’s proposed route traverses a moderately populated and developed land use in the Town of Abingdon and portions of Washington County. The proposed 138 kV H-frame structures that may be used in proximity to the Virginia Highlands Airport were selected in order to reduce the height of the transmission line near the airport, by using a horizontal conductor configuration.

The Company plans to use a low-reflective finish on the Project’s proposed transmission line structures and non-specular conductors to reduce visual presence.

C. **Describe and furnish plan drawings of all new substations, switching stations, and other ground facilities associated with the proposed project.**

**Proposed New Construction of the South Abingdon 138 kV Substation:**

The fenced portion of the proposed substation will be approximately 300’ by 240’ and will be located on a 20.7 acre parcel that the Company owns. This property was formerly the Abingdon Stockyard Exchange. The substation plan includes space for future expansion.

The new substation includes the installation of:

- Three 138 kV transmission line positions in a standard in-line layout (two to be installed as part of the Project and one to be installed in the future);
- One 138/12 kV transformer and standard 12 kV left hand rural distribution structure with three 12 kV distribution feeder positions; and
- One new 16’ x 36’ mirrored base DICM (Drop in Control Module) to be located in the southwest corner of the new substation.

See Exhibit 8 and the one-line diagram located in Section I (Figure 4).

**Proposed Improvements at the Existing Abingdon 138 kV Substation:**

The 138/69/34.5/12 kV improvements at the existing Abingdon Substation will be located within the Company’s existing property and include:

- Replacement of 138 kV MOAB “X1”, “X2”, “X3” and ground switches “Z1”, “Z2” and “Z3” with new 138 kV circuit switchers and disconnects;
• Replacement of MOAB switch “R” with a new 138 kV circuit breaker and disconnects and the replacement of MOAB switch “S” with a new MOAB;
• Relocation of the existing Abingdon – Hillman Highway 69 kV circuit to a new H-Frame substation structure on the northeast side of the substation;
• Replacement of circuit breaker “A” with a new 69 kV circuit breaker and disconnects and installation of new 69 kV CCVTs and surge arresters on the relocated Abingdon – Hillman Highway 69 kV circuit;
• Replacement of the low-side transformer disconnect switches with new circuit breakers and disconnect switches on Transformer #2, #3 and #4;
• Replacement of the transformer mounted surge arresters;
• Replacement of the 34.5 kV bus tie switch with a new 34.5 kV circuit breaker and disconnects, and;
• Addition of a new 16’ x 36’ DICM (Drop in Control Module) located in the southeast corner of the substation, and a new concrete duct bank from the 34.5 kV yard to the 138 kV yard.

See Exhibit 7 and the one-line diagram located in Section I (Figure 4).

Proposed Improvements at the Existing Hillman Highway 69 kV Substation:

The improvements at the existing Hillman Highway Substation will be located within the Company’s existing property. This minor work generally consists of protection and controls (e.g., relaying work) associated with the Project.

Proposed Improvements at the Existing Wolf Hills 138 kV Substation:

The 138 kV improvements required at the existing Wolf Hills Substation will include installation of new 138 kV Bus #2 CCVTs on the existing empty combo metering structure, and adding new line arresters.
SECTION III. IMPACT OF LINE ON SCENIC, ENVIRONMENTAL, AND HISTORIC FEATURES

The Route Development Report ("RDR") and the DEQ 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, see the RDR and the DEQ Supplement. General location maps depicting the Project are included as Exhibits 1, 2, and 3. More detailed GIS constraints maps, illustrating the Preferred Route, and the various resources and sensitive features in the vicinity of the Project, are included as Exhibit 5. Furthermore, the RDR includes additional Project maps.

A. Describe the character of the area which will be traversed by this line, including, land use, wetlands, etc. Provide the number of dwellings within 500 feet of the line for each route considered.

The majority of the study area has been impacted by activities associated with agricultural operations or by the construction of residential subdivisions, commercial and industrial facilities, and linear features including roadways, rail lines and utility corridors. The original forest vegetation of the area has been widely cleared. The Preferred Route is located on gently rolling topography, between forested ridges north and south of the Project. No significant topographic features, rivers or water bodies are crossed by the Preferred Route. The area is primarily composed of agricultural fields or development with small woodlots scattered throughout. Although the area is not heavily forested, scattered trees, wood lots, and hedgerows are prevalent. Bands of trees are found along many property lines and roadways. The existing landscape character is a mix of pastoral, agricultural areas composed of fields, agriculture-related structures, and scattered residences, and developed areas along main roadways.

The number of dwellings within 500 feet of the centerline of the Preferred Route (Alternative C) is 17. The number of dwellings within 500 feet of the centerline of Alternative Routes A and B are 40 and 23, respectively.

B. Advise of any public meetings the Company has had with neighborhood associations and officials of local, state or federal governments who will have an interest or responsibility with respect to affected area or areas.

Federal, State and Local Contacts
Contacts were made with federal, state, and local government agency representatives as discussed in the RDR. Agency comments, correspondence, and project reviews were utilized to develop, modify, and analyze the study segments and alternative routes. See Attachment 3 to the RDR and the attachments to the DEQ Supplement for copies of the agency responses. The Company also met with many local agencies and interested stakeholders or landowners throughout the process. A full list of these meetings is included in Section 2.4.3 in the RDR.
Public Open House

A public open house was held on September 24, 2015 from 5 p.m. to 8 p.m. at the Virginia Higher Education Center at One Partnership Circle in Abingdon, Virginia. The public open house was an open forum where residents or interested parties could visit a variety of information stations to learn about the Project and provide comments. The community was notified about the time and location of the meeting through several avenues:

1) Residents within 250 feet of any of the Project study segments (shown on Map 5 of the RDR) received two automated telephone notifications from Appalachian.

2) Residents within 250 feet of any of the Project study segments (shown on Map 5 of the RDR) received a first-class US mail letter informing them about the Project and the open house. Approximately 175 letters were mailed to landowners. The landowner addresses were obtained from the current Washington County GIS parcel data, which includes the tax parcel owners’ address(s). This is the best readily available data for such a mass mailing.

3) A Project description, map, and public open house invitation were published in the local newspapers (Washington County News and Bluefield Daily Telegraph) once during the week of September 14, 2015 and once during the week of September 21, 2015.

4) The meeting was announced on the Project website established by Appalachian (www.AppalachianPower.com/SouthAbingdon) to further encourage attendance of the local community.

At the public open house, the Company and POWER provided several avenues for the public to provide comments. First, printed maps displaying the study segments at a scale of 1 inch = 200 feet were provided at the meeting. Members of the Company and POWER assisted the public in writing and capturing hand written comments on the printed maps. Second, the Company and POWER set up four GIS stations to receive and load public comments directly into the Project comment database. Third, the Company and POWER provided blank comment cards and asked open house attendees to fill them out at the meeting or mail to Appalachian at a later date. Finally, Appalachian created a Project website where members of the public can submit comments to the Company and POWER or email a Project Team representative at any time.

One hundred and fifteen (115) people attended the open house. Approximately, 50 comments have been received on the Project and entered into the Project public comment database, as of February 18, 2016.
Other Utilities
The Project is located within Appalachian’s service area. No other electric utilities will be affected.

C. Detail the nature, location, and ownership of all buildings which will have to be demolished or relocated if the project is built as proposed.

No residential dwellings are located within 50 feet of the Preferred Route centerline.

One outbuilding structure is located within 50 feet of the Preferred Route centerline and will need to be removed. The outbuilding is located near the proposed South Abingdon Substation and on the future expansion area of the Abingdon Quarry. According to Abingdon Quarry representatives, this building would be removed for the proposed future expansion of mining operations in the next five years, regardless of the Project.

One commercial structure is located within 50 feet of the Preferred Route centerline and will need to be removed. The building is located north of I-81 and is an office for a used car dealer. The structure appears to be a mobile structure that could be relocated to a location outside of the right-of-way.

D. What existing physical facilities will the line 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 right-of-way that will be paralleled. How long has the right-of-way been in use?

There were no existing linear facilities in the study area suitable for paralleling by any Project alternatives, including the Preferred Route.

E. Has the Company investigated land use plans in the areas of the proposed route? How will the building of the proposed line effect future land use of the areas affected?

Yes. At the start of the route development process, the Company and POWER reviewed relevant local or state planning documents that were publicly available. Federal, state or local planning documents reviewed include:

- Virginia Department of Transportation (“VDOT”): Abingdon 2020 Transportation Plan
- VDOT: I-81 Exit 14 Improvement Plans
- Washington County, Comprehensive Plan
- Virginia Department of Conservation and Recreation, Virginia Outdoors Plan
- Abingdon Historic Properties Master Plan
- Town of Abingdon Capital Improvements Plan
- United States Fish and Wildlife Service (USFWS): Information for Planning and
Conservation System

Further, the Company met with officials and administrators from Washington County and the Town of Abingdon, as well as with other key stakeholders including Virginia Highlands Community College leadership, Southwest Virginia Higher Education Center representatives, Virginia Highlands Airport Authority personnel and consultants, Abingdon Quarry managers, the Pioneer Chevrolet dealership’s manager, representatives of Dutt & Wagner of Virginia, Inc., and other local landowners. The meetings were conducted to introduce the Project, obtain feedback and information on planned and future use in the area, and to keep the localities and public informed of the Project.

The Preferred Route does not cross any Virginia Outdoors Foundation (“VOF”) conservation easements or any other conservation easements.

The Preferred Route traverses residential, commercial, and industrial development areas. The Preferred Route crosses one area that the Town of Abingdon Comprehensive Plan (See RDR) identifies as a “development opportunity area” and is located around Exit 14 on I-81. The comprehensive plan identifies another area as a “potential park facility” also near Exit 14 on I-81. The Washington County Comprehensive Plan’s Future Growth Map shows that the Preferred Route crosses areas designated for commercial and residential uses. The Preferred Route avoids land use designated as open space and highlands (where open space and conservation is encouraged). Further, Appalachian met with the Town of Abingdon and Washington County several times to discuss the Project and potential land use conflicts. During these meetings, the local officials and administrators did not indicate that the Preferred Route would have impacts on future use in the area. Lastly, development around Exit 14 of I-81 can occur after the transmission line has been constructed, as long as no buildings are located within the final right-of-way. More information regarding existing and future land use can be found in Section 5.3 and 6.3 of the RDR.

Both the Washington County Planning Commission and Board of Supervisors have approved the proposed South Abingdon Substation as being in accord with the County’s Comprehensive Plan (see Exhibit 10).

Construction has begun on a large new residential development within the study area (140 units proposed at The Heritage at Abingdon) located between Millbrook Drive and Stone Mill Road. The Company contacted the owner/developer and received a copy of the development plans and route recommendations. To minimize conflicts, the Preferred Route was sited to cross the northern edge of the proposed development, crossing lots that are not numbered for sale and roughly paralleling the development's water line easement.

The Company met with representatives from the Abingdon Quarry to discuss the future expansion of the mining operation. Through this discussion, the Company
learned that the Abingdon Quarry plans to mine its property south of the existing operation, ultimately extending the quarry almost all the way to Vances Mill Road. The Preferred Route was sited to run along the western edge of the Abingdon Quarry property and be roughly 40 feet from the existing sewer line on the southern edge of the property. The location of the Preferred Route is not anticipated to adversely impact the Abingdon Quarry’s future plans.

Transportation infrastructure crossed by the Preferred Route includes Interstate 81, a U.S. highway, two state highways, a railroad, and five county roads. The Preferred Route will not present any permanent conflicts with these transportation routes. Through agency consultation and one in-person meeting with VDOT representatives, it was determined that the Project will have no effect on any proposed VDOT transportation projects (see Attachment 3 of the RDR).

1. **Has the Company 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 Virginia Code Section 3.1-18.5.3?**

   After inquiry by the Company, Washington County and the Town of Abingdon indicated that neither has designated any important farmlands within their respective jurisdictions.

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

   NA

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

   NA

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

   NA

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

   NA

F. **Identify the following that lie within or adjacent to the proposed right-of-way:**
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;

Per the Guidelines for Assessing Impacts of Proposed Electric Facilities on Historic Resources in the Commonwealth of Virginia (2008) (the "2008 Guidelines"), issued by the Virginia Department of Historic Resources ("VDHR"), POWER completed a Pre-Application Analysis (see Attachment 2.1.1 of the DEQ Supplement included in Volume 2 of this Application). Background archival research was conducted regarding surveyed properties within the buffers established by the 2008 Guidelines for the Alternative Routes. The Area of Potential Effect for the Project is the tiered radial buffer framework, as defined by VDHR as: extending 1.5 miles for National Historic Landmarks; 1.0 mile for resources listed on the National Register of Historic Places ("NRHP") and the Virginia Landmarks Register ("VLR") and historic districts/battlefields that have been determined eligible for the NRHP/VLR; and 0.5 mile for NRHP-eligible historic properties. The Pre-Application Analysis and a supplemental memo were submitted to VDHR for review. In its response, VDHR recommends a comprehensive archaeological and architectural survey, evaluation of resources for listing in the VLR/NHRP, assessment of potential direct and indirect impacts to all VLR/NHRP-eligible resources and the Overmountain Victory National Historic Trail (“OVNHT”), and avoidance, minimization, and/or mitigation for any moderate to severe impacts. Attachment 2.1.2 to the DEQ Supplement (Volume 2 of this Application) is a copy of the response letter received from the VDHR Office of Review and Compliance and its full list of recommendations on the South Abingdon 138 kV Extension transmission line. Appalachian will continue to work with VDHR to minimize impacts to cultural resources.

There are no National Historic Landmarks located within 0.0 to 1.5 miles and no NRHP-listed resources or NRHP/VLR-eligible historic districts or battlefields are within 0.0 to 1.0 miles of the Preferred Route centerline. There are no NHRP-eligible historic properties within 0.5 miles of the Preferred Route centerline.

2. Any historic landmark, site, building, structure, district or object included in the Virginia Landmarks Register maintained by the Virginia Board of Historic Resources;

There are no historic landmarks, sites, buildings, structures, districts or objects included in the Virginia Landmarks Register maintained by the Virginia Board of Historic Resources within or adjacent to the Preferred Route right-of-way.

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

The closest historic district is located within the Town of Abingdon, approximately 1.2 miles east of the Preferred Route.
4. Any state archaeological site or zone designated by the Director of the Virginia Department of Historic Resources, or his predecessor, and any site designated by a local archaeological commission, or similar body;

Two previously surveyed archaeological sites are within the Preferred Route right-of-way and include VDHR sites 44WG0298 and 44WG0123 (see Attachment 2.1.1 in the DEQ Supplement included in Volume 2 of this Application). Site 44WG0298 is classified as an open air site with Archaic and Woodland Period components and 44WG0123, represents the remains of an Archaic and Woodland Period upstream campsite. The VDHR inventory form for 44WG0298 states that an unknown portion of the site has been destroyed. Neither sites have been previously evaluated for the NRHP.

5. Any underwater historic property designated by the Virginia Department of Historic Resources, or predecessor agency or board;

None.

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

None.

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

None.

8. Any area accepted by the Director of the Virginia Department of Conservation and Recreation for the Virginia Natural Area Preserves System;

None.

9. Any conservation easement qualifying under Section 10.1-1009 to -1016 of the Code of Virginia, or prior provision of law;

None.

10. Any state Scenic River;

None.
11. Any federal, state, or local park, forest, game or wildlife preserve, recreational area, or similar facility; features, sites, and the like listed in 1 through 10 above need not be identified again.

The Preferred Route will cross the Overmountain Victory National Historic Trail ("OVNHT") at one location on Stone Mill Road. The OVNHT is administered by the National Park Service ("NPS") and although it has not been evaluated for the NRHP, is considered an important resource at both the state and federal levels. POWER, on behalf of Appalachian, has initiated consultation with the NPS and VDHR as part of the preparation of this application and will continue to work with these agencies to minimize potential impacts to the resource. A response letter was received from the NPS and can be found as Appendix C of Attachment 2.1.1 to the DEQ Supplement and in Attachment 3 to the RDR.

G. List any airports where the proposed route will place a structure or conductor within the glide path of the airport. Advise of contacts and results of contacts made with appropriate officials regarding the effect on the airport’s operations.

The Preferred Route passes approximately one mile east the Virginia Highlands Airport runway. Appalachian consulted and met with representatives of the Virginia Highlands Airport in the fall of 2015 and winter of 2016. On behalf of the Virginia Highlands Airport, Delta Airport Consultants, Inc. conducted a preliminary Part 77 review of the Preferred Route in January, 2016. The review indicated three of the proposed structures may be of concern to the airport. After reviewing the report prepared by Delta Airport Consultants, Inc., the Company was able to move one of the three structures to address the airport's concern. The two other structures of concern could not be moved. Appalachian will continue to coordinate with the airport’s operator and the Federal Aviation Administration ("FAA") to mitigate the airport's remaining concerns as appropriate (e.g., marker balls, reduced structure heights and lighting). The Project satisfies the criteria of 14 CFR Part 77.9 for filing a Notice of Construction or Alteration with the FAA and Appalachian will file such notice and work with the FAA in order to receive a favorable “Determination of No Hazard to Air Navigation.”

H. Advise of any scenic byways that are in close proximity to or 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 highway's crossings.

The Preferred Route does not cross any America’s Byways designated by the Federal Highways Administration or any Virginia Scenic Byways designated by VDOT. VDCR lists Virginia Route 75 as a scenic road that should be evaluated for qualification as a Virginia scenic byway. Route 75 is also part of the OVNHT motor route. Virginia Route 75 is on the southeast corner of the study area and is not crossed by the Preferred Route; however, it is approximately 0.25 mile from the Preferred Route centerline, in the vicinity of the proposed South Abingdon Substation.
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 right-of-way. If the new transmission line is to be constructed on an existing electric transmission line right-of-way, provide the present EMF levels as well as the maximum levels calculated at the edge of right-of-way after the new line is operational.

The following is an analysis of electric and magnetic fields (“EMF”) associated with Appalachian’s proposed South Abingdon 138 kV Extension Transmission Line Project (the “Project”). The Project is located in the general vicinity of the Town of Abingdon in southwest Virginia (see Exhibit 1).

The new line will be built to 138 kV standards using double-circuit monopole structures. An optimal phase configuration, known as “superbundle” (1-2-3/1-2-3, top-to-bottom), will minimize combined EMF exposure from the two circuits of the new line because these circuits normally will carry power in opposite directions.

EMF levels were computed at the ROW edges of the new 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 2017-18 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 new 138 kV line are 0.1 kV/m and 12.2 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.

Electric and magnetic fields 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 kilovolts per meter (“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 milligauss (“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 IV-3.
As part of the National Energy Policy Act of 1992, 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 everyday, 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 C95.6™-2002 [6] recommends the following limits:
<table>
<thead>
<tr>
<th>General Public</th>
<th>Controlled Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric Field Limit (kV/m)</td>
<td>5.0</td>
</tr>
<tr>
<td>Magnetic Field Limit (mG)</td>
<td>9040</td>
</tr>
</tbody>
</table>

*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 World Health Organization 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 Electric Power Research Institute, an independent, non-profit organization sponsoring and coordinating EMF epidemiological, laboratory and exposure studies.

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

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.

A description of the proposed transmission line route is provided below. The requested map is included as Exhibit 2.

The proposed approximately 3.8 mile transmission line route begins at Appalachian’s existing Saltville-Kingsport 138 kV transmission line and connects to this existing line at a tap point to be located between existing structures No. 87 and 88, located in Washington County approximately 0.25 mile southwest of US Route 19/Alternative 58 and approximately 0.5 miles north of the Town of Abingdon. The proposed route starts southeast for 0.25 mile, turns southwestward for 0.3 mile across an open field and spans Woodland Hills Road approximately 0.2 mile east of Abingdon Elementary School. The route continues southward, crosses Wyndale Road, runs adjacent to the Town of Abingdon boundary through mostly pasture fields for 0.6 mile and enters the Town of Abingdon just southeast of the Washington County Fairgrounds. Turning southeastward, the route continues adjacent to Pioneer Chevrolet, crosses US Route 11/Main Street, spans Old Jonesboro Road about 0.5 mile west of the Virginia Highlands Community College, spans I-81 just east of Exit 14, continues across a wooded area, and exits the Town of Abingdon after 1.2 miles.

The proposed route re-enters Washington County, turns eastward for 0.75 mile crossing an open field and spanning Stone Mill Road. Turning southward, the route runs adjacent to the western boundary of the Abingdon Quarry property for approximately 0.2 mile, turns eastward and parallel to Vances Mill Road for 0.4 mile, turns southward, spans Vances Mill Road, and enters the proposed South Abingdon Substation located at 21488 Vances Mill Road (the former site of the Abingdon Stockyard Exchange).

B. List Company offices at which members of the public may inspect the application.

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

Washington County Public Library
205 Oak Hill Street
Abingdon, VA 24210
(276) 676-6233

This application, exhibits and maps are also available at Appalachian’s public website: www.AppalachianPower.com/SouthAbingdon.

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

Federal
U.S. Fish and Wildlife Service, Virginia Field Office
U.S. Army Corps of Engineers, Norfolk District
Environmental Protection Agency, Region 3 Office
U.S. House of Representatives, 9th District (H. Morgan Griffith) **

State
Virginia Department of Environmental Quality **
Virginia Department of Environmental Quality, Southwest Regional Office
Virginia Department of Environmental Quality, Office of Wetlands & Stream Protection
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 Game and Inland Fisheries, Environmental Services Section
Virginia Department of Game and Inland Fisheries, Marion Office (Region 3)
Virginia Department of Agriculture and Consumer Services
Virginia Department of Transportation (Central Office – Richmond)
Virginia Department of Transportation (Local District Office – Bristol)
Virginia Department of Aviation
Virginia Department of Health, Office of Drinking Water- Abingdon Field Office
Virginia Department of Mines, Minerals and Energy, Division of Energy
Virginia Department of Forestry
Virginia Marine Resources Commission
Virginia Outdoors Foundation
Senate of Virginia, 40th District (Charles W. Carrico) **
Virginia House of Delegates, 5th District (Israel O’Quinn ) **
Virginia House of Delegates, 4th District (Todd Pillion) **

Local
Washington County, Administrator (Jason Berry) *
Washington County, Community Development & Planning (Cherith Marshall, Director)*
Washington County, County Attorney (Lucy Phillips, Esq.) *
Washington County, Board of Supervisors (Randy Pennington, Chair) *

Town of Abingdon, Mayor and Town Council (Edward Morgan, Mayor) *
Town of Abingdon, Town Manager (Greg Kelly) *
Town of Abingdon, Town Attorney (Deb Icenhour, Esq.) *
Town of Abingdon, Planning Department (Matthew Johnson, Director) **
Town of Abingdon, Parks and Recreation (Kevin Worley, Director) **

Mount Rogers Planning District Commission (Aaron Sizemore, Director) *
* Appalachian will distribute a copy of the application and related materials to these agencies.

** Appalachian will distribute a CD-ROM containing an electronic copy of the application and related materials to these agencies and/or officials.
GENERAL HIGHWAY MAP & EXISTING TRANSMISSION FACILITIES (Washington County)
Note: Three full-size versions are being provided to the Commission with this Application (Page 2 of 2)
EXHIBIT 4
PRESENT TRANSMISSION SYSTEM
Note 1: A 100-foot wide right-of-way (ROW) will be sited within the 500-foot corridor. The Company needs the flexibility to shift the centerline no more than 200 feet in either direction from the centerline indicated as necessary after completion of the final engineering, ground surveys and interviews with the landowners. Nonetheless, the Company believes the centerline illustrated is the most suitable alignment based upon preliminary analysis.

Note 2: The Expanded Corridor will afford the Company the flexibility for further discussions with affected landowners in the area and the completion of an environmental and cultural survey to avoid and minimize impacts to potential resources in the area. Nonetheless, the Company believes the centerline shown in the Application is the most suitable alignment based upon preliminary analysis.
Note 1: A 100-foot wide right-of-way (ROW) will be sited within the 500-foot corridor. The Company needs the flexibility to shift the centerline no more than 200 feet in either direction from the centerline indicated as necessary after completion of the final engineering, ground surveys and interviews with the landowners. Nonetheless, the Company believes the centerline illustrated is the most suitable alignment based upon preliminary analysis.
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Note 2: The Expanded Corridor will afford the Company the flexibility to avoid conflicts with Abingdon Quarry’s future mining plans. Nonetheless, the Company believes the centerline shown in the Application is the most suitable alignment based upon preliminary discussions with the quarry.
Double Circuit Steel Monopole with Davit Arms

(1) SHIELD WIRE

Foundation: Direct embedded pole (15-foot average depth)

Width at Base: 3.5' Diameter (Average)

Not to Scale

TYPICAL SCHEMATIC
Double Circuit Steel Monopole with Davit Arms

FINAL PHASE CONFIGURATION TO BE DETERMINED LATER TO REDUCE EMF LEVELS AS PRACTICABLE.
Either a galvanized steel structure with a dulled finish (left) or a weathering steel structure (right) will be used, to be determined during final engineering.

COMPARABLE EXISTING STRUCTURE PHOTOGRAPHS
NOTE: Approximately two structures consisting of two H-Frames each may be necessary to reduce structure height in proximity of the Virginia Highlands Airport depending on FAA recommendations.
EXHIBIT 6
PROPOSED 138 kV TRANSMISSION STRUCTURES (Page 5 of 6)

H-Frame

NOTE: Approximately two structures consisting of two H-Frames each may be necessary to reduce structure height in proximity of the Virginia Highlands Airport depending on FAA recommendations.
Either a galvanized steel structure with a dulled finish (left) or a weathering steel structure (right) will be used, to be determined during final engineering.

**COMPARABLE EXISTING STRUCTURE PHOTOGRAPHS**

NOTE: Approximately two structures consisting of two H-Frames each (only one H-Frame is shown above) may be necessary to reduce structure height in proximity of the Virginia Highlands Airport depending on FAA recommendations.
Note 1: Existing stockyard and cattle buildings are in the process of being removed.
COMPARABLE EXISTING SUBSTATION PHOTOGRAPHS
EXHIBIT 9
PUBLIC OPEN HOUSE PHOTOGRAPHS
Virginia Higher Education Center (Abingdon, VA)
September 24, 2015 (115 Attendees)
Comprehensive Plan Compliance Determination for Proposed South Abingdon Substation (Parcel ID No. 125-2-3)

Information

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<td>Sponsors:</td>
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Attachments

Printout
   Compliance Determination Letter of Request and Presentation Materials - South Abingdon Substation (8-24-15)

Suggested Motions

SUGGESTED MOTION(s):

At the Board's discretion, a motion could be made to do any of the following: to concur with the recommendation of the Planning Commission, to overrule the action of the Planning Commission, or pursuant to Virginia Code § 15.2-2232 the Board can direct the Planning Commission to hold a public hearing on the matter after public notice is provided as required by § 15.2-2204.

Meeting History

Sep 8, 2015 6:30 PM Video Board of Supervisors Regular Meeting

Ms. Cherith Marshall, County Planner, along with representatives from AEP provided an overview of the request. She stated AEP is planning to build a sub-station on Vance's Mill Road. Due to stated code this substation is required to have approval on the County's Comprehensive Plan compliance review.

Mrs. Mary Beagley, Scott Kennedy, Tim Hall and Christian with AEP stated the Planning Commission approved this sub-station is in compliance with the County's Comprehensive Plan.

Mr. Tim Hall with AEP provided a powerpoint and spoke on the area and the increase in electrical use over the last fifteen years. He stated this area is the largest growth in the district. This is to ensure the infrastructure is in place to handle the load that is coming in the future.

Discussion ensued.

On motion of Mr. Owens, second by Mr. Gibson, this carried by a vote of 7-0, the Board concurred with the recommendation of the Planning Commission in that the proposed substation is in accord with the county's adopted Comprehensive Plan.

At this time the Board took a ten minute break.

RESULT: ADOPTED [UNANIMOUS]

MOVER: Odell Owens, F-11 Tyler District
SECONDER: William B. Gibson, C-11 Madison District

Washington County VA