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BRISTOL, TENNESSEE AREA POWER IMPROVEMENT PROJECT

ENVIRONMENTAL ASSESSMENT

Sullivan County, Tennessee

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Acronyms, Abbreviations, and Glossary of Terms Used

acre	A unit measure of land area equal to 43,560 square feet
access road	A dirt, gravel, or paved road that is either temporary or permanent, and is used to access the right-of-way and transmission line structures for construction, maintenance, or decommissioning activities
ACHP	Advisory Council on Historic Preservation
APE	Area of potential effect
BING	Microsoft web search engine
BMP	Best management practice or accepted construction practice designed to reduce environmental effects
BTES	Bristol Tennessee Essential Services
CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
circuit	A section of conductors (three conductors per circuit) capable of carrying electricity to various points
conductors	Cables that carry electrical current
CEQ	Council on Environmental Quality
CWA	Clean Water Act
danger tree	A tree located outside the right-of-way that could pose a threat of grounding a line if allowed to fall near a transmission line or a structure
DBH	Diameter at breast height
EA	Environmental Assessment
easement	A legal agreement that gives TVA the right to use property for a purpose such as a right-of-way for constructing and operating a transmission line
EJScreen	An environmental justice screening and mapping tool
EIS	Environmental Impact Statement
EMF	Electromagnetic field
endangered species	A species in danger of extinction throughout all or a significant part of its range
EO	Executive Order
EPA	United States Environmental Protection Agency
ephemeral stream	Watercourses or ditches that only have water flowing after a rain event; also called a wet-weather conveyance
ESA	Endangered Species Act

FHWA	Federal Highway Administration
feller-buncher	A piece of heavy equipment that grasps a tree while cutting it, which can then lift the tree and place it in a suitable location for disposal; this equipment is used to prevent trees from falling into sensitive areas, such as a wetland
FONSI	Finding of No Significant Impact
GIS	Geographic Information System
groundwater	Water located beneath the ground surface in the soil pore spaces or in the pores and crevices of rock formations
guy	A cable connecting a structure to an anchor that helps support the structure
HUC	Hydrologic Unit Code
hydric soil	A soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop conditions of having no free oxygen available in the upper part
hydrophytic vegetation	Aquatic and wetland plants that have developed physiological adaptations allowing a greater tolerance to saturated soil conditions including with limited or absence of oxygen
IPaC	The United States Fish and Wildlife Services' "Information for Planning and Conservation" database tool that allows users to identify managed resources quickly and easily.
IRP	Integrated Resource Plan
kV	Symbol for kilovolt (1 kV equals 1,000 volts)
load	That portion of the entire electric power in a network consumed within a given area; also synonymous with "demand" in a given area
LPC	Local power company
milligauss	The unit of measurement for the magnetic component of electromagnetic fields (EMF)
NAIP	National Agriculture Imagery Program
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
NESC	National Electric Safety Code
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NSCR	Non-site Cultural Resources
NRHP	National Register of Historic Places
NWI	National Wetland Inventory

OPGW	Fiber-optic ground wire
outage	An interruption of the electric power supply to a user
PEIS	Programmatic Environmental Impact Statement
PI	Point of intersection at which two straight transmission line sections intersect to form an angle
RCRA	Resource Conservation and Recovery Act
riparian	Related to or located on the banks of a river or stream
ROW	Right-of-way, a corridor containing a transmission line
runoff	That portion of total precipitation that eventually enters a stream or river
SHPO	State Historic Preservation Officer
SMZ	Streamside management zone
structure	A pole or tower that supports a transmission line
substation	A facility connected to a transmission line used to reduce voltage so that electric power may be delivered to a local power distributor or user
surface water	Water collecting on the ground or in a stream, river, lake, or wetland; it is naturally lost through evaporation and seepage into the groundwater
switch	A device used to complete or break an electrical connection
SWPPP	Stormwater Pollution Prevention Plan
TDEC	Tennessee Department of Environment and Conservation
TDOT	Tennessee Department of Transportation
threatened species	A species likely to become endangered within the foreseeable future
TNBWG	Tennessee Bat Working Group
TRAM	Tennessee Rapid Assessment Method developed to rapidly determine the condition of a wetland in the field based solely on hydrogeomorphic classification meant to be a “snapshot” of current condition based on on-site and external influences and variables relative to a reference standard. Information on the condition of the wetland is then used to evaluate a proposed impact justification and assess mitigation needs.
TVA	Tennessee Valley Authority
TWRA	Tennessee Wildlife Resources Agency
U. S.	United States
USACE	U. S. Army Corps of Engineers
USCB	U. S. Census Bureau
USDA	U. S. Department of Agriculture
USFS	U. S. Forest Service
USFWS	U. S. Fish and Wildlife Service

USGS	U. S. Geological Survey
wetland	A marsh, swamp, or other area of land where the soil near the surface is saturated or covered with water, especially one that forms a habitat for wildlife
WHO	World Health Organization
WWC	Wet-weather Conveyance. See definition above for ephemeral stream.

CHAPTER 1 – PURPOSE AND NEED FOR ACTION

1.1. Proposed Action – Improve Power Supply

Bristol Tennessee Essential Services (BTES) plans to construct the South Bristol 161-kV Substation in Bristol, Tennessee. The Tennessee Valley Authority (TVA) proposes to build two separate 161-kV transmission lines to serve the new substation (Figure 1-1). TVA's proposed Sullivan-South Bristol 161-kV Transmission Line and Bluff City-South Bristol 161-kV Transmission Line would result in about 14.2 miles of new transmission lines utilizing about 40.5 acres of existing right-of-way (ROW) and 131.6 acres of new ROW. TVA would also install new fiber-optic ground wire (OPGW) on the transmission lines to facilitate communications with the TVA network.

TVA's proposed Sullivan-South Bristol 161-kV Transmission Line would begin at TVA's existing Sullivan 500-kV Substation in Bluff City and extend northeast about 10.8 miles to BTES' planned South Bristol Substation. About 7.7 miles of the new transmission line would parallel existing TVA transmission lines and utilize both existing and new ROW. The remaining 3.1 miles of transmission line would be located on new 100-foot-wide ROW. This proposed transmission line would utilize 35.7 acres of existing ROW and would require 95.3 acres of new ROW. The line would be built using a combination of single-pole and H-frame steel structures.

TVA's proposed Bluff City-South Bristol 161-kV Transmission Line would begin at TVA's existing Bluff City 161-kV Substation in Bluff City and extend northeast about 3.4 miles to BTES' planned South Bristol Substation. The new transmission line would parallel an existing BTES 69-kV transmission line for about 1.6 miles utilizing about 4.8 acres of existing ROW and 36.3 acres of new 100-foot-wide ROW. The line would be built using single-pole steel structures.

TVA expects to utilize existing and/or new temporary access roads for construction and maintenance of the proposed transmission lines.

At BTES' planned South Bristol Substation, TVA would install breakers and a new switch house with associated metering, communication, and protective equipment to be located within the planned substation's footprint.

Additionally, to facilitate the operation of the new transmission lines and OPGW, TVA would need to modify/upgrade some of its existing substations and modify the TVA system map boards to include the names and numbers of the new transmission lines.

1.2. Need for the Proposed Action

TVA plans its transmission system according to industry-wide standards established by the North American Electric Reliability Corporation (NERC). Those standards state that the TVA transmission system must be able to survive NERC defined contingency events while continuing to serve customer loads[1] with adequate voltage and no overloaded facilities while maintaining adequate transmission line clearances as required by the National Electric Safety Code (NESC).

[1] "Load" is defined as that portion of the entire electric power in a network that is consumed within a given area. The term is synonymous with "demand" in a given area.

BTES provides power to their service area from the Bluff City and Blountville 161-kV substations which are jointly owned with TVA. These substations, along with TVA's South Holston Hydro Plant, feed into BTES' extensive 69-kV transmission system, which is near capacity. Based on TVA's 2020 forecasted system loading, the Blountville Substation is projected to exceed its guaranteed available, or "firm" capacity by winter 2021. This means that since the winter of 2021 the station has been susceptible to some risk (i.e., it would become overloaded if one of the transformers is lost during peak loading conditions). The Bluff City Substation is heavily loaded and could also overload in extreme conditions such as if power from the South Holston Hydro Plant becomes not available. Currently, the complete loss of either the Bluff City or Blountville substation would result in an overload of the remaining substation. These issues could result in a power outage in the area. Additionally, the loss of the Bluff City Substation would create heavy load flows on BTES' entire 69-kV system which could result in depressed system voltages and loss of load on the system.

The BTES service area has also been growing steadily for the last several years. BTES has received several inquiries from potential customers about locating at their industrial parks. These potential customers cannot be accommodated with the current loading on the BTES system.

The Bluff City Substation cannot be taken out-of-service due to current system conditions. As such, NERC-required upgrades to this substation have not been able to be completed.

BTES' proposed capacity for its planned South Bristol Substation is very high. Additionally, BTES' plans for long-range growth and the system backup needs would be provided through its new substation. Through system studies, TVA deemed that to meet BTES' needs and provide the desired capacity to BTES' substation, two separate power sources (i.e., transmission lines) from the TVA transmission system grid into the South Bristol Substation would be needed. One power source would originate at the Sullivan 500-kV Substation and the other from the Bluff City 161-kV Substation.

The proposed project would provide additional power sources into the Bristol area to alleviate loading concerns, provide BTES with additional operating flexibility, allow TVA and BTES to complete NERC-required upgrades at the Bluff City 161-kV Substation, and support load growth and economic development in the Bristol area by adding necessary power capacity.

1.3. Decisions to be Made

The primary decision before TVA is whether to provide power to BTES' planned South Bristol 161-kV Substation by constructing, operating, and maintaining approximately 14.2 miles of new transmission lines. TVA would also install OPGW on the new transmission lines to facilitate communications with the TVA network. If the proposed transmission lines are to be built, other secondary decisions are involved. These include the following considerations:

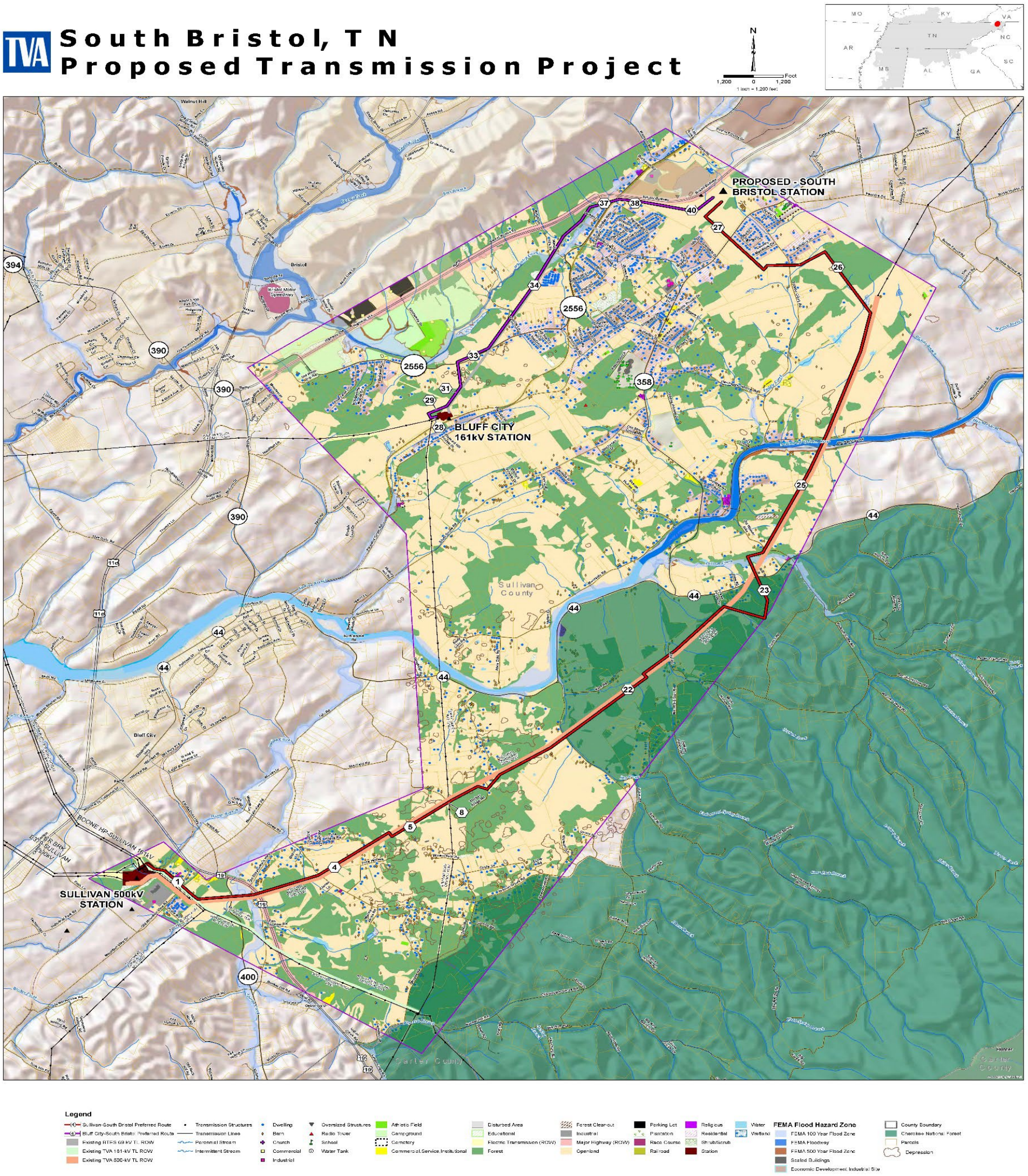

Figure 1-1. TVA's Preferred Transmission Line Routes to the Bristol Tennessee Essential Services' planned South Bristol 161-kV Substation in Sullivan County, Tennessee

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- Timing of the proposed improvements;
- Most suitable route for the proposed transmission line;
- Modifications/upgrades TVA would need to do at some of its existing substations to facilitate the operation of the two new transmission lines; and
- Determination of any necessary mitigation and/or monitoring to meet TVA standards and to minimize the potential for damage to environmental resources.

A detailed description of the alternatives is provided in Section 2.1.

1.4. Related Environmental Reviews or Documentation

In 2019, TVA completed the 2019 Integrated Resource Plan (IRP) and the associated environmental impact statement (EIS) (TVA 2019a). These documents provide direction on how TVA can best deliver clean, reliable, and affordable energy in the Valley over the next 20 years, and the associated EIS looks at the natural, cultural, and socioeconomic impacts associated with the IRP. TVA's IRP is based upon a "scenario" planning approach that provides an understanding of how future decisions would play out in future scenarios.

In 2019, TVA released a Transmission System Vegetation Management Programmatic EIS (PEIS), which is incorporated by reference (TVA 2019b). This review more broadly represented a comprehensive analysis of management activities and potential environmental impacts associated with TVA's vegetation management program within the TVA power service area. The analysis considered various vegetation management methods and tools. TVA issued a Record of Decision on October 18, 2019, identifying its preferred vegetation management program alternative as a condition-based control strategy with a goal of maintaining the ROWs in a meadow-like end-state (84 FR 55995).

On October 19, 2023, TVA issued a final EA and FONSI for its proposal to perform routine vegetation management on about one-third of the transmission system ROWs in Fiscal Year 2024 (TVA 2023a). TVA issued final EAs and FONSIs for similar proposals on November 9, 2020 (addressing Fiscal Year 2021) and October 1, 2021 (addressing Fiscal Years 2022 and 2023) (TVA 2020; TVA 2021). The management of vegetation is needed to ensure the transmission system can continue to provide reliable power and to prevent outages related to incompatible vegetation. Site-specific effects were considered within twelve managed Sectors in areas that had been previously and continuously maintained on a recurring cycle. The EAs tiered from the PEIS which evaluated and analyzed TVA's vegetation management program (TVA 2019b).

1.5. Scoping Process and Public Involvement

TVA contacted the following federal and state agencies, as well as federally recognized Indian tribes, concerning the proposed project:

- Absentee Shawnee Tribe of Indians of Oklahoma
- Cherokee Nation
- Coushatta Tribe of Louisiana
- Eastern Band of Cherokee Indians
- Eastern Shawnee Tribe of Oklahoma
- Kialegee Tribal Town

- The Muscogee (Creek) Nation
- Shawnee Tribe
- Tennessee Department of Environment and Conservation (TDEC)
- Tennessee State Historic Preservation Office (SHPO)
- Tennessee Wildlife Resources Agency (TWRA)
- Thlopthlocco Tribal Town
- United Keetoowah Band of Cherokee Indians in Oklahoma
- U. S. Fish and Wildlife Service (USFWS)

TVA developed a public communication plan that included a website with information about the project, a map of the alternative routes (Figure 1-2), and numerous feedback mechanisms. TVA held a virtual open house from January 14 to February 16, 2021. The 346 property owners who could potentially be affected by the project route alternatives, or had property near the route alternatives, along with public officials were invited to the virtual open house. TVA used local news outlets and notices placed in local newspapers to notify other interested members of the public of the open house. The virtual open house was attended by 129 people. The virtual open house included ten stations, with content listed below:

Station 1 – Welcome - instructions on navigating the website, how to comment or ask questions.

Station 2 - Need for the project including reasons for the improvement and the project benefits.

Station 3 - Project information, the proposed project schedule, and the proposed transmission line route alternatives with alternative segments and possible routes (as shown in Figure 1-2).

Station 4 - Virtual Interactive Map – allowed attendees to enter their address to see how the proposed project might affect their property.

Station 5 - An explanation of TVA’s transmission line siting process.

Station 6 - An explanation of the environmental considerations considered during the project including the NEPA process.

Station 7 - TVA’s land and easement acquisition process.

Station 8 - Frequently asked questions about the transmission system and an explanation of the transmission line construction process.

Station 9 - TVA’s Mission

Station 10 - Thank you and Ask for Comments

Each of the stations provided opportunities for attendees to provide comments.

The interest of those who attended the virtual open house pertained mostly to the effects of the proposed transmission lines to the individual landowners’ property and property values, concerns around impacts to already planned or future development potential, proximity to homes, and deforestation. A toll-free phone number was provided to facilitate comments for those who did not want to submit comments through the virtual open house, email or U.S. mail.

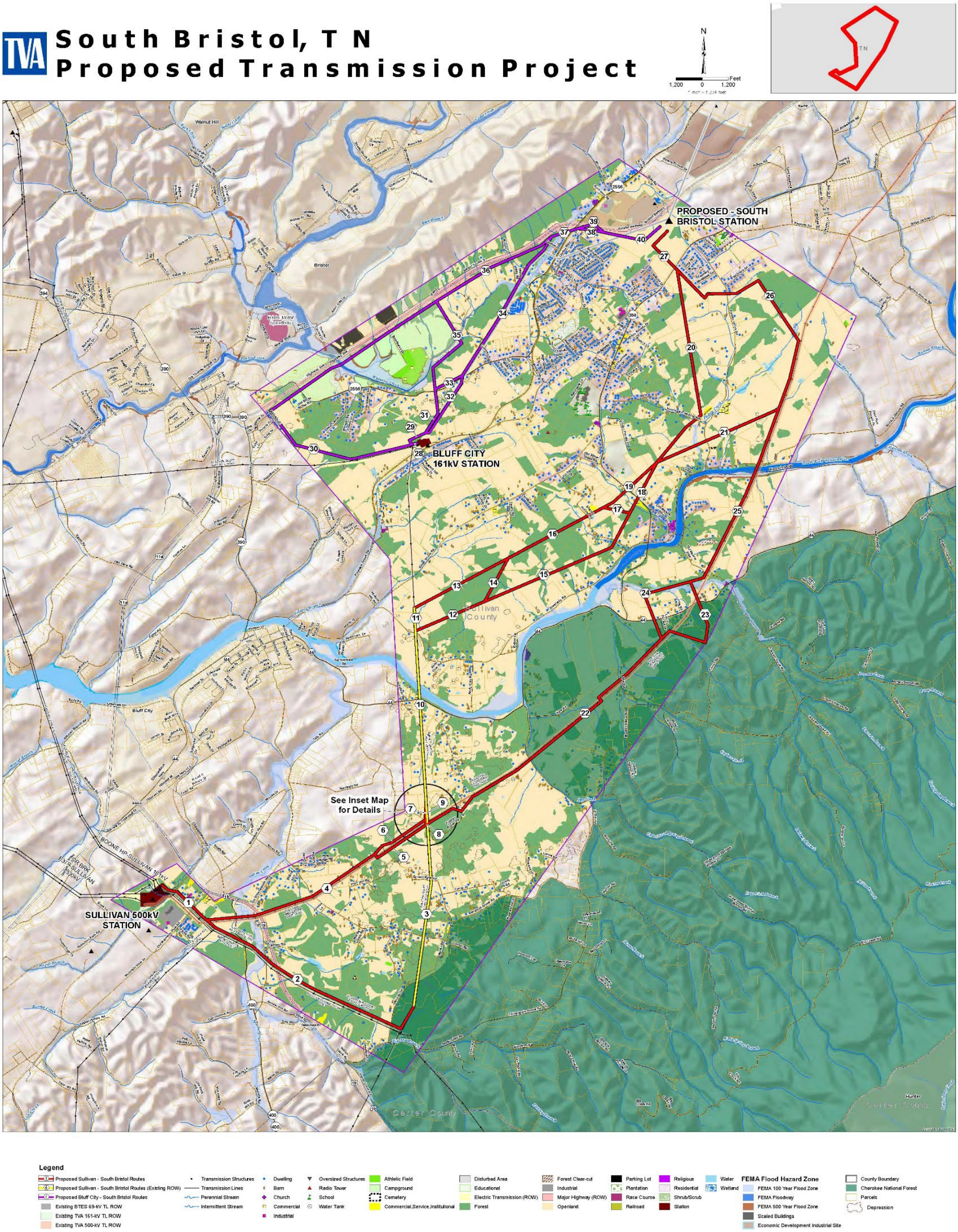

Figure 1-2. Proposed Transmission Lines to the Bristol Tennessee Essential Services' planned South Bristol 161-kV Substation in Sullivan County, Tennessee

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Each property owner affected by the preferred transmission line routes was mailed a letter explaining the project. Owner input was reviewed, and where practical, included in changes to the selected transmission line routes prior to the field surveys. Adjustments to the preferred routes to accommodate property owner wishes prior to field surveys are addressed in Section 2.4.3.

A 30-day public review and comment period followed the virtual open house. Multiple avenues for feedback were provided such as an email, a toll-free number, mailing addresses and comment forms.

A total of 111 property owners submitted comments during the virtual open house comment period. The Sullivan-South Bristol Transmission Line received the most comments which centered around impacts to planned commercial and residential development and impacts to a horse farm. Most comments on the Bluff City-South Bristol Transmission Line routes centered around opposition to Segment 30 due to its proximity to a subdivision.

At the conclusion of the comment period, TVA considered the additional information and developed a preferred route. TVA announced the preferred route to the public in May 2021 (Figure 1-1). Letters were sent to affected property owners and elected officials, and information was provided to the public through TVA's website.

As a result of information obtained following the announcement of the preferred route from both public and agency comments, as well as from environmental field surveys, TVA made additional route adjustments to the preferred transmission line route (Figure 1-1). These adjustments are described in Section 2.4.3.

1.6. Issues to be Addressed

TVA prepared this EA to comply with the National Environmental Policy Act (NEPA) and regulations promulgated by the Council of Environmental Quality and TVA to implement NEPA. The EA will investigate the construction, operation, and maintenance of two new transmission lines as well as the purchase of ROW for this purpose or taking no action.

TVA has determined the resources listed below are potentially affected by the alternatives considered. These resources were identified based on internal scoping as well as comments received during the scoping period.

- Water quality (surface waters and groundwater)
- Aquatic ecology
- Vegetation
- Wildlife
- Endangered and threatened species and their critical habitats
- Floodplains
- Wetlands
- Aesthetic resources (including visual and noise)
- Archaeological and historic resources
- Recreation, parks, and managed areas
- Socioeconomics and environmental justice

TVA's action would satisfy the requirements of Executive Order (EO) 11988 (Floodplain Management), EO 11990 (Protection of Wetlands), EO 12372 (Intergovernmental Review), EO 12898 (Environmental Justice), EO 13112 (Invasive Species), EO 13653 (Preparing the U. S. for the Impacts of Climate Change), and applicable laws including the Farmland Protection Policy Act, the National Historic Preservation Act, the Endangered Species Act (ESA), the Clean Air Act (CAA), and the Clean Water Act (CWA). Correspondence received from agencies related to this review and coordination is included in Appendix A.

Potential effects related to prime farmland, transportation, air quality and global climate change, solid and hazardous waste, and health and safety were considered. Because of the nature of the action, any potential effects to these resources would be minor and insignificant. Thus, any further analysis for effects to these resources was not deemed necessary.

1.7. Necessary Permits or Licenses

Prior to construction, a permit would be required from TDEC for the discharge of construction site storm water associated with the construction of the transmission lines. TVA would prepare the required Storm Water Pollution Prevention Plan (SWPPP) and coordinate them with the appropriate state and local authorities. A Section 401 Water Quality Certification or an Aquatic Resource Alteration Permit (ARAP) would be obtained as required for physical alterations to waters of the State. A Section 404 Nationwide Permit would be obtained from the USACE if construction activities would result in the discharge of dredge or fill into waters of the U.S. A permit would be obtained from the Tennessee Department of Transportation (TDOT) for crossing state highways or federal interstates during transmission line construction.

CHAPTER 2 – ALTERNATIVES INCLUDING THE PROPOSED ACTION

As described in Chapter 1, TVA proposes to build two separate 161-kV transmission lines to serve BTES' planned South Bristol 161-kV Substation. A description of the proposed action is provided below in Section 2.1.2. Additional background information about construction, operation, and maintenance of the transmission lines is also provided in Section 2.2 and would be applicable regardless of the location of the proposed facilities.

This chapter has seven major sections:

1. A description of alternatives;
2. A description of the construction, operation, and maintenance of the proposed transmission lines;
3. An explanation of the transmission line siting process;
4. A comparison of the alternative transmission line routes;
5. A comparison of anticipated environmental effects by alternative;
6. Identification of mitigation measures; and
7. Identification of the preferred alternative.

2.1. Alternatives

Two alternatives (i.e., the No Action Alternative and the Action Alternative) are addressed in further detail in this EA. Under the No Action Alternative, TVA would not implement the proposed action. The Action Alternative involves the purchase of easements for ROW and the construction, operation, and maintenance of the proposed transmission lines.

2.1.1. The No Action Alternative – TVA Does Not Provide Additional Power Supplies to the Bristol, Tennessee Service Area

Under the No Action Alternative, TVA would not construct the proposed transmission lines to serve BTES' planned South Bristol 161-kV Substation. As a result, the TVA power system in the Bristol service area would continue to operate under current conditions, increasing the risk for substation and transmission overloading, loss of service, and occurrence of violations of NERC reliability criteria. TVA's ability to provide a strong, reliable source of power for continued economic health and future residential and commercial growth in the area would be jeopardized.

Considering TVA's obligation to provide reliable electric service, the No Action Alternative is not a reasonable alternative. However, the potential environmental effects of adopting the No Action Alternative were considered in the EA to provide a baseline for comparison with respect to the potential effects of implementing the proposed action.

2.1.2. Action Alternative – TVA Provides Additional Power Supplies to the Bristol, Tennessee Service Area

Under the Action Alternative, TVA would build two transmission lines to serve BTES' planned South Bristol 161-kV Substation. The Sullivan-South Bristol 161-kV Transmission Line and Bluff City-South Bristol 161-kV Transmission Line would result in approximately 14.2 miles of new transmission lines on about 40.5 acres of existing ROW and 131.6 acres

of new ROW (Figure 1-1). TVA would also install OPGW on the proposed transmission lines to facilitate communications with the TVA network.

TVA's proposed Sullivan-South Bristol 161-kV Transmission Line would begin at TVA's existing Sullivan 500-kV Substation located at 281 Massengill Place in Bluff City. This proposed transmission line would then extend northeast about 10.8 miles to BTES' planned South Bristol 161-kV Substation located between Weaver Pike and State Route 394 in Bristol. About 7.7 miles would parallel an existing TVA transmission line. The first 0.5 mile of the line would begin at the Sullivan Substation and then parallel the existing Northeast Johnson City No. 2-Sullivan 161-kV Transmission Line. TVA would utilize 12.5 feet of this existing ROW and purchase 87.5 feet of new ROW in this 0.5-mile section. The new transmission line would additionally parallel 7.2 miles of the Sullivan-Broadford 500-kV Transmission Line. TVA would utilize 40 feet of this ROW and purchase 60 feet of new ROW in this section. The remaining 3.1 miles would be located on new 100-foot-wide ROW. Overall, the proposed Sullivan-South Bristol 161-kV Transmission Line would utilize 35.7 acres of existing ROW and would require 95.3 acres of new ROW easements. The line would be built using a combination of single-pole and H-frame steel structures.

TVA's proposed Bluff City-South Bristol 161-kV Transmission Line would begin at TVA's existing Bluff City Substation located in Bluff City. The new transmission line would then extend northeast about 3.4 miles to BTES' planned South Bristol Substation. The new transmission line would parallel an existing BTES 69-kV Transmission Line for about 1.6 miles. TVA would utilize 25 feet of this existing ROW totaling 4.8 acres, and 75 feet of new ROW. The remaining 1.8 miles would be located on a new 100-foot-wide ROW. The new ROW would require about 36.3 acres of new ROW easements. The line would be built using single-pole steel structures.

Temporary access roads would be required for construction and maintenance of the proposed transmission lines.

At BTES' planned South Bristol Substation, TVA would install breakers and a new switch house with associated metering, communication, and protective equipment to be located within the footprint of the planned substation.

To facilitate the operation of the new transmission lines, TVA would need to modify/upgrade some of its existing substations. At the Sullivan 500-kV Substation, TVA would install a breaker and associated equipment as needed for the new transmission line. Also, existing communication equipment would be retired for the OPGW along the Sullivan–South Bristol Transmission Line. Within the Bluff City 161-kV Substation, TVA would install a pull-off structure to terminate the new transmission line into the substation and add a breaker with associated equipment for protection, metering, and communication purposes. Existing communication equipment would also be retired for the OPGW on the Bluff City–South Bristol Transmission Line. To facilitate the operation of the proposed transmission lines, TVA would modify the TVA system map boards to include the names and numbers of the new transmission lines.

Additional information describing implementation of the proposed Action Alternative and how the most suitable transmission line routes were determined is provided below in Sections 2.2 through 2.4.

2.1.3. Alternatives Considered but Eliminated from Further Discussion

During the development of this proposal, other alternatives were considered. However, upon further study, TVA determined that these alternatives were not feasible for the reasons provided below.

2.1.3.1. Upgrade the Bluff City and Blountville 161-kV Substations and Associated 69-kV Transmission Lines

Under this alternative, BTES would upgrade the existing Bluff City and Blountville 161-kV substations by adding higher voltage transformers and modifying the existing 69-kV bus[2] at each substation along with adding additional breakers at the Blountville Substation. Additionally, about 31 miles of existing 69-kV transmission lines which feed the Bluff City and the Blountville substations would be required to be upgraded.

Implementation of this option would help alleviate potential overloading of the Bluff City and the Blountville 161-kV substations, but not to the degree of the proposed Action Alternative. As such, the Action Alternative would provide a much stronger power source than this alternative while maintaining an overall lower cost to implement. Additionally, the action proposed under this alternative would not improve the power supply or address anticipated future load growth in the area to the degree of the Action Alternative. For these reasons, this alternative was eliminated from further consideration.

2.1.3.2. Construct a Single New Transmission Line

Initially, TVA explored the possibility of building one transmission line which would begin at the Sullivan Substation, connect at Bluff City Substation, and continue to the planned South Bristol Substation. This option would maximize the use of the vacant side of the double-circuit Sullivan-Bluff City No. 2 161-kV Transmission Line (for a length ranging between 3.5 to 5 miles, depending on where the route connected with this existing transmission line), from the southern portion of the study area up to the Bluff City Substation. No new ROW or clearing would be required in this section since this double-circuit transmission line is currently in-service and maintained. However, because the transmission line section from Bluff City to South Bristol would be constructed double-circuit and BTES required two separate single-circuit lines primarily in the event of an outage to one of the transmission lines, this option was eliminated from consideration before route alternatives were finalized.

2.1.3.3. Underground Utility Lines

A frequent objection to the construction of new transmission lines involves their adverse visual effects. Thus, a frequently suggested alternative is the installation of underground transmission lines.

Power lines can be buried. However, most buried transmission lines tend to be low-voltage distribution lines (lines that are 13-kV or less) rather than high-voltage transmission lines, which tend to be 69-kV and above. Although low-voltage distribution lines can be laid into trenches and buried without the need for special conduits, burying higher voltage transmission lines requires extensive excavation as these transmission lines must be encased in special conduits or tunnels. Additionally, measures to ensure proper cooling and to provide adequate access are required. Usually, a road along or within the ROW for buried transmission lines must be maintained for routine inspection and maintenance.

[2] A conductor, which may be a solid bar or pipe, normally made of aluminum or copper, used to connect one or more circuits to a common interface. An example would be the bus used to connect a substation transformer to the outgoing circuits.

Although buried transmission lines are much less susceptible to catastrophic storm damage, especially wind damage, they tend to be very expensive to install and maintain. Depending on the type of cable system used, special equipment or ventilation systems may be required to provide adequate cooling for the underground conductors. Similarly, they must be protected from flooding, which could cause an outage. Repairs of buried transmission lines may require excavation, and the precise location of problem areas can be difficult to determine.

The potential adverse environmental effects of constructing and operating a buried high-voltage transmission line would likely be greater overall than those associated with a traditional aboveground transmission line. In addition, the expense of a buried high-voltage transmission line would be prohibitive. For these reasons, burying the proposed transmission line is not a feasible option and this alternative was eliminated from further consideration.

2.2. Construction, Operation, and Maintenance of the Proposed Transmission Lines

2.2.1. Transmission Line Construction

2.2.1.1. Right-of-Way Acquisition and Clearing

A ROW utilizes an easement that would be designated for a transmission line and associated assets. The easement would require maintenance to avoid the risk of fires and other accidents and to ensure reliable operation. The ROW provides a safety margin between the high-voltage conductors and surrounding structures and vegetation. The ROW for this project is described in Section 2.1.2.

TVA would acquire easements from landowners for the proposed new ROW. These easements would give TVA the right to clear the ROW and to construct, operate, and maintain the transmission line, as well as remove “danger trees” adjacent to the ROW. Danger trees include any trees located beyond the cleared ROW, but that are tall enough to pass within five feet of a conductor or strike a structure should it fall toward the transmission line. The fee simple ownership of the land within the ROW would remain with the landowner, and many activities and land uses could continue to occur on the property. However, the terms of the easement agreement prohibit certain activities, such as construction of buildings and any other activities within the ROW that could interfere with the operation or maintenance of the transmission line or create a hazardous situation.

Because of the need to maintain adequate clearance between tall vegetation and transmission line conductors, as well as to provide access for construction equipment, all trees and most shrubs would be removed from the entire width of the ROW. Equipment used during this ROW clearing would include chain saws, skidders, bulldozers, tractors, and/or low ground-pressure feller-bunchers[3]. Marketable timber would be salvaged where feasible; otherwise, woody debris and other vegetation would be piled and burned, chipped, or taken off site. In some instances, vegetation may be windrowed along the edge of the ROW to serve as sediment barriers.

[3] A feller-buncher is a self-propelled machine with a cutting head that is capable of holding more than one stem at a time. Tracked feller-bunchers are capable of operating on wet and loose soils, have a lower ground-pressure than wheeled equipment, and are less prone to rutting and compaction.

Vegetation removal in streamside management zones (SMZs) and wetlands would be restricted to trees tall enough, or with the potential to soon grow tall enough, to interfere with conductors. Clearing in SMZs would be accomplished using handheld equipment or remote-handling equipment, such as a feller-buncher, to limit ground disturbance.

TVA utilizes standard practices for ROW clearing and construction activities. These guidance and specification documents (listed below) are provided on TVA's transmission system projects web page and are taken into account when considering the effects of the proposed Action Alternative (TVA 2024). TVA transmission projects also utilize best management practices (BMPs) as identified in TVA (2022) to provide guidance for clearing and construction activities.

1. *ROW Clearing Specifications*
2. *Environmental Quality Protection Specifications for Transmission Line Construction*
3. *Transmission Construction Guidelines Near Streams*
4. *Environmental Quality Protection Specifications for Transmission Substation or Communications Construction*
5. *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities* (hereafter referred to as "TVA 2022")

The emission of criteria pollutants or their precursors would not exceed *de minimis* levels specified in 40 CFR § 93.153(b). Thus, consistent with Section 176(c) of the CAA, project activities would be in conformity with the requirements of Tennessee's State Implementation Plan for attaining air quality standards.

Following clearing and construction, an appropriate vegetative cover on the ROW would be restored. TVA would utilize appropriate seed mixtures as described in TVA 2022 or work with property owners with impacted crop land to ensure restoration supports or minimizes impacts to production. Erosion controls would remain in place until the plant communities become fully established. Streamside areas would be revegetated as described in the above documents. Failure to maintain adequate clearance can result in dangerous situations, including ground faults. As such, native vegetation or plants with favorable growth patterns (slow growth and low mature heights) would be maintained within the ROW following construction.

2.2.1.2. Access Roads

Access roads would be needed to allow vehicular access to each structure and other points along the ROW. Typically, new permanent or temporary access roads used for transmission lines are located on the ROW wherever possible and are designed to avoid severe slope conditions and to minimize environmental resources such as stream crossings. Access roads are typically about 12 to 16 feet wide and are covered with dirt, mulch, or gravel.

Culverts and other drainage devices, fences, and gates would be installed as necessary. Culverts installed in any permanent streams would be removed following construction.

However, in ephemeral[4] streams the culverts would be left or removed, depending on the wishes of the landowner or any permit conditions that might apply. If desired by the property owner, TVA would restore new temporary access roads to previous conditions. Additional applicable ROW clearing and environmental quality protection specifications are listed in *TVA ROW Clearing Specifications*, *Environmental Quality Protection Specifications for Transmission Line Construction*, and *Transmission Construction Guidelines Near Streams* (TVA 2024)

2.2.1.3. Construction Assembly Areas

A construction assembly area (or "laydown" area) would be required for worker assembly, vehicle parking, and material storage. This area may be on existing substation property or may be leased from a private landowner for the duration of the construction period. The property is typically leased by TVA about a month before construction begins. Properties such as existing parking lots or areas used previously as car lots are ideal laydown areas because site preparation is minimal. Selection criteria used for locating potential laydown areas include areas that are typically five acres in size; relatively flat; well drained; previously cleared; preferably graveled and fenced; preferably with wide access points with appropriate culverts; sufficiently distant from streams, wetlands, or sensitive environmental features; and located adjacent to an existing paved road near the transmission line. TVA initially attempts to use or lease properties that require no site preparation. However, at times, the property may require some minor grading and installation of drainage structures such as culverts. Likewise, the area may require graveling and fencing. Trailers used for material storage and office space would be parked on the site. Following completion of construction activities, all trailers, unused materials, and construction debris would be removed from the site. Removal of TVA-installed fencing and site restoration would be performed by TVA at the discretion of the landowner.

2.2.1.4. Structures and Conductors

The proposed transmission lines would utilize single and double steel-pole structures. Examples of these structure types are shown in Figure 2-1. Structure heights would vary according to the terrain but would range between 90 and 140 feet above ground.

Three conductors (the cables that carry the electrical current) are required to make up a single circuit in alternating current transmission lines. For a 161-kV transmission line, each single-cable conductor is attached to porcelain insulators suspended from the structure cross arms. A smaller overhead ground wire or wires are attached to the top of the structures.

Poles at angles (angle points) in the transmission lines may require supporting screw, rock, or log-anchored guys. Some angle structures may be self-supporting poles or steel towers, which would require concrete foundations. Most poles would be directly imbedded in holes augured into the ground to a depth equal to 10 percent of the pole's length plus an additional two feet. Normally, the holes would be backfilled with the excavated material, but, in some cases, gravel or a concrete-and-gravel mixture would be used, depending on local soil conditions.

[4] Ephemeral streams are also known as wet-weather conveyances or streams that run only following a rainfall.

Figure 2-1. Typical Single and Double Steel-Pole Structures

Equipment used during the construction phase would include trucks, truck-mounted augers and drills, excavators, as well as tracked cranes and bulldozers. Low ground-pressure-type equipment would be used in specified locations (such as areas with soft ground) to reduce the potential for environmental impacts.

2.2.1.5. Conductor and Ground Wire Installation

Reels of conductor and ground wire would be delivered to the construction assembly area(s), and temporary clearance poles would be installed at road crossings to reduce interference with traffic. A small rope would be pulled from structure to structure. The rope would be connected to the conductor and ground wire and used to pull them down the line through pulleys suspended from the insulators. A bulldozer and specialized tensioning equipment would be used to pull conductors and ground wires to the proper tension. Crews would then clamp the wires to the insulators and remove the pulleys.

2.2.2. Operation and Maintenance

2.2.2.1. Inspection

Periodic inspections of 161-kV transmission lines are performed by helicopter aerial surveillance after operation begins. Foot patrols or climbing inspections are performed to locate damaged conductors, insulators, or structures, and to discover any abnormal conditions that might hamper the normal operation of the line or adversely affect the surrounding area. During these inspections, the condition of vegetation within the ROW, as well as that immediately adjoining the ROW, is noted. These observations are then used to plan corrective maintenance and routine vegetation management.

2.2.2.2. Vegetation Management

Management of vegetation along the ROW would be necessary to ensure access to structures and to maintain an adequate distance between transmission line conductors and vegetation. Adequate ground clearance is important to account for construction, design, and survey tolerances (e.g., conductor sagging). TVA uses more conservative distances than NESC requirements. TVA uses a minimum ground clearance of 24 feet for a 161-kV transmission line and 30-feet for a 500-kV transmission line at the maximum line operating temperature. Vegetation management along the ROW would consist of two different activities: felling danger trees adjacent to the cleared ROW (as described in Section 2.2.1.1), and vegetation control within the cleared ROW total width. These activities occur on approximately 3-year cycles.

As referenced in Section 1.4, TVA completed the Transmission System Vegetation Management PEIS in 2019 which addresses tools and methods TVA will use to manage ROW vegetation. Subsequent site specific NEPA documents which tiered from the PEIS were also completed (TVA 2020; TVA 2021; TVA 2023a) to ensure resource impacts will be avoided, minimized, or mitigated. Management of vegetation within the cleared ROW would include an integrated vegetation management approach designed to encourage the low-growing plant species and discourage tall-growing plant species. A vegetation re-clearing plan would be developed for each transmission line connection, based on the results of the periodic inspections described above. The two principal management techniques are mechanical mowing (using tractor-mounted rotary mowers) and herbicide application. Herbicides are normally applied in areas where heavy growth of woody vegetation is occurring on the ROW and mechanical mowing is not practical. Herbicides would be selectively applied from the ground with backpack sprayers or vehicle-mounted sprayers, or, in rare cases, by helicopter.

Any herbicides used are applied in accordance with applicable state and federal laws and regulations. Only herbicides registered with the U.S. Environmental Protection Agency (EPA) are used. A list of the herbicides currently used by TVA in ROW management is presented in Appendix B. This list may change over time as new herbicides are developed or new information on presently approved herbicides becomes available.

2.2.2.3. Structure Replacement

Other than vegetation management, only minor maintenance work is generally required. The transmission line structure and other components typically last several decades. If a structure needs to be replaced, the structure would normally be lifted out of the ground by crane-like equipment, and the replacement structure would be inserted into the same hole or an adjacent hole. Access to the structures would be via existing roads. Replacement of structures may require leveling the area surrounding the replaced structures, but additional area disturbance would be minor compared to the initial installation of the structure.

2.3. Siting Process

The Siting methodology is a process of weighing all relevant factors to achieve a balanced solution. The process of Siting the proposed transmission lines followed the basic steps used by TVA to determine a transmission line route. These include the following steps:

- Determine the potential existing power sources to supply the transmission lines.
- Define the study area.

- Collect data to minimize potential impacts to social, engineering, and environmental (cultural and natural) features.
- Identify general route segments producing potential routes.
- Gather public input.
- Redefine general route segments.
- Incorporate public input into the final selection of the transmission line route.

2.3.1. Definition of the Study Area

The study area was determined primarily by the geographic boundaries of existing power system assets and BTES' planned South Bristol Substation site. The two proposed transmission line connections would originate from the Sullivan 500-kV Substation and the Bluff City 161-kV Substation. These two substations, along with their associated existing transmission line connections, established the western boundary of the study area. The southern boundary was set by the Sullivan 500-kV Substation and the Northeast Johnson City No. 2-Sullivan 161-kV Transmission Line. The Sullivan-Broadford 500-kV Transmission Line and BTES' planned South Bristol Substation site created the eastern boundary, and the northern boundary is dictated by the planned South Bristol Substation site and the development, including three industrial parks, north of Highway 394. The study area is approximately 22.5 square miles and is in Sullivan County, Tennessee.

2.3.2. Description of the Study Area

The study area has a mix of flat and gently rolling terrain, much of which is utilized for agriculture and residential areas. Much steeper terrain lies just outside the study area boundary in most directions. The farmland is a mixture of commercial farming (corn, soybeans, and cotton) and cattle pasture. The residential homes are built up around the main road systems and are much denser in the northern portion of the study area. The South Fork Holston River, popular for its trout fishing, runs east-west through the central portion of the study area. The proclamation boundary of the Cherokee National Forest encompasses an eastern section of the study area; however all federally owned forest service property is outside the study area. The southern portion of the study area is characterized by some karst terrain and contains several caves.

2.3.3. Data Collection

TVA collected geographic data such as topography, land use, transportation, environmental features, and cultural resources for the study area. Information sources used in the transmission line study included design drawings for area transmission lines, data collected into a geographic information system (GIS), including U.S. Geological Survey (USGS) digital line graphs, National Wetland Inventory (NWI) maps, wetland modelling results, floodplains, photo-interpreted land use/land cover data and Sullivan County tax maps. Also used were various proprietary data maintained by TVA in a corporate geo-referenced database (i.e., TVA Regional Natural Heritage file data on sensitive plants and animals and archaeological and historical resources).

TVA used the National Agriculture Imagery Program (NAIP) GeoHub website, BING (a Microsoft web search engine), and World imagery from various years for the study area. This aerial photography was then photo-interpreted to obtain land use and land cover data such as forests, agriculture, wetlands, dwellings, barns, commercial and industrial buildings, churches, and cemeteries.

The data was then analyzed both manually and with GIS. The use of GIS allows substantial flexibility in examining various types of spatially superimposed information. This system allowed the multitude of study area factors to be examined simultaneously for developing and evaluating numerous options and scenarios to select the transmission line route that would best meet project needs, which included avoiding or reducing potential environmental impacts.

Calculations from aerial photographs, tax maps, and other sources included, but were not limited to, the number of road crossings, stream crossings, and property parcels. The aerial photography, GIS-based map, and other maps and drawings were supplemented by reconnaissance, where possible by TVA.

2.3.4. Establishment and Application of Siting Criteria

TVA uses a set of evaluation criteria that represents opportunities and constraints for development of alternative transmission line routes. These criteria include social, engineering, and environmental factors such as existing land use, ownership patterns, environmental features, cultural resources, and visual quality. Cost is also an important factor, with engineering considerations, materials, and ROW acquisition costs being important elements. Identifying feasible transmission line routes involves weighing and balancing these criteria. TVA can, and does, deviate from the criteria, adjusting as specific conditions dictate.

Specific criteria used to evaluate transmission line route options are described below. For each feature identified as occurring along a proposed route option, specific considerations related to these features were identified and scored. A higher score means a larger constraint or obstacle for locating a transmission line. For example, a greater number of streams crossed, a longer transmission line route length, or a greater number of historic resources affected would produce a higher, less favorable score.

- **Engineering and Constructability Criteria** include considerations such as terrain (steeper slopes can present major challenges for design and construction), total length of the transmission line route, number of primary and secondary road crossings, accessibility, the presence of pipeline and transmission line crossings, and total line cost.

- **Social Criteria** include total acreage of new ROW, parallel to existing TVA or local power company (LPC) lines, number of affected property parcels, issues raised in public comments, visual aesthetics, planned commercial/industrial development, and proximity to schools, dwellings, commercial or industrial buildings, and barns.

- **Environmental Criteria** include number of forested acres within the proposed ROW, the number of open water crossings, the number of floodplain or floodway crossings, the presence of wetlands, rare species habitat, and sensitive stream crossings (i.e., those supporting endangered or threatened species), the number of perennial and intermittent stream crossings, and the presence of archaeological and historic sites, churches, and cemeteries.

The total of the number of occurrences for each of the individual criteria was calculated for each potential alternative route. Next, a normalized ranking of alternative routes was performed for each individual feature based on each route’s value as it related to the other alternative routes. Weights reflecting the severity of potential effects were then developed

for each individual criterion. These criterion-specific weights were multiplied by the individual alternative rankings to create a table of weighted rankings. The weighted rankings for each alternative were added to develop overall scores for each alternative route based on engineering, social, and environmental criteria, and overall total. For each of these categories, a ranking of each alternative route was calculated based on the relationship between the various route's scores.

These rankings made it possible to recognize which routes would have the least and the greatest impact on engineering, social, and environmental resources based on the data available at this stage in the Siting process. Finally, the scores from each category were combined into an overall score. The alternative route options were then ranked by their overall scores.

2.4. Development of General Route Segments and Potential Transmission Line Routes

As described in Section 2.3.3, the collected data were used to develop possible transmission line route segments that would best meet the project needs while avoiding or reducing conflict with constraints and by using identified opportunities. For reference, Segment locations are shown on Figure 1-2.

2.4.1. Potential Transmission Line Corridors

Using the two identified starting points of the Sullivan 500-kV and Bluff City 161-kV substations, the BTES' planned South Bristol 161-kV Substation site, and the tools listed in the Siting Process in Section 2.3, preliminary route segments were identified that could be used to define alternative transmission line routes that would best meet project needs while avoiding or reducing conflict with constraints and by using existing opportunities.

2.4.2. Sullivan-South Bristol Transmission Line

The abundance of existing transmission line connections on the east side of the Sullivan 500-kV Substation, along with existing development in the vicinity of the substation created opportunity but also limited routing options in this area. There are four existing transmission line corridors that currently terminate in the northern portion of the Sullivan 500-kV Substation, where the new transmission line must exit. Space constraints within the existing switchyard dictated that TVA would install a new breaker in the far northeast corner of the switchyard, and that the initial path from Sullivan Substation would parallel the eastern-most transmission line, the NE Johnson City No. 2-Sullivan 161-kV Transmission Line. This line is double-circuit with the Milligan College-Sullivan 161-kV Transmission Line. Segment 1, which is shared by all 34 alternative routes and is located mostly on TVA property, is about 0.5 mile long and runs parallel to the NE Johnson City No. 2-Sullivan 161-kV Transmission Line for the entire distance; TVA would use 12.5 feet of the existing ROW and purchase 87.5 feet of new ROW in this section. Segment 2 continues parallel to the same line for about 2.2 miles before joining the vacant side of the double-circuit Sullivan-Bluff City No. 2 161-kV Transmission Line at Structure 17 and continuing for about 3.6 miles, along Segments 3, 9, 10, and 11. These four segments would require no new ROW.

Due to BTES' concerns related to line outages with each transmission line, it was necessary to create adequate distance between the two single-circuit transmission lines (Sullivan-South Bristol and Bluff City-South Bristol) required for this project. As such, Sullivan-South Bristol route segments using entirely new 100-foot-wide ROW were developed beginning at the end of Segment 10 (near Structure 31) and 11 (near Structure 32) on the Sullivan-Bluff City No. 2 161-kV Transmission Line. This is roughly 1.5 miles

from the Bluff City Substation. Existing development, including a new middle school that opened in January 2020 when TVA's initial field studies began, limited routing options but two general corridors that headed northeast toward BTES' planned South Bristol 161-kV Substation site were created using Segments 12 through 21 (see Figure 1-2).

Alternative Segments 4, 5, 6, 8, 22, 25, and the initial portion of Segment 26 mostly parallel the Sullivan-Broadford 500-kV Transmission Line. Segment 4 begins at a point just after the 500-KV transmission line crosses over several existing 161-kV transmission lines. Some sections of entirely new ROW were necessary along Segments 6, 22, 23, and 24 to avoid existing development. The combined length of these segments is about 7.2 miles and, except for the short sections described above, would require only 60 feet of new ROW width, as the proposed Sullivan-South Bristol Transmission Line could share 40 feet of the existing 500-kV ROW in these areas. The majority of Segment 26 and Segment 27 traverse the northeastern part of the study area into BTES' planned South Bristol Substation site. Segment 27, like Segment 1, is common to all route alternatives for the Sullivan-South Bristol Transmission Line. The alternative segments are shown in red on Figure 1-2.

These 27 route segments resulted in a total of 34 alternative routes for the Sullivan-South Bristol Transmission Line (see Table 2-1).

Table 2-1 Sullivan-South Bristol Alternative Routes

Route Number	Alternative Segments
1	1-2-3-9-10-12-15-18-20-27
2	1-2-3-9-10-12-15-18-21-26-27
3	1-2-3-9-10-12-14-16-19-20-27
4	1-2-3-9-10-12-14-16-19-21-26-27
5	1-2-3-9-10-12-14-16-17-18-20-27
6	1-2-3-9-10-12-14-16-17-18-21-26-27
7	1-2-3-9-10-11-13-16-19-20-27
8	1-2-3-9-10-11-13-16-19-21-26-27
9	1-2-3-9-10-11-13-16-17-18-20-27
10	1-2-3-9-10-11-13-16-17-18-21-26-27
11	1-2-3-22-23-25-26-27
12	1-2-3-22-24-25-26-27
13	1-4-5-7-10-12-15-18-20-27
14	1-4-5-7-10-12-15-18-21-26-27
15	1-4-5-7-10-12-14-16-19-20-27
16	1-4-5-7-10-12-14-16-19-21-26-27
17	1-4-5-7-10-12-14-16-17-18-20-27
18	1-4-5-7-10-12-14-16-17-18-21-26-27
19	1-4-5-7-10-11-13-16-19-20-27
20	1-4-5-7-10-11-13-16-19-21-26-27
21	1-4-5-7-10-11-13-16-17-18-20-27
22	1-4-5-7-10-11-13-16-17-18-21-26-27
23	1-4-5-8-22-23-25-26-27
24	1-4-5-8-22-24-25-26-27
25	1-4-6-10-12-15-18-20-27
26	1-4-6-10-12-15-18-21-26-27
27	1-4-6-10-12-14-16-19-20-27
28	1-4-6-10-12-14-16-19-21-26-27
29	1-4-6-10-12-14-16-17-18-20-27
30	1-4-6-10-12-14-16-17-18-21-26-27
31	1-4-6-10-11-13-16-19-20-27
32	1-4-6-10-11-13-16-19-21-26-27
33	1-4-6-10-11-13-16-17-18-20-27
34	1-4-6-10-11-13-16-17-18-21-26-27

2.4.3. Bluff City-South Bristol Transmission Line

Routing options exiting the Bluff City Substation were limited by dense residential development and a railroad to the immediate south, TVA and LPC lines to the west, and LPC lines to the east. Segment 28 is common to all routes since it was necessary to connect in the northwest corner of the substation. Segment 29 skirts property lines along the western and northern perimeter of the substation until it reaches the north side of an existing BTES transmission line ROW. This BTES 69-kV line, which heads northeast from the Bluff City Substation created another opportunity for TVA to potentially minimize project impacts. TVA requested BTES remove the 69-kV line to be replaced with a TVA 161-kV line with a BTES 69-kV underbuild to utilize all existing ROW for this section. However, because this 69-kV transmission line must remain in service, this was not feasible. Instead, TVA could build the new 161-kV line parallel to BTES' line and share 25 feet of ROW.

The most direct path from the Bluff City Substation to BTES' planned South Bristol 161-kV Substation would follow in the general direction of the BTES transmission line, and Segments 31, 32, and 34 parallel the LPC line. Segments 31 and 32 are options on either side of the LPC line; Segment 32 requires two crossings of the LPC line but combined with Segment 34 offers the most direct path to optimize the amount of shared ROW. Segment 31 requires no LPC crossings but provides limited opportunity to use some existing ROW.

A separate corridor was developed from Segment 28 that does not follow the path of the BTES line. While this is a more indirect path to BTES' planned South Bristol Substation, the intent of this corridor was to present route alternatives that are not overly reliant on utilizing the BTES ROW. Segment 30 runs west out of the Bluff City Substation, parallel to the Sullivan-Bluff City No. 1 161-kV Transmission Line for about 0.5 mile and could potentially use 12.5 feet of that existing ROW. Once Segment 30 leaves the existing ROW corridor, it skirts the western boundary of the study area and then turns east and runs along the south side of Highway 394 to avoid residential development. Segment 30 is about 3.2 miles long and would require an entirely new 100-foot-wide ROW for about 2.7 miles.

Segments 33 and 35 serve as connectors (from Segment 31) to the two general route corridors. Segment 36 continues along the path of Segment 30, south of Highway 394, for about 1.1 miles. Segments 37 and 40 are common to all routes; Segment 40 is the final connection to BTES' planned substation and is entirely on BTES property. Segments 38 and 39 connect Segments 37 and 40 and are options on either side of Highway 394.

The TDOT ROW for Highway 394 created some routing challenges for this line. Portions of Segments 36 through 39 encroach on TDOT ROW. Historically, TVA would avoid placing structures in TDOT ROW for many reasons, including future obligations (TVA to incur all expenses required to move or adjust the transmission line should it be affected by a TDOT required road expansion or other modification). TVA provided these route options to TDOT for review prior to the Virtual Open House, and received concurrence that structures could be permitted but that TDOT would need to review the actual locations and placement to determine feasibility. Preliminary TVA studies ensured the route options presented would be feasible. The alternative route segments are shown in purple on Figure 1-2.

These 13 route segments resulted in a total of 8 alternative routes for the Bluff City-South Bristol Transmission Line (see Table 2-2).

Table 2-2. Bluff City-South Bristol Alternative Routes

Route Number	Alternative Segments
1	28-29-31-33-34-37-38-40
2	28-29-31-33-34-37-39-40
3	28-29-31-35-36-37-38-40
4	28-29-31-35-36-37-39-40
5	28-29-32-34-37-38-40
6	28-29-32-34-37-39-40
7	28-30-36-37-38-40
8	28-30-36-37-39-40

2.4.4. Potential Transmission Line Corridors

Using the identified end points, opportunities, and constraints, alternative route segments were identified that could then be used to define alternative transmission line routes. The tax maps provided property boundaries, which were used to locate a route with minimum impact to the number of properties as well as to individual properties. In addition, several site visits were made to further characterize any potential problem areas in the study area. Forty route segments were identified for the South Bristol project. These segments were used to analyze 42 alternative routes, thirty-four for the Sullivan-South Bristol Transmission Line and eight for the Bluff City-South Bristol Transmission Line (see Figure 1-2).

2.5. Identification of the Preferred Transmission Line Route

Some of the considerations used in identifying and assessing alternative transmission line route locations were existing transmission line assets for use of existing ROW, public comments, residential and commercial development, transmission line length, terrain, road/highway crossings, threatened and endangered species habitat, forest clearing, stream crossings, cultural resources, and number of parcel/property tracts.

Statistical analyses (described in Section 2.3.4) using the criteria were completed for the alternative routes on the Sullivan-South Bristol and Bluff City-South Bristol transmission lines. The results of the analyses were used as a tool to help determine which routes had the fewest impacts with respect to engineering, environmental, and social constraints.

2.5.1. Sullivan-South Bristol Transmission Line

As the proposed route exits the Sullivan 500-kV Substation, the options were to parallel either TVA's NE Johnson City No. 2-Sullivan 161-kV Transmission Line along Segment 2, or the Sullivan-Broadford 500-kV Transmission Line along Segment 4. Although TVA received few comments in these areas, there was more opposition to Segment 2 and the line would potentially interfere with a planned barn expansion. Segment 6 received opposition from one property owner and would require some new ROW to avoid existing development. TVA received no comments related to Segments 3, 9, 10, and 11 which utilize the vacant side of the existing Sullivan-Bluff City No. 2 161-kV Transmission Line.

TVA received comments opposing Segments 12 through 21 that are located on entirely new ROW. Segments 18 to 21 would result in major impacts to planned commercial development; one owner provided approved business plans that Segment 18 crosses over; there was a planned barn and other development; one property is a Century Farm, and another contains a private airstrip. Segments 18 and 19 are also located on new middle school property; the Sullivan County Board of Education only provided contact information and no comments. In addition, TVA received information regarding planned residential development along Segments 12 through 16, although drawings were not provided.

Segment 24 received the highest volume of public opposition on the Sullivan-South Bristol Transmission Line; comments were related to the project's impacts to a horse boarding, training, and lesson facility (and a planned indoor arena expansion) that is crossed by Segment 24 where it veers west of the existing 500-kV transmission line.

Near the Sullivan-Broadford 500-kV Transmission Line Structures 16 to 18, Segment 22 is within the 0.25-mile buffer of a known gray bat cave, which resulted in worse scores in the Environmental category for all routes containing this segment. However, the alternative segment is on the south side of the existing 200-foot-wide easement, a greater distance from the cave than the centerline of the existing transmission line. Further, adjustments to move the new transmission line easement outside of the 0.25-mile buffer would result in encroachments to some buildings.

The South Fork Holston River floodway flows through the northeast portion of the study area, and crosses Segment 25 between Structures 34 and 35 of the Sullivan-Broadford 500-kV Transmission Line. While this also resulted in worse Environmental scores for routes using this segment, Transmission Line Engineering confirmed that no structures or fill would have to be placed in the floodway.

Of the 34 alternative routes considered, Route 23 (Segments 1, 4, 5, 8, 22, 23, 25, 26, and 27) had the fewest overall impacts considering the social, engineering, and environmental criteria. This route avoids existing and planned development in the central portion of the study area including the new middle school; parallels more existing ROW; would require one of the lowest acreages of forest clearing among routes not using Segments 3, 9, 10, and 11 which utilize the vacant side of the existing Sullivan-Bluff City No. 2 Transmission Line; and received the fewest negative public comments. TVA's Preferred Route for the Sullivan-South Bristol Transmission Line is shown in red on Figure 1-1.

2.5.2. Bluff City-South Bristol Transmission Line

Existing development limited the routing options near the Bluff City Substation to either a more direct path northeast to BTES' planned South Bristol Substation utilizing the existing BTES 69-kV transmission line or heading west in the opposite direction from BTES' planned South Bristol Substation. Segment 30 is over 3 miles long on almost entirely new ROW and received the most opposition from the public due to its proximity to a subdivision. Additionally, this segment crosses a campground that is used during events at the nearby Bristol Motor Speedway and was opposed by that owner. Segment 30 crosses the Whitetop Creek floodway and would likely need a PI[5] in the floodway. Segments 30 and 36 run on the south side of Highway 394, and much of Segment 36 would fall within TDOT ROW. For these reasons, Routes 7 and 8 that included Segments 30 and 36 had the worst scores by a wide margin. Similarly, Routes 3 and 4 scored poorly due to the inclusion of Segment 36.

[5] A point of intersection at which two straight transmission line sections intersect to form an angle.

Segment 32, which parallels the east side of the BTES line, requires switching to the west side of the LPC line at White Top Road, between two houses. This resulted in worse Engineering scores for Routes 5 and 6 which use this segment, as this arrangement would require the use of two 3-pole dead-end structures, one on either side of the road.

Segment 34 is entirely along the west side of the BTES line and would allow TVA to share 25 feet of ROW with BTES in this section. Segment 37 avoids residential development and minimizes the transmission line footprint on TDOT ROW to the extent possible. While Segment 38 is closer to homes on the south side of Highway 394, TVA did not receive any opposition to this segment. Segment 39 requires two crossings of the highway, adds multiple PIs, and places a structure inside the industrial park.

Of the eight alternative routes considered, Route 1 (Segments 28, 29, 31, 33, 37, 38, and 40) had the fewest overall impacts when considering the social, engineering, and environmental criteria. This route minimizes impacts to residences by utilizing about 1.6 miles of the BTES ROW; requires one of the lowest acreages of forested clearing; and received the fewest negative public comments. The Preferred Route for the Bluff City-South Bristol Transmission Line is shown in purple on Figure 1-1.

2.5.3. Explanation of Changes to the Proposed Preferred Transmission Line Route

The following changes were made to the original preferred route after contacting owners for survey permission and field surveys:

2.5.3.1. Sullivan-South Bristol Transmission Line

- Just prior to this project, the Static Condenser building at the Sullivan Substation was removed which had an underground storage tank. The PI inside the substation on Segment 1 was moved back towards the pull-off to ensure the structure foundations avoid the fill area. This change resulted in an adjustment to the PI on the east side of the railroad tracks outside the substation to keep guy wires outside of the railroad ROW.

- The crossing of the Sullivan-Broadford 500-kV Transmission Line at the beginning of Segment 5, shifted northeast, closer to Structure 12, in the span between Structures 12 and 13 to avoid steeper terrain and ensure adequate clearance space for the proposed Sullivan-South Bristol 161-kV Transmission Line to cross under the 500-kV transmission line.

- Two PIs in the vicinity of Structure 15 of the 500-kV transmission line, along Segment 22, were adjusted to accommodate a property owner request. A PI was moved from a front yard on the west side of Timber Ridge Road to the property used for farming on the east side of the road.

- Again, along Segment 22, a crossing of the 500-kV transmission line shifted northeast, closer to Structure 23, in the span between Structures 22 and 23 to ensure adequate clearance space for the proposed Sullivan-South Bristol 161-kV Transmission Line to cross under the 500-kV transmission line.

- At the beginning of Segment 23, the proposed Sullivan-South Bristol 161-kV Transmission Line was initially projected to cross under the 500-kV transmission line near the mid-span of Structure 26 and 27. Due to the steep terrain, creek running through this area, and line clearance concerns, the crossing was shifted back

(southwest) about 1,000 feet. This adjustment also removed the proposed transmission line from two properties that were previously affected by the Preferred Route.

- The next two PIs after the next 500-kV transmission line crossing (formed by the end of Segment 23 and the beginning of Segment 25), on all new ROW in the vicinity of Structures 29 and 30 of the 500-kV transmission line, were adjusted slightly to reduce impacts to a property owner, and to avoid steep terrain and improve clearance over a distribution line along Old Weaver Pike.

- A PI located about 1,000 feet west of Paddle Creek Road on Segment 26, was deemed unnecessary prior to field surveys and was thus eliminated.

2.5.3.2. Bluff City-South Bristol Transmission Line

No adjustments were made to this route. The property owner located at the end of Segment 34 where the TVA line leaves the BTES ROW requested that the proposed Bluff City-South Bristol Transmission Line be moved to the front of the property, further from Highway 394. However, after some study, adjustments were deemed not feasible due to the steep terrain and the need to maintain an adequate buffer between the proposed transmission line and Whitetop Creek.

2.6. Comparison of Environmental Effects by Alternative

A summary of the anticipated potential effects of implementing the No Action and the Action Alternative is provided in Table 2-3.

Table 2-3. Summary and Comparison of Alternatives by Resource Area

Resource Area	Impacts From No Action Alternative	Impacts From Proposed Action Alternative
Groundwater and Geology	No effects to local groundwater quality or quantity are expected.	Impacts to groundwater quality or quantity are anticipated to be minor.
Surface Water	No changes in local surface water quality are anticipated.	Any impacts to surface waters in the project area are expected to be minor, temporary impacts with the proper implementation of standard BMPs (TVA 2022).
Aquatic Ecology	Aquatic life in local streams would not be affected.	With the implementation of SMZs and BMPs, impacts to aquatic animals resulting from the proposed project would not be significant.

Resource Area	Impacts From No Action Alternative	Impacts From Proposed Action Alternative
Vegetation	Local vegetation would not be affected.	Site preparation and clearing of approximately 62.2 acres of trees for the proposed transmission line ROWs would have a minor effect on most local vegetation. No uncommon plant communities are known from the vicinity of the project area and no rare plant communities were observed in the project area during the field survey. Implementation of the proposed project would not affect unique or important terrestrial habitat.
Wildlife	Local wildlife would not be affected.	Temporary direct impacts could occur to immobile wildlife and migratory birds of conservation concern during construction activities. Temporary minor indirect impacts are anticipated due to removing trees and other vegetation within the project area that would displace wildlife using these habitats. Because there are sufficient adjacent local habitats, any effects to populations of these species are expected to be insignificant.
Endangered and Threatened Species	No effects to endangered or threatened species or any designated critical habitats are anticipated.	The state-listed common barn owl and hairy-tailed mole individuals may be directly impacted during construction; however, impacts to populations would be negligible. Potential indirect effects to the federally listed Indiana bat and the northern long-eared bat are possible due to removal of approximately 37.17 acres of suitable summer roosting habitat. However, with appropriate implementation of BMPs and procedures that are designed to avoid and minimize impacts to federally or state-listed species during site preparation, construction, and on-going maintenance activities, USFWS concurs that the proposed TVA action would not impact Cumberland monkeyface, is not likely to adversely affect federally listed gray bat, Indiana bat, and northern long-eared bat and would not jeopardize the continued existence of tricolored bat and monarch butterfly. The Proposed Action would not impact the populations of state-listed species.

Resource Area	Impacts From No Action Alternative	Impacts From Proposed Action Alternative
Floodplains	No changes in local floodplain functions are expected.	With the implementation of standard BMPs and mitigation measures, no significant impact on floodplains would occur. All actions would be consistent with EO 11988.
Wetlands	No changes in local wetland extent or function are expected.	The proposed project would permanently impact 0.41 acres of forested wetlands within the Beaver Creek Watershed of the project area. With appropriate permits, mitigation, and BMPs implemented, wetland impacts would be minor on a watershed scale.
Visual Resources	Aesthetic character of the area is expected to remain virtually unchanged.	Minor visual discord above ambient levels would be produced during construction and maintenance activities. The proposed transmission lines would present a minor, long-term visual effect.
Noise and Vibration	No noise or vibration impacts from construction or operation would occur because the proposed transmission lines would not be constructed.	Overall, temporary, minor noise above ambient levels would be produced during construction, operation, and maintenance activities.
Archaeological and Historic Resources	No adverse effects to archaeological or historic resources are anticipated.	TVA finds that the proposed undertaking would result in no adverse effects on historic properties.
Recreation, Parks, and Managed Areas	No changes in local recreation opportunities, managed areas, natural areas, or ecologically significant sites are expected.	No major impacts are anticipated to managed areas, natural areas, or ecologically significant sites from construction or operation of the proposed transmission lines.

Resource Area	Impacts From No Action Alternative	Impacts From Proposed Action Alternative
Socioeconomics and Environmental Justice	No change in local demographics, socioeconomic conditions, community services, or environmental justice populations.	Any adverse impacts to low income or minority communities in the project area would be similarly experienced by all people living along the proposed transmission line corridors. However, any adverse impacts would be minor due to the distance between residences and the proposed project area. These impacts are similar to impacts experienced by communities (Environmental Justice and non-Environmental Justice communities) living along TVA's transmission line network across the Valley. The proposed alternative would allow TVA to meet the foreseeable power demand for the area as well as providing BTES with additional operating flexibility and would ensure a continuous, reliable source of electric power in Bristol, resulting in long-term indirect economic benefits to the area.

2.7. Identification of Mitigation Measures

TVA employs standard practices when constructing, operating, and maintaining substations, transmission lines, structures, and the associated ROW and access roads. These can be found on TVA's Transmission organization's website (TVA 2024). Some of the more specific routine measures which would be applied to reduce the potential for adverse environmental effects during the construction, operation, and maintenance of the proposed transmission lines and access roads are as follows:

- TVA would utilize standard BMPs, as described in Transmission's BMP guidance (TVA 2022), to minimize erosion during construction, operation, and maintenance activities.
- To minimize the introduction and spread of invasive species in the ROW, access roads and adjacent areas, TVA would follow standard operating procedures consistent with EO 13112 as amended by 13751 (Invasive Species) for revegetating with noninvasive plant species as defined in the BMP guidance (TVA 2022).
- Wetlands would be protected by the implementation of standard BMP's as identified in Transmission's BMP guidance (TVA 2022).
- Ephemeral streams, also called wet-weather conveyances (WWC), that could be affected by the proposed construction would be protected by implementing standard BMPs as identified in Transmission's BMP guidance (TVA 2022).
- Perennial and intermittent streams, both classified as "streams" in this document, would be protected by the implementation of standard stream protection (Category A) as defined in Transmission's BMP guidance (TVA 2022).

- Any construction activities in the vicinity of the five large nests thought or observed to belong to red-tailed hawks observed on transmission structures on the existing Sullivan-Broadford transmission line or within 660 feet of active raptor nests would be performed outside the nesting season or would require observation by U.S. Department of Agriculture (USDA) Wildlife Services.

- Vegetation would be managed as outlined in TVA's Transmission System Vegetation Management PEIS (TVA 2019b) and according to TVA's *Transmission Environmental Protection Procedures Right-of-Way Vegetation Management Guidelines* (see Appendix B).

- During vegetation clearing activities, marketable timber would be salvaged where feasible; otherwise, woody debris and other vegetation would be piled, chipped, or taken off site. In some instances, vegetation may be windrowed along the edge of the project site to serve as sediment barriers. Implementation of *TVA ROW Clearing Specifications*, *Environmental Quality Protection Specifications for Transmission Line Construction*, *Transmission Construction Guidelines Near Streams*, and *Environmental Quality Protection Specifications for Transmission Substation or Communications Construction* (TVA 2024), and Transmission's BMP guidance (TVA 2022) would provide further guidance for clearing and construction activities.

- During construction of access roads, culverts and other drainage devices, fences, and gates would be installed, as necessary. Culverts installed in any perennial streams would be removed following construction. However, in ephemeral streams/WWCs, the culverts would be left or removed, depending on the wishes of the landowner or any permit conditions that might apply. If desired by the property owner, TVA would restore new temporary access roads to previous conditions.

- Pesticide/herbicide use as part of construction or maintenance activities would comply with the TDEC General Permit for Application of Pesticides, which also requires a pesticide discharge management plan. In areas requiring chemical treatment, only EPA-registered and TVA approved herbicides would be used in accordance with label directions designed in part to restrict applications near receiving waters and to prevent unacceptable aquatic impacts (Appendix B).

The following non-routine measures would be applied during construction of the proposed transmission lines and access roads to reduce the potential for adverse environmental effects.

- Clearing would occur during the inactive season between November 1st and March 15th to avoid direct impacts to bat species.

- Construction would adhere to the TVA subclass review criteria for transmission line location in floodplains (TVA 1980).

- Any road improvements or construction would be done in such a manner that upstream flood elevations would not be increased by more than 1.0 foot.

- Excess material would be spoiled outside of published floodways.

2.8. The Preferred Alternative

The Action Alternative—that TVA provides additional power sources to the BTES planned South Bristol 161-kV Substation—is TVA's preferred alternative for this proposed project. TVA would acquire ROW easements and any associated access road easements and would build two separate 161-kV transmission lines, Sullivan-South Bristol 161-kV Transmission Line and Bluff City-South Bristol 161-kV Transmission Line, to serve BTES' planned substation. TVA would also install OPGW on the new transmission lines to facilitate communications with the TVA network.

TVA's preferred route alternatives for the Action Alternative are alternative route Option 23 for the Sullivan-South Bristol Transmission Line, consisting of Segments 1, 4, 5, 8, 22, 23, 25, 26, and 27; and alternative route Option 1 for the Bluff City-South Bristol Transmission Line, consisting of Segments 28, 29, 31, 33, 37, 38, and 40. The total combined length of the two transmission lines and ROW would be approximately 14.2 miles.

CHAPTER 3 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

The existing condition of environmental resources that could be affected by the proposed Action Alternative during construction, operation, or maintenance of the approximately 14.2 miles of two transmission lines is described in this chapter. The descriptions below of the potentially affected environment are based on field surveys conducted between December 2022, January and February 2023, and August 2023, on published and unpublished reports, and on personal communications with resource experts. This information establishes the baseline conditions against which TVA decision makers and the public can compare the potential effects of implementing the alternatives under consideration.

The analysis of potential effects to endangered and threatened species and their habitats included records of occurrence within a 3-mile radius for terrestrial animals, a 5-mile radius for plants, and a 10-mile radius for aquatic animals. The analysis of potential effects to aquatic resources included the local watershed but was focused on watercourses within or immediately adjacent to the proposed ROW and associated access roads. The area of potential effect (APE) for architectural resources included all areas within a 0.5-mile radius from the proposed transmission line route, as well as any areas where the project would alter existing topography or vegetation in view of a historic resource. The APE with respect to archaeological resources included the entire ROW width as described in Section 2.2.1.1 for the proposed route and the associated access roads.

Potential effects related to prime farmland, transportation, air quality, global climate change, solid waste, hazardous and nonhazardous wastes, and health and safety were considered. Potential effects on these resources were found to be minimal or absent because of the nature of the action.

3.1. Groundwater and Geology

3.1.1. Affected Environment

The project area is located in the Valley and Ridge Physiographic Province and according to available mapping is underlain by Ordovician aged rocks (Hardeman et al. 1966). The Valley and Ridge aquifer consists of folded and faulted bedrock comprised of carbonates, sandstone, and shale. Soluble carbonate rocks and some easily eroded shales underlie the valleys in the province, and more erosion-resistant siltstone, sandstone, and cherty dolomite underlie ridges. The arrangement of the northeast-trending valleys and ridges are the result of a combination of folding, thrust faulting, and erosion. Compressive forces from the southeast have caused these rocks to yield, first by folding and subsequently by repeatedly breaking along a series of thrust faults. The result of the faulting is that geologic formations are repeated several times across the region often with older age strata overlying rock of a younger geologic age (Lloyd and Lyke 1995). The bedrock near the BTES' planned South Bristol 161-kV Substation in the project area was determined to be limestone and dolomite bedrock, which are both carbonate rocks (Foundation Systems Engineering, P.C. 2021).

Groundwater associated with aquifers in the Valley and Ridge Province is primarily stored in and moves through fractures, bedding planes, and solution openings in the rocks. These aquifers are typically present in valleys and rarely present on the ridges. Most of the

carbonate-rock aquifers are directly connected to sources of recharge, such as rivers or lakes, and solution activity has enlarged the original openings in the carbonate rocks. In the carbonate rocks, the fractures and bedding planes have been enlarged by dissolution of the rock. The dissolution occurs as slightly acidic water dissolves some of the calcite and dolomite which are the principal components of carbonate-rock aquifers. Chemical weathering progresses ultimately resulting in the development of karst features (caves, sinkholes, springs).

Generally, groundwater movement is from the ridges toward lower water levels adjacent to major streams that flow parallel to the long axes of the valleys. Most of the groundwater is discharged directly to local springs or streams (Lloyd and Lyke 1995). In unconfined or poorly confined conditions, karst aquifers have very high flow and transport rates of dissolved constituents under rapid recharge conditions such as during storm events.

The chemical quality of water in the freshwater parts of the Valley and Ridge aquifers is similar for both shallow wells and springs. The water is hard, is a calcium magnesium bicarbonate type, and typically has a dissolved-solids concentration of 170 milligrams per liter or less. In places where the residuum that overlies the carbonate rocks is thin, the Valley and Ridge aquifers are susceptible to contamination by human activities (Lloyd and Lyke 1995).

Groundwater in the Valley and Ridge aquifers primarily is stored in and moves solution openings in carbonate rocks and faults and fractures within sandstone and shale (Brahana et al.1986). The aquifers in the Valley and Ridge were the second most used groundwater system in Tennessee as of 2015 (TDEC 2018).

The layered carbonate rock units of Valley and Ridge aquifer are highly folded and faulted due to the Appalachian orogenic events. Consequently, there is a highly variable underlying karst system attributing the topographic features within the Valley and Ridge province (USGS 2021). The water moves from the ridges where the water levels are high toward lower water levels adjacent to major streams that flow parallel to the long axes of the valleys. Most of the groundwater is discharged directly to local springs or streams (Lloyd and Lyke1995).

Public water supply in Sullivan County in the vicinity of the project area is provided by Bluff City, the City of Bristol, and the Bristol-Bluff City Utility District. The drinking water from these systems is sourced primarily from surface water from the South Fork Holston River and from the Underwood Spring (City of Bluff City 2022; City of Bristol 2023, TDEC 2022a). Additionally, Sullivan County residents and privately owned businesses may rely on private wells for water supply (EPA 2023a). The State of Tennessee has developed a Wellhead Protection Program to protect public water systems from contaminated groundwater by designating official wellhead protection areas to monitor groundwater (TDEC 2023a). There are 65 public water wells within a one-mile radius of the proposed transmission lines; 56 of the wells are registered for residential usage, six are registered for farm usage, two are designated for irrigation usage, and one is registered for commercial usage (TDEC 2023b).

The Safe Drinking Water Act of 1974 established the sole source aquifer protection program that regulates certain activities in areas where the aquifer (water-bearing geologic formations) provides at least half of the drinking water consumed in the overlying area. No sole source aquifers exist in Tennessee (EPA 2023b).

3.1.2. Environmental Consequences

3.1.2.1. Alternative A – No Action

Under the No Action Alternative, TVA would not acquire new ROW to construct the new transmission lines, expand existing ROW, or construct new access roads. Therefore, no impacts to groundwater or geologic resources would occur as a result of TVA actions associated with the proposed project.

3.1.2.2. Alternative B – Action Alternative

Under the Action Alternative, construction activities would entail localized ground disturbance and shallow excavation. Depth of excavation would be approximately 10 percent of the pole structure height plus an additional two feet. Because proposed structures would range from 60 to 135 feet in height, excavation depth would be approximately 8 to 15.5 feet below ground surface. These construction activities would be limited to the transmission line ROW.

Potential water quality impacts to shallow groundwater can also occur at the construction site due to releases of contaminants such as petroleum fuels, lubricants, and hydraulic fluids associated with the operation and maintenance of construction equipment. However, the use of appropriate BMPs would prevent and minimize the potential for such releases. These BMPs include the proper maintenance of vehicles, restriction of maintenance and fueling activities to appropriate offsite areas, measures to avoid spills, and immediate management of incidental and accidental releases in accordance with standard practice and regulatory requirements.

Indications of karst activity were identified within the vicinity of the project area according to a 2021 geotechnical exploration conducted at BTES' planned South Bristol Substation. Areas where the surface soils are disturbed are of concern as the upper soil layers provide a natural seal over the subsurface cracking. When this protective layer is removed, the fissures in the soil structure can be exposed to rainfall and surface water, thus increasing the potential for sinkhole activity. BMPs, including backfilling any excavated subsurface in identified karst areas and avoiding identified karst features to the extent practicable, would be implemented (Foundation Systems Engineering, P.C. 2021).

If groundwater is encountered during any construction activities, dewatering processes would be used to control groundwater infiltration into the excavation site and all state and federal requirements relating to groundwater protection would be followed. BMPs would be used to control sediment infiltration from storm water runoff to minimize impacts to groundwater (TVA 2022). The proposed construction activities and below ground excavation would be localized and limited to the construction phase of the proposed project; therefore, any impacts to groundwater would be minor.

No groundwater use would be required for construction or operation of the transmission lines; therefore, there would be no impact to groundwater levels or availability.

3.2. Surface Water

3.2.1. Affected Environment

The Federal Water Pollution Control Act, commonly known as the Clean Water Act (CWA) is the primary law that affects water quality. It establishes standards for the quality of surface waters and prohibits the discharge of pollutants from point sources unless a

National Pollutant Discharge Elimination System (NPDES) permit is obtained. Several other environmental laws contain provisions aimed at protecting surface water, including the Resource Conservation and Recovery Act (RCRA); the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); and the Federal Insecticide, Fungicide, and Rodenticide Act.

The project area lies within the Beaver Creek (0601010205) and Boone Lake-South Fork Holston River (0601010206) hydrologic unit code (HUC)-10 watersheds, both of which are located in the South Fork Holston 8-digit-HUC watershed (USGS 2023a). Upstream of the project area, the South Fork Holston River has been channelized to charge TVA's hydroelectric South Holston Dam (TVA 2023b).

Field surveys conducted in February and August of 2023 identified 43 watercourses, including 10 intermittent streams, 19 perennial streams, 10 WWCs, and four ponds, that cross the two proposed ROWs and associated access roads (TVA 2023b). The surface water streams within the project area are listed in Appendix C.

Precipitation in the general vicinity of the project area averages about 41 inches per year. The wettest month is July with approximately 4.7 inches of precipitation, and the driest month is October, receiving approximately 2.1 inches of precipitation. The annual air temperature ranges from a monthly average low of 44 degrees Fahrenheit to a monthly average high of 67 degrees Fahrenheit (US Climate Data 2023). Stream flow varies with rainfall and averages about 17.6 inches of runoff per year (USGS 2023b).

Water quality standards are established for individual waterbodies by identifying the most stringent criteria for each assigned use and considering the antidegradation status. Seven designated uses for the waterways of the State are defined in Rules of Tennessee Department of Environment and Conservation, Chapter 0400-40-04. Table 3-1 provides a listing of streams in the project area with their state designated use classifications (TDEC 2019).

Table 3-1. Use Classifications for Streams Crossed by the Proposed Sullivan-South Bristol and Bluff City-South Bristol 161-kV Transmission Lines and Associated Access Roads

Stream	Use Classification[1]						
	DOM	IWS	FAL	REC	LWW	IRR	NAV
South Fork Holston River	X	X	X	X	X	X	
Indian Creek			X	X	X	X	
Woods Branch			X	X	X	X	
Booher Creek			X	X	X	X	
Dry Creek			X	X	X	X	
Possum Creek			X	X	X	X	
Miller Branch			X	X	X	X	
Whitetop Creek			X	X	X	X	
Paddle Creek			X	X	X	X	

[1] Codes: DOM = Domestic Water Supply, ISW = Industrial Water Supply, FAL = Fish and Aquatic Life, REC = Recreation, LWW = Livestock Watering and Wildlife, IRR = Irrigation, NAV = Navigation
Source: TDEC 2019

The CWA under Section 303(d) requires all states to identify all waters in which required pollution controls are not sufficient to attain or maintain applicable water quality standards and to establish priorities for the development of limits based on the severity of the pollution

and the sensitivity of the established uses of those waters. In addition, the state assigns a priority for development of Total Maximum Daily Loads (TMDL) based on the severity of the pollution and the sensitivity of the uses, among other factors (EPA 2023c). States are required to submit reports to the EPA. The term "303(d) list" refers to the list of impaired and threatened streams and water bodies identified by the state. The segment of the South Fork Holston River within the project area, along with associated tributaries including Woods Branch, Booher Creek, Dry Creek, Miller Branch, Whitetop Creek, and Paddle Creek, are listed on Tennessee's 2022 303(d) list as impaired due to flow regime modifications, temperature, bacteria, sedimentation or siltation, and/or alteration in stream-side littoral or vegetative covers (Table 3-2).

Table 3-2. TDEC 303(d) Listed Streams Crossed by the Proposed Sullivan-South Bristol and Bluff City-South Bristol 161-kV Transmission Lines and Associated Access Roads

303(d) Impaired Stream	Impairment	Cause	Source
South Fork Holston River	Fish and Aquatic Life	Flow Regime Modification	Dam or Impoundment
		Temperature	Dam or Impoundment
Woods Branch	Recreation	*Escherichia coli*	Grazing in Riparian or Shoreline Zones
Booher Creek	Fish and Aquatic Life	Alteration in Stream-Side or Littoral Vegetative Covers	Grazing in Riparian or Shoreline Zones
	Recreation	*E. coli*	Grazing in Riparian or Shoreline Zones
Dry Creek	Recreation	*E. coli*	Animal Feeding Operations (Non-Point Source)
Miller Branch	Recreation	*E. coli*	Grazing in Riparian or Shoreline Zones
Whitetop Creek	Fish and Aquatic Life	Alteration in Stream-Side or Littoral Vegetative Covers, Sedimentation/Siltation	Grazing in Riparian or Shoreline Zones, Municipal (Urbanized High-Density Area)
	Recreation	*E. coli*	Grazing in Riparian or Shoreline Zones, Municipal (Urbanized High-Density Area)
Paddle Creek	Fish and Aquatic Life	Alteration in Stream-Side or Littoral Vegetation Covers	Grazing in Riparian or Shoreline Zones
	Recreation	*E. coli*	Grazing in Riparian or Shoreline Zones

Source: TDEC 2022b

3.2.2. Environmental Consequences

3.2.2.1. Alternative A - No Action

Under the No Action Alternative, TVA would not construct new transmission lines or access roads. Therefore, no impacts to surface water would occur from TVA actions. However, changes to surface water systems are anticipated to continue to occur from the cumulative effects of surrounding land use practices and development.

3.2.2.2. Alternative B - Action Alternative

3.2.2.2.1. Surface Runoff

Construction activities associated with the proposed transmission lines would involve ground disturbance for the installation of transmission line structures, resulting in the potential for increased erosion and sediment release, which may temporarily affect local surface waters via stormwater runoff. Soil erosion and sedimentation can clog small streams and threaten aquatic life. Appropriate BMPs would be followed to ensure the proposed action would minimize erosion and sedimentation impacts and possible introduction of pollutants into surface waters. Removal of the tree canopy along stream crossings can increase water temperatures, algal growth, and dissolved oxygen depletion, and cause adverse impacts to aquatic biota. Improper use of herbicides to control vegetation could result in runoff to streams and subsequent aquatic impacts. Vegetation would be managed as outlined in TVA's Transmission System Vegetation Management PEIS (TVA 2019b) and according to TVA's *Transmission Environmental Protection Procedures Right-of-Way Vegetation Management Guidelines* (see Appendix B).

A general construction storm water permit would be needed if more than 1 acre is disturbed. This permit also requires the development and implementation of a SWPPP to identify specific BMPs to address construction-related activities that would be adopted to minimize storm water impacts. Additionally, applicable ARAP and USACE Section 404 Permits would be obtained for any stream crossing or alterations within the project area.

TVA routinely includes precautions in the design, construction, and maintenance of its transmission lines projects to minimize these potential impacts. TVA expects to utilize existing and/or new temporary access roads to access the ROWs and as such potential impacts to streams will be minimized through avoidance (if practical) and the implementation of erosion and sediment BMPs identified in the SWPPP, to reduce potential sediment-laden runoff into adjacent or downgradient streams. However, temporary stream crossings may be required. Temporary stream crossings and other construction activities would comply with appropriate state and federal permit requirements and TVA requirements as described in TVA 2022. Additionally, BMPs as described in *the Tennessee Erosion and Sediment Control Handbook* (TDEC 2012) would be used to avoid contamination of surface waters in the project area. Proper implementation of these controls would be expected to result in only minor, temporary impacts to surface waters. See Section 3.3 Aquatic Ecology and Appendix C for buffer zone sizes and additional stream crossing details.

Impervious buildings and infrastructure prevent rain from percolating through the soil, which results in additional runoff of water and pollutants into storm drains, ditches, and streams. Clearing of vegetation and ground cover would alter the current stormwater flows on the site(s). This flow would be properly treated through implementation of the proper stormwater BMPs or an engineered discharge drainage system that could handle any increased flows prior to discharge into the outfall(s).

3.2.2.2.2. Domestic Sewage

During the construction phase, portable toilets would be provided for the construction workforce as needed. These toilets would be provided by a licensed vendor, would be pumped out regularly, and the sewage would be transported by tanker truck to a publicly owned wastewater treatment works that accepts pump out.

3.2.2.2.3. Equipment Washing and Dust Control

Equipment washing and dust control discharges would be handled in accordance with BMPs described in the SWPPP for water-only cleaning. TVA routinely includes precautions in the design, construction, and maintenance of its transmission line projects to minimize these potential impacts. Permanent stream crossings that cannot be avoided are designed to not impede runoff patterns and the natural movement of aquatic fauna. Temporary stream crossings and other construction and maintenance activities would comply with appropriate state permit requirements and TVA requirements (TVA 2022). ROW maintenance would employ manual and low-impact methods wherever possible. Proper implementation of these controls is expected to result in only minor temporary impacts to surface waters.

Design and construction of the Sullivan-South Bristol and Bluff City-South Bristol 161-kV transmission lines would abide by all federal, state, and local guidelines and all applicable permits and requirements for protective measures to surface water including the implementation of BMPs; therefore, there would be no impacts to surface waters.

3.2.2.2.4. Transmission Line Maintenance

Improper use of herbicides to control vegetation within transmission line ROW has the potential to result in runoff to streams and impact resident aquatic biota. Therefore, any pesticide/herbicide use as part of construction or maintenance activities would have to comply with the TDEC General Permit for Application of Pesticides, which also requires a pesticide discharge management plan. In areas requiring chemical treatment, only EPA-registered and TVA approved herbicides would be used in accordance with label directions designed in part to restrict applications near receiving waters and to prevent unacceptable aquatic impacts. Proper implementation and application of these products would be expected to have no significant impact to surface waters.

Maintenance of vegetation within ROWs would also be consistent with TVA's PEIS (TVA 2019b) and BMPs (TVA 2022). TVA would use BMPs specifically directed toward avoiding or minimizing adverse impacts on SMZs and the waterbodies to minimize erosion and transport of sediments in the streams along the transmission line ROW. TVA guidance for environmental protection and BMPs limit the broadcast application of fertilizers and herbicides within the SMZs, including the spraying of herbicides other than those labeled for aquatic use (TVA 2022).

3.2.2.2.5. Summary

Construction and maintenance of the proposed project would increase the potential for sediment, herbicides, and other pollutants to enter waterways. Appropriate BMPs would be followed to minimize impacts associated with soil disturbance and all proposed project activities. All activities would be conducted in a manner to ensure waste materials are contained and managed appropriately (e.g., refueling, maintenance, and storage of equipment) to ensure that the introduction of pollutants to the receiving waters would be minimized (TVA 2022).

Proposed project activities that result in unavoidable direct impacts to surface water resources would be mitigated as appropriate in conjunction with agency consultation. Additionally, BMPs would be used that would further reduce indirect impacts to surface water. Therefore, both direct and indirect impacts to surface water resources are anticipated to be minor.

3.3. Aquatic Ecology

3.3.1. Affected Environment

The analysis of potential effects to aquatic resources included the local watersheds but was focused on the location of the proposed project (herein referred to as the proposed project area) which included the watercourses within or immediately adjacent to the proposed Sullivan-South Bristol and Bluff City-South Bristol 161 kV transmission line ROWs and associated access roads. The proposed project area lies within the Beaver Creek (0601010205) and Boone Lake-South Fork Holston River (0601010206) HUC-10 watersheds, in the Southern Limestone/Dolomite Valleys and Low Rolling Hills IV sub-ecoregion of the greater Ridge and Valley III ecoregion. This sub-ecoregion is a relatively heterogeneous region composed primarily of limestone and cherty dolomite with landforms of low rolling ridges and valleys. Agriculture, thick forests, and areas of industrial and urban development comprise the majority of landcover (Griffith et al. 2009). Field surveys conducted in February and August of 2023 identified 43 watercourses (29 streams and 10 WWC/ephemeral streams) and four ponds (Appendix C).

Because transmission line construction and maintenance activities primarily affect riparian conditions and instream habitat, TVA evaluated the existing condition of these factors at each stream crossing along the proposed transmission line route. Hydrologic determinations were made using the Tennessee Division of Water Pollution Control's Version 1.4 field forms by Tennessee qualified hydrologic professionals in training. These forms evaluate the geomorphology[6], hydrology[7] , and biology of each stream.

A listing of perennial and intermittent stream and pond crossings within the two proposed ROWs and associated access roads, excluding ephemeral streams (WWCs), is provided in Appendix C. Additional information regarding watercourses located in the vicinity of the project area can be found in Section 3.2 Surface Water.

During field surveys in February and August of 2023, headwater cold or cool water streams were encountered as well as larger tributaries to the South Holston River. These streams were observed in primarily forested cover with some agricultural and urban influences. Substrates were primarily cobble or sand bottoms, and significant spring influence was observed.

Three classes were used to indicate the current condition of streamside vegetation within the proposed substation site, as defined below, and accounted for in Table 3-3.

[6] The branch of geology that studies the form of the earth's surface.

[7] The scientific study of the properties, distribution, and effects of water on the earth's surface, in the soil and underlying rocks, and in the atmosphere.

- Forested - Riparian area is mostly vegetated with trees, shrubs, and herbaceous plants. Vegetative disruption from mowing or grazing is minimal or not evident. Riparian width extends more than 60 feet on either side of the stream.

- Partially forested - Although not forested, sparse trees and/or scrub-shrub vegetation is present within a wider band of riparian vegetation (20 to 60 feet). Disturbance of the riparian zone is apparent.

- Non-forested - No trees or only a few trees are present within the riparian zone. Significant clearing has occurred, usually associated with pasture or cropland.

Table 3-3. Riparian Condition of Streams Crossed by the Proposed Transmission Lines and Associated Access Roads

Riparian Condition	Streams Within ROW
Forested	14
Partially forested	12
Non-forested	17
Total	**43**

TVA assigns appropriate SMZs and BMPs based on field observations and other considerations (i.e., State 303(d) listing and presence of endangered or threatened aquatic species). Appropriate application of the SMZs and BMPs would minimize the potential for impacts to water quality and in-stream habitat for aquatic organisms. These guidelines outline site preparation standards with emphasis on soil stabilization practices, structural and sediment controls including runoff management, and general stream protection practices associated with construction activities. TVA would be obliged to adhere to state and federal permit requirements and to commit to any mitigation provisions as a result of adverse modifications made to the project area.

Hydrological determinations were conducted by a Tennessee Qualified Hydrologic Professional-In Training to determine its jurisdictional status. Linear watercourses were classified as stream or ephemeral/WWC. Streams according to the 2020 TDEC Division of Water Pollution Guidance for Making Hydrologic Determinations are “a surface water that is not a wet-weather conveyance” [Rule 0400-4-3-.04(20)]. A WWC is a “man-made or natural watercourses, including natural watercourses that have been modified by channelization: that flow only in direct response to precipitation runoff in their immediate locality: whose channels are at all times above the ground water table: that are not suitable for drinking water supplies: and in which hydrological and biological analysis indicate that, under normal weather conditions, due to naturally occurring ephemeral or low flow there is not sufficient water to support fish, or multiple populations of obligate lotic aquatic organisms whose life cycle includes an aquatic phase of at least two months [Rule 1200—3.04(25)].

3.3.2. Environmental Consequences

3.3.2.1. Alternative A – No Action

Under the No Action Alternative, TVA would not construct the new transmission lines or access roads. No impacts would occur to aquatic ecology from TVA actions. However, changes to aquatic ecology are anticipated to continue to occur from the cumulative effects of surrounding land use practices and development.

3.3.2.2. Alternative B – Action Alternative

The proposed project would be for the construction of new transmission lines and structures within the ROW easement. As such, it is foreseeable that the proposed ROW grading and clearing as well as future vegetation management processes could result in associated stream impacts.

Aquatic life could be affected by the proposed Action Alternative. Impacts would either occur directly by the alteration of habitat conditions within the stream or indirectly due to modification of the riparian zone and storm water runoff resulting from construction and maintenance activities associated with the vegetation removal efforts.

Potential impacts due to removal of streamside vegetation within the riparian zone include increased erosion and siltation, loss of instream habitat, and increased stream temperatures. Other potential effects resulting from construction and maintenance include alteration of stream banks and stream bottoms by heavy equipment and by herbicide runoff into streams.

Siltation has a detrimental effect on many aquatic animals adapted to riverine environments. Turbidity caused by suspended sediment can negatively impact spawning and feeding success of many fish and mussel species (Brim Box and Mossa 1999; Sutherland et al. 2002).

Watercourses that convey only surface water during storm events (e.g., WWC/ephemeral streams and ponds) and that could be affected by the construction, operation, or maintenance of the proposed transmission lines would be protected by TVA's standard BMPs as identified in TVA (2022) and/or standard permit requirements. These BMPs are designed in part to minimize disturbance of riparian areas and subsequent erosion and sedimentation that can be carried to streams or ponds.

For any alterations to perennial or intermittent streams, TVA would require SMZs to be implemented. TVA also identifies a SMZ and provides additional categories of protection to perennial or intermittent watercourses directly affected by an Action Alternative based on the variety of species and habitats that exist in the streams, as well as the state and federal requirements to avoid harming certain species (Appendix C). The width of the SMZs is determined by the type of watercourse, primary use of the water resource, topography, or other physical barriers (TVA 2022).

Applicable permits would be obtained prior to any construction for any stream alterations located within the proposed ROWs. The terms and conditions of these permits would be followed including any required mitigation from the proposed activities. All perennial or intermittent watercourses and ponds identified in Appendix C within the proposed ROWs or crossed by proposed access roads would be protected by Standard Stream Protection

(Category A) as defined in TVA (2022). This standard (basic) level of protection for streams and the habitats around them is aimed at minimizing the amount and length of disturbance to the water bodies without causing adverse impacts on the construction work.

Because appropriate BMPs and SMZs would be implemented during construction, operation, and maintenance of the proposed project, any direct or indirect effects to aquatic ecology would be temporary and insignificant because of implementing the proposed Action Alternative.

Cumulative impact analysis of the aquatic ecology effects considers stream loss at a watershed-level scale and includes current actions or those that would occur within the reasonable and foreseeable future. Since the transmission lines would span any watercourse within the ROW, no stream loss is anticipated because of the construction, operation, or maintenance of the proposed transmission lines or access roads.

3.4. Vegetation

3.4.1. Affected Environment

The proposed project would occur in the Southern Limestone/Dolomite Valleys and Low Rolling Hills Level IV ecoregion (Griffith et al. 1998). This lowland region of the Ridge & Valley portion of the Appalachians is comprised of undulating to rolling valleys with rounder hills and some steep ridges in the north. The Appalachian oak forest is prevalent with mixed oaks, hickory, pine, poplar, birch, and maple, along with bottomland oak and mesophytic forests; forests that are adapted to neither a particularly dry nor particularly wet environment. Land cover is a mixture of cropland, mixed forest, pasture, and some pine plantations and land use is rural residential, urban, and industrial.

Field surveys were conducted in January 2023 to document plant communities, infestations of invasive plants, and to search for possible threatened and endangered plant species in areas where work would occur. Most areas along the two proposed ROWs were visited during the surveys. Using the National Vegetation Classification System (Grossman et al. 1998), vegetation types observed during field surveys can be classified as a combination of deciduous forest, evergreen, mixed evergreen, and herbaceous vegetation. No forested areas in the proposed project area had structural characteristics indicative of old growth forest stands (Leverett 1996). All forested areas encountered were fragmented, occurring in isolated islands; the largest continuous forested area was found south of Timber Ridge Road on the proposed Sullivan-South Bristol ROW. The plant communities observed during field surveys are common and well represented throughout the region. Vegetation within the proposed transmission line ROWs are characterized by two main types: forest (35 percent) and herbaceous (65 percent).

Evergreen forest, which accounts for about ten percent of total forest cover, has comparatively very low species diversity and the canopy is dominated by Virginia pine followed by eastern red cedar with some areas containing eastern hemlock. The herbaceous layer consisted mainly of poison ivy followed by Japanese honeysuckle.

Deciduous forest, where deciduous trees account for more than 75 percent of total canopy cover, is the most common type of forest and occupies about 70 percent of the entire proposed project. Deciduous forests are dominated by a variety of tree species including American sycamore, black cherry, box elder, mockernut hickory, pignut hickory, post oak, red maple, southern red oak, sugar maple, sycamore, tulip poplar, and white oak. The

understory consisted of American beautyberry, Chinese privet, flowering dogwood, hophornbeam, pawpaw, and winged elm. Herbaceous plants and woody vines observed included Christmas fern, cypress panic grass, Japanese honeysuckle, Japanese stiltgrass, jumpseed, little brown jug, longleaf woodoats, muscadine, poison ivy, roundleaf greenbrier, trumpet creeper, and Virginia creeper. Most deciduous forests in the project area have trees that average between 6- and 18-inches diameter at breast height. Large, forested wetlands were found in several locations of the proposed ROW. Forested wetlands are described in detail in Section 3-8 Wetlands.

Mixed evergreen-deciduous forest, defined as stands where both evergreen and deciduous species contribute between 25 to 75 percent of total canopy cover, occurs on about 20 percent of the entire proposed project APE, where work would occur. In general, these forest types are similar to the deciduous forests described above but contain a greater percentage of eastern red cedar and white pine and to a lesser extent, eastern hemlock.

Herbaceous vegetation is characterized by greater than 75 percent cover of forbs and grasses and less than 25 percent cover of other types of vegetation. Most of this habitat type occurs along the existing transmission line ROW but cropland, hayfields, recent clear-cuts, and heavily manipulated pastures also support herbaceous vegetation. Most of these sites are dominated by plants indicative of early successional habitats including many non-native species. Early successional areas with naturalized vegetation contain herbaceous species like American pokeweed, annual ragweed, broomsedge, Carolina elephants foot, giant ironweed, Japanese honeysuckle, Japanese stiltgrass, Johnson grass, henbit, Himalayan blackberry, marsh bristle grass, purpletop tridens, Queen Anne’s lace, rice button aster, sawtooth blackberry, sericea lespedeza, tall fescue, tall goldenrod, virgin’s bower, white crownbeard, wild garlic, yellow bristle grass, and yellow crownbeard. Areas of emergent wetlands were present in the project area. See Section 3-8 Wetlands for species indicative of those areas.

EO 13112 directed TVA and other federal agencies to prevent the introduction of invasive species (both plants and animals), control their populations, restore invaded ecosystems and take other related actions. EO 13751 amends EO 13112 and directs actions by federal agencies to continue coordinated federal prevention and control efforts related to invasive species. This order incorporates considerations of human and environmental health, climate change, technological innovation, and other emerging priorities into federal efforts to address invasive species; and strengthens coordinated, cost efficient federal action. Some invasive plants have been introduced accidentally, but most were brought here as ornamentals or for livestock forage. Because these robust plants arrived without their natural predators (insects and diseases) their populations spread quickly across the landscape displacing native species and degrading ecological communities or ecosystem processes (Miller 2010). No federal noxious weeds were observed, but many non-native invasive plant species were observed throughout the project area. Federal noxious weeds are any plant product that can directly or indirectly injure or cause damage to crops, the natural resources of the United States, the public health, or the environment, including native plant species and native plant communities and federally and state-listed plant species (USDA 2022). Invasive species present across significant portions of the landscape include Amur honeysuckle, Callery pear, Chinese privet, Japanese honeysuckle, Japanese stiltgrass, Johnson grass, sericea lespedeza, tall fescue, wild garlic, and yellow bristle grass. During field surveys, invasive plants were prevalent in sections of herbaceous vegetation types.

3.4.2. Environmental Consequences

3.4.2.1. Alternative A – No Action

Under the No Action Alternative, areas within the proposed ROWs and access roads would remain in their current condition. Thus, terrestrial plant ecology would not be affected because no project-related work would occur. Changes to local plant communities resulting from natural ecological processes and human-related disturbance would continue to occur, but the changes would not result from the proposed project. Therefore, there would be no direct, indirect, or cumulative impacts to terrestrial plant ecology under the No Action Alternative.

3.4.2.2. Alternative B – Action Alternative

Implementing the Action Alternative would involve clearing the ROWs (to accommodate transmission lines and structures) and access roads. Such ground-disturbing activities would directly affect the existing plant communities in these areas. Additionally, vegetation management along the ROWs is necessary to prevent tall, woody vegetation from becoming established within the ROW. Therefore, the type of vegetative cover that occurs on the ROWs would be directly affected.

Adoption of the Action Alternative would not significantly affect the terrestrial plant ecology of the project area. Converting forested land for the construction of the proposed transmission lines would require clearing of approximately 62.2 acres of forest and would be long-term in duration, but insignificant. Virtually all forested land in the project area has been previously cleared and the plant communities found there are common and well represented throughout the region. As of 2019, there were well over 680,000 acres of forested land within Sullivan County, and the surrounding Tennessee counties of Carter, Johnson, Hawkins, and Washington (USFS 2023). Cumulatively, project-related effects to 62.2 acres of forest resources would be negligible and insignificant when compared to the total amount of forested land occurring in Sullivan and the surrounding counties. Also, project-related work would temporarily affect herbaceous plant communities, but these areas would likely recover to their pre-project condition in less than one year. Nearly the entire project area currently has a substantial component of invasive terrestrial plants. Adoption of the Action Alternative would not significantly affect the extent or abundance of these species at the county, regional, or state level. The use of TVA's BMPs, including vegetating with noninvasive species, would serve to minimize the potential introduction and spread of invasive species in the project area (TVA 2022).

3.5. Wildlife

3.5.1. Affected Environment

Habitat assessments for terrestrial animal species were conducted in December 2022 and January 2023. The project area is a mixture of pastures, hay fields, forest fragments, and residential/developed areas. The thirty-eight fragmented forested areas are composed primarily of deciduous and mixed deciduous/evergreen tree species. Eight wetlands, three ponds, and 24 streams occur within the proposed ROW areas. Small herbaceous areas are present in existing ROWs, nested between forest fragments and along edges of roads and agricultural fields. Overall, wildlife communities present in the project area are common to the region as habitats are not unique or uncommon.

Forested areas provide habitat for an array of terrestrial animal species. Birds observed in this habitat included golden-crowned kinglet, Carolina wren, northern cardinal, blue jay, white-breasted nuthatch, pileated woodpecker, brown creeper, northern flicker, and red-bellied woodpecker. These areas can also provide foraging and roosting habitat for several species of bat, particularly in areas where the forest understory is partially open. Common bat species likely found within this habitat include big brown bat, eastern red bat, evening bat, and silver-haired bat. Eastern chipmunk, gray squirrel, fox squirrel, and raccoon or their sign were observed. Eastern box turtle, eastern fence lizard, ring-necked snake, and mountain chorus frog are reptiles and amphibians that can be found in deciduous forests in the northeastern Tennessee region (TWRA 2023a, TWRA 2023b).

Pastures and agricultural fields are a common habitat type in the proposed project ROWs. Early successional habitats containing native species are less common but can be found in some existing ROW areas adjacent to forested fragments and in small parcels along roadsides and field edges. Common inhabitants observed in early successional habitat include eastern meadowlark, American kestrel, American crow, turkey vulture, red-tailed hawk, European starling, and White-tailed deer. Bobcat, coyote, eastern cottontail, hispid cotton rat, and red fox are mammals typical of fields and cultivated land in this region (National Audubon Society 1997). Reptiles including common garter snake, northern copperhead, and northern black racer are also known to occur in this habitat type (TWRA 2023a).

Developed areas near the proposed project ROWs are home to many common species. American robin, rock pigeon, Carolina chickadee, house sparrow, mourning dove, northern mockingbird, and black vulture are birds observed along road edges, yards, and ROWs. Mammals and sign observed in this community type include eastern gray squirrel, raccoon, and Virginia opossum. Roadside ditches provide potential habitat for amphibians including American toad, upland chorus frog, and spring peeper. Reptiles potentially present include gray rat snake and yellow-bellied kingsnake (TWRA 2023a).

Forested wetlands, emergent wetlands, and three ponds occur within the project area (see Section 3.2 Surface Water, Section 3.8 Wetlands, and Appendix C for more details). Eastern towhee, white-throated sparrow, northern flicker, winter wren, red-bellied woodpecker, song sparrow, tufted titmouse, and American beaver were present during field surveys. Golden mouse, northern short-tailed shrew, and muskrat are common mammals in emergent wetland and aquatic communities (TWRA 2023c). Midland brown snake and rough green snake are common reptiles likely present within this habitat (TWRA 2023a). Amphibians likely found in forested wetlands in this area include eastern newt, marbled salamander, mole salamander, northern slimy salamander, and spotted salamanders, lesser siren, upland chorus frog, eastern narrow-mouth toad, eastern spadefoot toad, Fowler’s toad, Cope’s gray treefrog, and southern leopard frog (TWRA 2023b).

Review of the TVA Regional Natural Heritage database in November 2022 indicated that twenty-seven caves have been documented within three miles of the project area. Of those, ten were located within 0.5 mile, eight within 0.25 mile, and four within 200 feet of the proposed Sullivan-South Bristol ROW. Four of those within 0.25 mile were surveyed in December 2022, and three more were suspected or confirmed to be filled in (see Section 3.6 Endangered and Threatened Species for more details). No other unique or important terrestrial habitats were identified within the project area. In addition, no aggregations of migratory birds or wading bird colonies have been documented within three miles of the project area and none were observed during the TVA field surveys.

3.5.1.1. Migratory Birds

Five large nests thought or observed to belong to red-tailed hawks were observed on transmission structures of the existing Sullivan-Bradford Transmission Line. No osprey or heron nests have been previously recorded within three miles of the project area. No osprey or heron nests were observed during field surveys in December 2022 and January 2023 of the proposed ROWs. However, great blue herons and bald eagles were observed at the South Holston River where the proposed Sullivan-S. Bristol ROW would cross. Review of the USFWS's Information for Planning and Consultation (IPaC) website in November 2022 resulted in thirteen migratory bird species of conservation concern (bald eagle, black-billed cuckoo, bobolink, Canada warbler, cerulean warbler, chimney swift, eastern whip-poor-will, Kentucky warbler, prairie warbler, prothonotary warbler, red-headed woodpecker, rusty blackbird, and wood thrush) identified as having the potential to occur in the project area (Figure 1-1). Suitable foraging habitat exists in the proposed ROWs for all these species. Suitable nesting habitat was observed in the proposed ROWs for each of these species except rusty blackbird and bobolink which breed elsewhere (Cornell Lab of Ornithology 2023a, Cornell Lab of Ornithology 2023b).

3.5.2. Environmental Consequences

3.5.2.1. Alternative A – No Action

Under the proposed No Action Alternative, TVA would not construct the new transmission lines or access roads. Terrestrial animals and their habitats would not be affected under Alternative A.

3.5.2.2. Alternative B – Action Alternative

Under the proposed Action Alternative, TVA would build two 161-kV transmission lines, the Sullivan-South Bristol 161-kV Transmission Line and Bluff-City-South Bristol 161-kV Transmission Line, ROWs, and associated access roads. Actions within the proposed new and/or expanded ROWs would include removing trees and other vegetation, as well as establishing transmission infrastructure and associated access roads. Most wildlife currently using these habitats would be temporarily displaced by habitat removal or alteration. Some wildlife would return following construction when vegetation has returned. Less mobile individuals may be lost as a result of construction, particularly if clearing activities take place during breeding/nesting seasons. Construction-associated disturbances and habitat removal would disperse mobile wildlife into surrounding areas to find new food and shelter sources and to reestablish territories. However, the actions are not likely to affect populations of species common to the area, as similarly forested and herbaceous habitat exists in the surrounding landscape.

Some migratory birds of conservation concern identified by the USFWS could be impacted by the proposed actions. Foraging habitat for thirteen species exists in the project area (see Section 3.5.1.1). Should individuals occur on site, they are expected to flush if disturbed. No direct mortality is anticipated. Suitable nesting areas may be present for any of these except rusty blackbird and bobolink which breed elsewhere (Cornell Lab of Ornithology 2023a, Cornell Lab of Ornithology 2023b). Nests, eggs, and juveniles may be destroyed by construction activities; however, it is not expected that populations of these migratory bird species would be impacted. Any construction activities in the vicinity of the five large nests thought or observed to belong to red-tailed hawks observed on transmission structures on the existing Sullivan-Broadford Transmission Line or within 660 feet of active raptor nests would be performed outside the nesting season or would require observation by USDA Wildlife Services.

3.6. Endangered and Threatened Species

The ESA provides broad protection for species of fish, wildlife, and plants that are listed as threatened or endangered in the U.S. or elsewhere. The ESA outlines procedures for federal agencies to follow when taking actions that may jeopardize federally listed species. The policy of Congress is that federal agencies must seek to conserve endangered and threatened species and use their authorities in furtherance of the ESA's purposes.

The State of Tennessee provides legal protection for species considered threatened, endangered, or deemed in need of management within the state other than those federally listed under the ESA. The legal listing is handled by TDEC; however, the Tennessee Heritage Program and TVA both maintain databases of species that are considered threatened, endangered, or special concern, or tracked in Tennessee. Species listed under the ESA or by the State (see Table 3-4) are discussed in this section.

Table 3-4. Federally and State-listed Species from the Proposed Bristol, Tennessee Power Improvement Project Area

Common Name	Scientific Name	Federal Status[2]	State Status[2]	State Rank[3]
Aquatic Animals				
Fishes				
Longhead Darter	*Percina macrocephala*	–	THR	S2
Tennessee Dace	*Chrosomus tennesseensis*	–	D	S3
Mussels				
Cumberland Monkeyface	*Quadrula intermedia*	END, XN	END	S1
Tan Riffleshell	*Epioblasma Florentina walkeri*	END	END	S1
Tennessee Pigtoe	*Pleuronaia barnesiana*	UR	–	S2
Snails				
Spiny Riversnail	*Io fluvialis*	UR	–	S2
Terrestrial Plants				
American Barberry	*Berberis canadensis*	–	SPCO	S2
American Ginseng	*Panax quinquefolius*	–	S-CE	S3S4
American Wintergreen	*Pyrola americana*	–	END	S2
Branching Whitlow-wort	*Draba ramosissima*	–	SPCO	S2
Butternut	*Juglans cinerea*	–	THR	S3
Carolina Hemlock	*Tsuga caroliniana*	–	THR	S3
Clasping Twisted-stalk	*Streptopus amplexifolius*	–	THR	S1
Crested Woodfern	*Dryopteris cristata*	–	THR	S2
Dwarf Rattlesnake-plantain	*Goodyera repens*	–	SPCO	S1
Large Purple Fringed Orchid	*Platanthera grandiflora*	–	THR	S2
Mountain Honeysuckle	*Lonicera dioica*	–	SPCO	S2
Northern Starflower	*Trientalis borealis*	–	THR	S1
Pale Green Orchid	*Platanthera flava* var. *herbiola*	–	THR	S2

Common Name	Scientific Name	Federal Status[2]	State Status[2]	State Rank[3]
Sand Grape	*Vitis rupestris*	–	END	S1
Skunk Cabbage	*Symplocarpus foetidus*	–	END	S1
Virginia Heartleaf	*Hexastylis virginica*	–	SPCO	S2
Wild Pink	*Silene caroliniana ssp. pensylvanica*	–	THR	S1S2
Terrestrial Animals				
Birds				
Bald eagle	*Haliaeetus leucocephalus*	DL	D	S3
Common barn owl	*Tyto alba*	–	–	S3
Insects				
Monarch butterfly[4]	*Danaus plexippus*	C	–	S4
Mammals				
Gray bat	*Myotis grisescens*	END	END	S2
Hairy-tailed mole	*Parascalops breweri*	–	D	S3
Indiana bat[5]	*Myotis sodalis*	END	END	S1
Northern long-eared bat	*Myotis septentrionalis*	END	THR	S1S2
Tricolored bat	*Perimyotis subflavus*	PE	THR	S2S3

[1] Sources: TVA Regional Natural Heritage database (accessed February 2023 and November 2022); USFWS Ecological Conservation Online System (http://ecos.fws.gov/ecos/home.action) (accessed November 2022); USFWS IPaC (accessed February 2023)

[2] Status Codes: C = Candidate Species; D = Deemed in Need of Conservation/Management; DL = Delisted; END = Endangered; PE = Proposed Endangered; SPCO = Special Concern; S-CE = Special Concern/Commercially Exploited; THR = Threatened; UR = Under Review; XN = Non-essential Experimental Population

[3] State Ranks: S1 = Critically Imperiled; S2 = Imperiled; S3 = Vulnerable; S4 = Apparently Secure; S#S# = Denotes a range of ranks because the exact rarity of the element is uncertain (e.g., S1S2)

[4] Candidate species for listing under the Endangered Species Act. Historically this species has not been tracked by state or federal heritage programs.

[5] Federally listed species that has not been documented within three miles of the project area or from Sullivan County, Tennessee; USFWS has determined this species could occur in the project area.

3.6.1. Affected Environment

3.6.1.1. Aquatic Animals

A query of the TVA Regional Natural Heritage database and the USFWS's IPaC indicated two federally listed mussels, one under review mussel, and one under review snail are known from the potentially affected Beaver Creek and Boone Lake-South Fork Holston River 10-digit HUC watersheds of the proposed project area. Additionally, two state-listed fish are known from these two watersheds (Table 3-4). TVA considers all records of federally listed or under review species, and the state-listed fish, longhead darter, for these drainages historical or extirpated because they are greater than 25 years old. The state-listed fish, Tennessee dace, is extant within these watersheds. However, the Tennessee dace has experienced substantial population decline and is uncommon even if the small streams it typically inhabits are present with stable habitat due to the degree of historical alteration to the small headwater streams (Neves and Angermeier 1990).

3.6.1.2. Vegetation

Review of the TVA Regional Natural Heritage database indicated that no federally listed and seventeen state-listed plant species have been previously reported within a five-mile vicinity of the project area (Table 3-4). No federally listed plant species have been previously reported from Sullivan County. No federally or state-listed plants were observed in the project area. No designated critical habitat for plants occurs in the project area.

3.6.1.3. Wildlife

A review of terrestrial animal species in the TVA Regional Natural Heritage database in November 2022 indicated two federally listed species, three state-listed species, and one federally protected species have been documented within three miles of the proposed ROWs (Table 3-4). The USFWS has determined that the federally listed Indiana bat and the monarch butterfly, a candidate for federal listing, have the potential to occur in Sullivan County (Table 3-4). Thus, habitat suitability and potential impacts to each of these species have been addressed in the sections below.

Species Accounts

Monarch butterflies are a highly migratory species, with eastern U.S. populations overwintering in Mexico. Summer breeding habitat in the U.S. requires milkweed plant species, on which adults exclusively lay eggs for larvae to develop and feed on. Adults will drink nectar from other blooming wildflowers when milkweeds are not in bloom. No records of the monarch butterfly are known from Sullivan County, but the USFWS has determined that this species could occur within the project area. Suitable early-successional habitat is abundant in the project area.

Bald eagles are protected under the Bald and Golden Eagle Protection Act. This species is associated with large mature trees capable of supporting their massive nests. These are usually found near large waterways where the eagles forage. The nearest known bald eagle nest was recorded approximately 0.7 mile from the proposed activities and would not be impacted. Foraging habitat exists within the proposed Sullivan-S. Bristol ROW at the South Holston River and bald eagles were observed there during field surveys in January 2023. No bald eagle nests were observed during field surveys in December 2022 and January 2023.

Common barn owls inhabit open areas, including agricultural fields, grasslands, and marshes. They nest in hollow trees and in buildings with little human activity. Barn owls forage anywhere pray is abundant, typically grasslands, agricultural fields, and in and around farm buildings. The nearest record of this species is approximately 1.7 miles from the project area.

Hairy-tailed moles construct tunnels in deciduous woodlands with a thick layer of humus. They are adapted to second growth stands, old fields, and hedgerows. This species prefers well-drained, light, moist soil with well-mixed organic matter and minerals, and avoids soils that are hard, dry, or have a large clay content. Males leave tunnel systems in search of females during breeding season (March – May). The nearest record of this species is approximately 2.8 miles from the project area.

Gray bats are associated with caves year-round, migrating between different roosts in winter and summer. This species emerges at dusk to forage for insects along waterways. Foraging habitat is present in the project action area over the South Holston River, farm ponds, streams, and wetlands. The nearest record of gray bats is from a hibernaculum that exists beneath the proposed Sullivan-South Bristol ROW.

Tricolored bats are proposed for federal listing and are generally solitary or found in small groups. They are associated with forested landscapes where they forage near trees and along waterways, especially riparian areas. Maternity and other summer roosts are mainly dead or live tree foliage. Caves, mines, culverts, and rock crevices may be used as night roosts and hibernacula. The nearest record of tricolored bats is from a hibernaculum that exists beneath the proposed Sullivan-South Bristol ROW.

The Indiana bat hibernates in caves during winter and inhabits forested areas around these caves for swarming (mating) in the fall and staging in the spring, prior to migration to summer habitat. During summer, Indiana bats roost under exfoliating bark, and within cracks and crevices of trees, typically located in mature forests with an open understory and a nearby source of water. Indiana bats are known to change roost trees frequently throughout the season, yet still maintain site fidelity, returning to the same summer roosting areas in subsequent years (Pruitt and TeWinkel 2007; Kurta et al. 2002). The USFWS has determined that this species has the potential to occur statewide in Tennessee; however, no records are known from Sullivan County (USFWS 2023; TNBWG 2022).

The northern long-eared bat predominantly overwinters in large hibernacula such as caves, abandoned mines, and cave-like structures. During the fall and spring, they utilize entrances of caves and the surrounding forested areas for swarming and staging. In the summer, northern long-eared bats roost individually or in colonies beneath exfoliating bark or in crevices of both live and dead trees. Roost selection by northern long-eared bat is similar to Indiana bat; however, it is thought that northern long-eared bats are more opportunistic in roost site selection. This species also roosts in abandoned buildings and under bridges. Northern long-eared bats emerge at dusk to forage below the canopy of mature forests on hillsides and roads, and occasionally over forest clearings and along riparian areas (USFWS 2014). The nearest record of northern long-eared bats is from a hibernaculum that exists beneath the existing Sullivan-Bradford and proposed Sullivan-South Bristol ROWs.

Review of the TVA Regional Natural Heritage database in November 2022 indicated that twenty-seven caves have been documented within three miles of the project area. Ten of these were located within 0.5 mile, eight within 0.25 mile, and four within 200 feet of the proposed Sullivan-South Bristol ROW. Four of the caves within 0.25 mile were surveyed on December 2022, and three more were suspected or confirmed to be filled in. Tricolored bats were observed in a cave approximately 140 feet from the proposed ROW and in a larger cave beneath the existing Sullivan-Bradford and proposed Sullivan-South Bristol ROWs. Gray bats and northern long-eared bats have previously been documented in the larger cave.

Based on the Range-Wide Indiana Bat and Northern Long-Eared Bat Survey Guidelines (USFWS 2022), TVA has determined that approximately 37.17 acres of potentially suitable summer roosting habitat for Indiana bat and northern long-eared bat exists within the thirty-eight forest fragments in the two proposed ROWs. Habitat quality ranged from moderate to high based on the presence of snags and live trees with exfoliating bark, cracks, and

crevices in the proposed project area. Potentially suitable summer roosting areas were comprised of both forested wetland and mature deciduous, evergreen, and mixed stands. Additional foraging habitat and sources of drinking water occur over the South Holston River, and ponds, streams, and wetlands within the action area.

3.6.2. Environmental Consequences

3.6.2.1. Alternative A – No Action

Under the No Action Alternative, TVA would not acquire new ROW to construct the new transmission lines, expand existing ROW, or construct new access roads. There would be no direct, indirect, or cumulative effects to federally or state-listed endangered or threatened aquatic animal species or critical habitats by TVA project-related actions.

Under the No Action Alternative, no impacts would occur to state-listed plant species. No federally listed plants or designated critical habitat occurs within the project area. Changes to local plant communities resulting from natural ecological processes and human-related disturbance would continue to occur. These changes may benefit or negatively affect plants present in the project area, but the changes would be unrelated to the proposed project.

Under the No Action Alternative, tree clearing and earth moving would not occur. Trees, soil, and vegetation would remain in their current state. Threatened and endangered terrestrial animals and their habitats would not be affected.

3.6.2.2. Alternative B – Action Alternative

3.6.2.2.1. Aquatic Animals

As indicated in Section 3.2.2.2 Surface Water, adverse water quality impacts can potentially result from the implementation of the proposed project, which could have direct and indirect impacts to aquatic biota within watercourses in the project area.

As stated in the 3.3.2.2 Aquatic Ecology, aquatic species could be affected by the proposed action directly or indirectly. However, as described in Section 3.2.2.2 Surface Water and 3.3.2.2 Aquatic Ecology, watercourses that could be affected by the proposed project would be protected by standard BMPs and additional protection measures as identified in TVA (2022). These BMPs are designed in part to minimize disturbance of riparian areas, and subsequent erosion and sedimentation that can be carried to streams.

TVA considers all records of federally listed or under review species, and the state-listed fish, longhead darter, for these drainages historical or extirpated because the records are greater than 25 years old (Table 3-4). The state-listed fish, Tennessee dace, is extant within these watersheds but has experienced substantial population decline and is uncommon due to the degree of historical alteration to the small headwater streams. Furthermore, no designated critical habitat for aquatic species occurs within the Beaver Creek and Boone Lake South Fork Holston Watershed in Sullivan County. The federally listed tan riffleshell and Cumberland monkeyface are both considered extirpated from the watersheds encompassing the project area; therefore, the proposed project would result in no effects to federally or state-listed aquatic species. In their letter dated August 2, 2023, the USFWS concurred with TVA’s No Effect Determination for the Cumberland monkeyface.

The streams documented within the proposed project area would be protected by standard BMPs and additional protection measures as identified in Appendix C and described in TVA (2022) or as required by standard permit conditions. These categories of protection are based on the variety of species and habitats that exist in the streams as well as the state and federal requirements to avoid harming certain species. No federally designated critical habitat is known from the potentially affected 10-digit HUC watersheds of the proposed project area.

3.6.2.2.2. Vegetation

Adoption of the Action Alternative would not impact federally or state-listed species. No federally listed plant species occur in the project area and no populations of state-listed species were observed during field surveys of the project area. Therefore, no direct, indirect, or cumulative impacts on endangered and threatened species and their critical habitats are anticipated as a result of implementing the Action Alternative.

3.6.2.2.3. Wildlife

Under the proposed Action Alternative, TVA would build two separate 161-kV transmission line feeds, the Sullivan-South Bristol 161-kV Transmission Line and Bluff-City-South Bristol 161-kV Transmission Line, ROWs, and associated access roads. Actions would include removing trees and other vegetation within the proposed ROWs, establishing transmission infrastructure, and associated access roads.

Suitable early-successional habitat is abundant in the project area. This habitat may contain milkweed species required for the larval stage of the monarch butterfly or nectaring flowers for the adults. Although individual eggs or larvae may be impacted during construction, creation of early-successional ROW habitat may ultimately benefit this species. This species is currently listed under the Endangered Species Act (ESA) as a candidate species and is not subject to Section 7 consultation under the ESA.

No bald eagle nests were observed during field surveys. BMPs would be implemented during proposed activities to minimize impacts to water quality and hydrology. The proposed project is in compliance with the National Bald Eagle Management Guidelines (USFWS 2007). No significant impacts to bald eagles are anticipated because of the proposed project.

Suitable nesting and foraging habitat for common barn owls is abundant within and adjacent to the project area. ROW clearing has potential to remove nesting habitat and directly impact nests and eggs, but common barn owl populations would not be impacted.

Suitable habitat for hairy-tailed mole is present in forests and ungrazed areas of existing ROWs within the project area. Individuals may be directly impacted during construction; however, hairy-tailed mole populations would not be impacted.

Gray bats, tricolored bats, Indiana bats, and northern long-eared bats have the potential to utilize the project area. Multiple cave entrances are present within 200 feet of the proposed Sullivan-South Bristol ROW and at least one hibernaculum for gray bats, northern long-eared bats, and tricolored bats exists beneath the proposed ROW. No blasting would occur, and any drilling would be conducted in a manner that would not compromise the structural integrity or alter the karst hydrology of the roost site. Any drilling would involve development of project-specific avoidance or minimization measures in coordination with the USFWS. Foraging habitat is present in forest fragments and over aquatic habitats. BMPs would be used to protect water quality and flow. Similar suitable forested habitat is abundant in the

area. Potential indirect effects to the federally listed Indiana bat and northern long-eared bat may occur due to the clearing of approximately 37.17 acres of suitable roosting habitat as part of the proposed project. TVA would remove trees during the inactive season between November 1st and March 15th to avoid direct impacts to bat species.

In compliance with Section 7 of the ESA, TVA initiated consultation with the USFWS on May 5, 2023, regarding the potential effects of the Proposed Action on species federally listed under the ESA, including terrestrial species (see Table 3-4). TVA determined that the Project may affect but is not likely to adversely affect the gray bat, northern long-eared bat, and Indiana bat. TVA determined that the proposed project would not jeopardize the continued existence of monarch butterfly or tricolored bat. USFWS concurred with the TVA determination in a letter dated August 2, 2023 (Appendix A).

The proposed actions are in compliance with the National Bald Eagle Management Guidelines (USFWS 2007). With the use of BMPs (TVA 2022) and conservation measures agreed to in consultation with USFWS, the proposed actions may affect but would not be likely to adversely affect federally listed bat species. Impacts to populations of state-listed species are not expected.

3.7. Floodplains

3.7.1. Affected Environment

A floodplain is the relatively level land area along a stream or river that is subjected to periodic flooding. The area subject to a one-percent chance of flooding in any given year is normally called the 100-year floodplain. The area subjected to a 0.2-percent chance of flooding in any given year is normally called the 500-year floodplain. It is necessary to evaluate development in the floodplain to ensure that the project is consistent with the requirements of EO 11988 (Floodplain Management).

The proposed transmission lines and several access roads would cross the 100-year floodplains of Booher Creek, Dry Creek, Indian Creek and several tributaries, Miller Branch and several tributaries, Paddle Creek, Possum Creek, South Fork Holston River, Whitetop Creek and several tributaries, and Woods Branch in Sullivan County.

3.7.2. Environmental Consequences

3.7.2.1. Alternative A – No Action

Under the No Action Alternative, TVA would not acquire new ROW to construct the new transmission lines, expand existing ROW, or construct new access roads. Therefore, no impacts to floodplains in the project area would occur as a result of TVA.

3.7.2.2. Alternative B – Action Alternative

As a federal agency, TVA adheres to the requirements of EO 11988, Floodplain Management. The objective of EO 11988 is "…to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative." The EO is not intended to prohibit floodplain development in all cases, but rather to create a consistent government policy against such development under most circumstances (U.S. Water Resources Council 1978). The EO requires that agencies avoid the 100-year floodplain unless there is no practicable alternative.

For certain “critical actions,” the minimum floodplain of concern is the 500-year floodplain. The U.S. Water Resources Council defines “critical actions” as “any activity for which even a slight chance of flooding would be too great” (U.S. Water Resources Council 1978). Critical actions can include facilities producing hazardous materials (such as liquefied natural gas terminals), facilities whose occupants may be unable to evacuate quickly (such as schools and nursing homes), and facilities containing or providing essential and irreplaceable records, utilities, and/or emergency services (such as large power-generating facilities, data centers, hospitals, or emergency operations centers).

EO 13690, Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input, was reinstated by President Joe Biden in May 2021. However, implementation of EO 13690 is still in development at the national level. TVA is working with other federal agencies to develop consistent implementing plans for these EO requirements and may update its implementing plan when federal guidance is finalized. TVA currently incorporates floodplain analyses with respect to the 500-year floodplain in alignment with EO 13690, in addition to EO 11988.

Appendix D, Figures D-1 through D-5, illustrates the locations where the proposed transmission lines, access roads, or both would cross floodplains. Consistent with EO 11988, overhead transmission lines and related support structures are considered repetitive actions in the 100-year floodplain that should result in minor impacts.

While the proposed transmission line ROWs would cross floodplains, none of the proposed structures would be located within 100-year floodplains. The transmission line conductors would be located well above the 100-year flood elevation. The support structures for the proposed transmission lines would not be expected to result in any increase in flood hazard, either as a result of increased flood elevations or changes in flow-carrying capacity of the streams being crossed. Construction in the floodplain would be consistent with EO 11988 provided the TVA subclass review criteria for transmission line location in floodplains are followed (TVA 1980).

Based upon a topographic map review, aerial photography, aquatics field survey, and a review of the Federal Emergency Management Agency National Flood Hazard Layer, portions of several access roads would cross 100-year floodplains. Consistent with EO 11988, access roads are considered repetitive actions in the 100-year floodplain that should result in minor impacts (TVA 1981). To minimize adverse impacts, any road improvements would be done in such a manner that upstream flood elevations would not be increased by more than 1.0 foot.

Cumulative impacts of the proposed project include construction of BTES’ planned South Bristol 161-kV Substation. Based on USGS topo maps, aerial photography, and detailed terrain maps on the egis web viewer, the substation would be located well outside of 100-year floodplains and tens of feet above the nearest perennial stream – Whitetop Creek, which would be consistent with EO 11988, and when applicable, EO 13690.

By implementing the mitigation measures below, the proposed project would have no significant impact on floodplains and their natural and beneficial values:

- Standard BMPs would be used during construction activities.
- Construction would adhere to the TVA subclass review criteria for transmission line location in floodplains.
- Any road improvements or construction would be done in such a manner that upstream flood elevations would not be increased by more than 1.0 foot.
- Excess material would be spoiled outside of published floodways.

3.8. Wetlands

3.8.1. Affected Environment

Wetlands are those areas inundated or saturated by surface or groundwater such that vegetation adapted to saturated soil conditions are prevalent. Examples include bottomland forests, swamps, wet meadows, isolated depressions, and fringe wetland along the edges of watercourses and impoundments. Wetlands provide many societal benefits such as toxin absorption and sediment retention for improved downstream water quality, storm water impediment and attenuation for flood control, shoreline buffering for erosion protection, and provision of fish and wildlife habitat for commercial, recreational, and conservation purposes.

Wetland assessments were performed to ascertain wetland presence, condition, and extent to which wetland functions are provided within the proposed project area. Field surveys were conducted in January 2023, to delineate wetland areas potentially affected by the proposed transmission lines and in August 2023 for the proposed access roads.

Activities in wetlands are regulated by state and federal agencies to ensure no net loss of wetland resources. Under CWA §404, activities resulting in the discharge of dredge or fill material to waters of the U. S., including wetlands, must be authorized by the USACE through a Nationwide, Regional, or Individual Permit to ensure no more than minimal impacts to the aquatic environment. Section §401 of the Clean Water Act requires state water quality certification for projects in need of USACE approval. In Tennessee, TDEC is responsible for issuance of water quality certifications pursuant to Section 401. Lastly, EO 11990 requires federal agencies to avoid construction in wetlands and minimize wetland degradation to the extent practicable. Wetland determinations were performed according to the USACE standards, which require documentation of hydrophytic (wet-site) vegetation, hydric soil, and wetland hydrology (Environmental Laboratory 1987; Lichvar et al. 2016; USACE 2010). The USACE defines vegetative cover stratums as:

- Trees/Forest stratum are considered: Woody plants, excluding woody vines, approximately 20 feet or more in height and 3 inches or larger in diameter at breast height (DBH).
- Shrub stratum are considered: Woody plants, excluding woody vines approximately 3 to 20 feet in height.
- Herb/emergent stratum are considered: All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 feet in height.

Using the Tennessee Rapid Assessment Method (TRAM), wetlands were evaluated by their functions and classified into three categories: (Table 3-5) (TDEC 2015).

- "Low quality" wetlands are degraded aquatic resources which may exhibit low species diversity, minimal hydrologic input, and connectivity, recent or on-going disturbance regimes, and/or predominance of non-native species. These wetlands provide low functionality and are considered of low value.
- "Moderate quality" wetlands provide functions at a greater value than low quality wetlands due to less degradation and/or due to their habitat, landscape position, or hydrologic input. Moderate quality wetlands are considered healthy water resources of value. Disturbance to hydrology, substrate and/or vegetation may be present to a degree at which valuable functional capacity is sustained, and there is a reasonable potential for restoration.
- "Exceptional resource value" wetlands offer high functions and values within a watershed or are of regional/statewide concern. These wetlands may exhibit little to no recent disturbance, provide substantial large scale stormwater storage, sediment retention, and toxin absorption, contain mature vegetation communities, or offer habitat to rare species. Conditions in these superior quality wetlands often represent restoration goals for wetlands functioning at a lower capacity.

Table 3-5. Wetlands located within proposed Bristol Area Improvement Project

Wetland Identifier	Wetland Type[1]	TRAM[2] Functional Capacity (score)	Wetland Acreage within the Footprint
W001	PEM1E	Low (31)	0.06
W002	PFO1E	Moderate (50)	0.04
W003	PEM1E	Moderate (62)	0.76
W004	PEM1E	Moderate (62)	0.15
W005	PFO1E	Moderate (63)	0.1
W006	PFO1E	Moderate (63)	0.27
W007	PEM1E	Low (15)	0.25
W008	PEM1E	Low (27)	0.09
Total Acres			**1.72**

[1]Classification codes as defined in Cowardin et al. (1979): E = Seasonally flooded/saturated; EM1=Emergent, persistent vegetation; FO1=Forested, broadleaf deciduous vegetation; P=Palustrine
[2]TRAM = Tennessee Rapid Assessment Method that categorizes wetland quality by their functional capacity

The proposed project traverses a rural landscape, dominated by agricultural fields, forested uplands and bottomlands in Sullivan County. The project area is located across the Beaver Creek (0601010205) and Boone Lake-South Fork Holston River (0601010206) HUC-10 watersheds. Field surveys were completed in January 2023 to identify actual wetland extent and quality. Eight wetland complexes, totaling 1.72 acres, were identified within the proposed project footprint (Table 3-5). W001 is located in the Boone Lake-South Fork Holston River Watershed and W002-W008 are located in the Beaver Creek Watershed. The combination of land-use practices and landscape position dictates the wetland habitat type, wetland functional capacity, and wetland value. The identified wetlands consisted of emergent and forested habitat, exhibiting both low and moderate condition, thus providing poor to suitable wetland value to the surrounding landscape (Tables 3-6 and 3-7).

Table 3-6. Acreage of Wetlands Representing Low, Moderate, or Exceptional Resource Value Within the action alternative footprint and Relative to Total Mapped Wetland Occurrence Within the Watersheds

Watershed (10-HUC)	NWI Estimated Total Wetland Acres in Watershed*	Delineated Wetland Acreage in Proposed Project Area			
		Low Value	Moderate Value	Exceptional Resource Value	TOTAL
Beaver Creek (0601010205)	**303**	0.34	1.32	0	**1.66**
Boone Lake-South Fork Holston River (0601010206)	**400**	0.06	0	0	**0.06**

[1]National Wetlands Inventory (U.S. Fish and Wildlife Service 1982)

Table 3-7. Acreage of Wetlands by Habitat Type Within the Action Alternative Footprint and Relative to Total Mapped Wetland Occurrence Within the Watersheds

Watershed (10-HUC)	NWI Estimated Total Wetland Acres in Watershed	Delineated Total Wetland Acreage in Proposed Project			
		Emergent	Scrub-Shrub	Forested	TOTAL
Beaver Creek (0601010205)	**303**	1.25	0	0.41	**1.66**
Boone Lake South Fork Holston River (0601010206)	**400**	0.06	0	0	**0.06**

Emergent wetlands within the project footprint totaled 1.31 acres across five of the eight delineated wetland areas. Emergent wetlands are generally devoid of woody vegetation with predominant cover by non-woody species across areas periodically saturated and/or inundated. Emergent wetlands in this general vicinity are often found where land-use practices or inundation deter growth of woody species. Emergent wetland habitats encountered within the proposed project footprint included saturated farmed/agriculture field (W001) and vegetated swales (W003, W004, W007, W008). All of these wetland areas contained indicators of wetland hydrology influencing soil physiology such that coloration indicative of wetland conditions was evident in the soil profile. Emergent wetlands were dominated by common emergent wetland vegetation including soft rush, Pennsylvania smartweed, and giant goldenrod. All emergent wetland habitat encountered scored as low quality or moderate quality using TRAM, indicating poor to moderate wetland quality, due to small size, surrounding land use, and evidence of disturbance (e.g. mowing, excavation, farming, etc.) (Table 3-5; Table 3-7).

Forested wetlands in general have deeper root systems and contain greater biomass (quantity of living matter) per acre than do emergent and scrub-shrub wetlands, which do not grow as tall. As a result, forested wetlands provide higher levels of wetland functions, such as sediment retention, carbon storage, and pollutant retention and transformation (detoxification), storm water storage, and flood attenuation, all of which support better water

quality and protection of downstream infrastructure (Ainslie et al. 1999; Scott et al. 1990; Wilder and Roberts 2002). A total of 0.41 acres of forested wetland were delineated across three wetland areas within the proposed project footprint (W002, W005, W006). All of these wetland areas contained indicators of wetland hydrology influencing soil physiology such that coloration indicative of wetland conditions was evident in the soil profile. All forested wetlands identified were dominated by common wetland vegetation including black willow, green ash, and American sycamore. All forested wetland habitat encountered scored as moderate quality using TRAM, indicating moderate wetland quality, due to small size and surrounding land use (Table 3-5; Table 3-8).

Table 3-8. Acreage of Low, Moderate, and Exceptional Resource Value Forested Wetlands by Watershed Within the Action Alternative Footprint

Watershed (10-HUC)	NWI Estimated Forested Wetland Acres in Watershed	Delineated Forested Wetland Acreage in Proposed Project Area			
		Low Value	Moderate Value	Exceptional Resource Value	TOTAL
Beaver Creek (0601010205)	**149**	0	0.41	0	**0.41**
Boone Lake South Fork Holston River (0601010206)	**277**	0	0	0	**0**

The Beaver Creek (0601010205) contains forested wetlands W002, W005, W006, within the proposed project area. Of an estimated total 149 forested wetland acres in this watershed, the proposed project footprint contains 0.41 acres proposed for clearing, or 0.28 percent (Table 3-8). All forested wetlands identified on this project scored as moderate quality due to size, hydrological influence, and surrounding land use Table 3-5). Wetland hydrology indicators, such as inundation, saturation, high water table, drainage patterns, and geomorphic position were exhibited within these wetlands. These hydrology parameters influenced the soil profile, and hydric soil coloration was evident. Hydrophytic forested vegetation was dominant and included black willow, green ash, and American sycamore.

3.8.2. Environmental Consequences

3.8.2.1. Alternative A – No Action

Under the No Action Alternative, the proposed project would not proceed. As such, no project related disturbance to wetlands within the proposed project footprint would occur. Therefore, no impacts to wetlands in the project area would occur as a result of TVA actions associated with the proposed project.

3.8.2.2. Alternative B – Action Alternative

Activities in wetlands are regulated by state and federal agencies to ensure no net loss of wetland resources. Under CWA Section 404, activities resulting in the discharge of dredge, fill, and associated secondary impacts to waters of the U.S., including wetlands, must be authorized by the USACE through a Nationwide, Regional, or Individual Permit. This project is in the Memphis District USACE. CWA Section 401 mandates state water quality certification for projects requiring USACE approval. In Tennessee, TDEC certifies CWA Section 404 permits and impacts to intrastate wetland resources through a general or

individual aquatic resources alteration permit. In Tennessee, this permit is required for any alteration to the physical, chemical, or biological properties of any waters of the state, including wetlands, pursuant to the Tennessee Water Quality Control Act (§69-3-108, 0400-40-07). TDEC's permit process ensures compliance with Tennessee's anti-degradation policy as well (§69-3-108, 0400-40-04). Lastly, EO 11990 requires federal agencies to minimize wetland destruction, loss, or degradation, and avoid new construction in wetlands wherever there is a practicable alternative, while carrying out agency responsibilities.

Efforts were made during project planning and siting to avoid wetlands to the extent practicable. However, because of project and topographic constraints, and because of the goal of minimizing impacts to other resources, no practicable alternative was available that would allow complete avoidance of wetlands. The process for detecting and avoiding wetland resources identified during the office level review, prior to field surveys, is described in Section 2.3.3.

Under the Action Alternative, the proposed transmission lines would be constructed. As described in Section 2.2.2.2, adequate clearance between tall vegetation and transmission line conductors would require trees within the proposed ROWs to be cleared. Establishing the two proposed transmission line corridors would require vegetation clearing within the full extent of the ROWs and future maintenance of low stature vegetation to accommodate clearance and abate interference with overhead wires.

The proposed project footprint contains a total of 1.31-acre emergent wetland and 0.41-acre forested wetland (Table 3-7). Emergent wetlands located on the proposed new ROW corridors would experience temporary impacts to accommodate access during construction. These wetlands would be maintained long term in their current state and functional capacity, due to their existing height being compatible and consistent with transmission line ROW vegetation management objectives. Of the 0.41 acre of forested wetland area within the proposed project for construction, all 0.41 acre would be cleared and permanently converted to emergent, meadow like wetland habitat for the perpetuity of the transmission line's existence (Table 3-9). Woody vegetation would be removed with a feller buncher. This involves a grip and blade attachment on a mechanized tracked or wide tire (low ground pressure) vehicle. The grip holds the tree trunk while the blade cuts below the grips. This method allows for removal of the cut aerial portion of a tree to an upland location for deposition, while leaving stumps less than 12 inches and the below ground root system entirely intact with minimal soil disturbance.

Table 3-9. Impacts to Forested Wetlands Within the Proposed Bristol, Tennessee Power Improvement Project Area

Wetland Identifier	Impact Type	Acreage of Forested Wetland Clearing
W001	Temporary, minimal, or avoid	--
W002	Clearing for TL Construction	0.04
W003	Temporary, minimal, or avoid	--
W004	Temporary, minimal, or avoid	--
W005	Clearing for TL Construction	0.1

Wetland Identifier	Impact Type	Acreage of Forested Wetland Clearing
W006	Clearing for TL Construction	0.27
W007	Temporary, minimal, or avoid	--
W008	Temporary, minimal, or avoid	--
	TOTAL ACRES	**0.41 Acre**

Woody (forested and scrub-shrub) wetland conversion to emergent habitat results in reduction in wetland function. Due to the rate of water uptake, extensive root system, and structural integrity of trees and shrubs relative to herbaceous plants, wooded wetlands function at a greater capacity to impede and hold storm water, absorb toxins, retain sediment, and provide the shaded forage and spawning habitat necessary for its aquatic and terrestrial inhabitants to exist. Therefore, conversion of this community type to a habitat devoid of woody vegetation would result in a reduction of existing functional capacity.

Forested wetland conversion to accommodate structure locations and transmission line spans is considered a secondary impact under section 404b of the CWA. Therefore, forested wetland loss is subject to the authority of the regulatory agencies to ensure no net loss of wetland functions and values, per the directive of the CWA and the federal no net loss of wetland policy (EPA 1990). The CWA authorizes regulatory oversight for these impacts. The USACE and Tennessee exert this oversight through an established permit process that ensures maintenance of the physical, biological, and chemical integrity of national and state waters, including wetlands, and the objectives of the CWA are upheld. The permitting process involves a demonstration of wetland avoidance, minimization of disturbance, and compensation for loss of wetland functions and values. In compliance with the CWA and EO11990, TVA has considered all options to avoid and minimize wetland impacts, resulting in the least wetland disturbance practicable (Section 2.1).

Wetland habitat located in areas proposed for heavy equipment travel could experience minor and temporary impacts during transmission line construction or long-term asset and vegetation management. TVA would minimize wetland disturbance through adherence to wetland BMPs for all work necessary within the delineated wetland boundaries (TVA 2022). This includes the use of low ground pressure vehicles, mats, or other wetland crossings to minimize rutting to less than 12 inches, erosion control techniques to deter indirect impacts through siltation into adjacent wetland area, dry season work, etc. Vehicular traffic would be limited to narrowed access corridors along the ROWs for structure and conductor placement, OPGW installation, and long-term maintenance.

TVA would comply with all USACE/TDEC mitigation requirements with wetland avoidance and minimization to compensate for the proposed loss of wetland resources, functions, and values resulting from the proposed Action Alternative. TVA would obtain the necessary Section 404/401 CWA permits and required compensatory mitigation to ensure that wetland functions and values remain at the current capacity within the larger affected watershed.

Cumulative impact analysis of wetland effects considers current wetland loss and habitat conversion at a watershed scale and within the reasonable and foreseeable future. Loss of wetland habitat due to wetland fill would be compensated through wetland mitigation banking, resulting in no cumulative wetland impacts. Loss of wetland functions and values

from forested wetland clearing would be compensated as required by TDEC. Forested wetland conversion for this project would take place across the Beaver Creek watershed (0601010205). A total of 0.41 acre of forested wetland clearing would be required, comprising about 0.28 percent of mapped forested wetland. In a letter dated October 19, 2023, TVA reserved 0.51 credits from the Lick Creek Wetland Mitigation Bank Number 2 for the permanent conversion of 0.41 acre of forested wetland to emergent, meadow-like wetland habitat for the perpetuity of the proposed transmission line's existence (Appendix A). TVA's compensatory mitigation compliance for wetland conversion would ensure no more than minimal impacts to the aquatic environment result and the objectives of the CWA and Tennessee's anti-degradation policy are upheld.

Similarly, general trends in wetland impacts resulting from development within the watershed would be subject to CWA, USACE, and TDEC mandates, and these regulatory requirements are in place to ensure wetland impacts do not result in cumulative loss. In this context, wetland impacts would be kept to a minimum on a cumulative scale due to the avoidance, minimization, and compliance measures in place. Therefore, in compliance and accordance with the CWA and the directives of USACE and TDEC, TVA would ensure wetland impacts are minimized and the proposed impacts on wetlands would be minimal.

3.9. Aesthetics

3.9.1. Visual Resources

3.9.1.1. Affected Environment

This assessment provides a review and classification of the visual attributes of existing scenery, along with the anticipated attributes resulting from the proposed action. The classification criteria used in this analysis are adapted from a scenic management system developed by the USFS and integrated with planning methods used by TVA (USFS 1995). Potential visual impacts to cultural and historic resources are not included in this analysis as they are assessed separately in Section 3.11 Archaeological and Historic Resources.

The visual landscape of an area is formed by physical, biological, and man-made features that combine to influence both landscape identifiability and uniqueness. The scenic value of a particular landscape is evaluated based on several factors that include scenic attractiveness, scenic integrity, and visibility. Scenic attractiveness is a measure of scenic quality based on human perceptions of intrinsic beauty as expressed in the forms, colors, textures, and visual composition of each landscape. Scenic attractiveness is expressed as one of the following three categories: distinctive, common, or minimal. Scenic integrity is a measure of scenic importance based on the degree of visual unity and wholeness of the natural landscape character. The scenic integrity of a site is classified as high, moderate, low, or very low. The subjective perceptions of a landscape's aesthetic quality and sense of place are dependent on where and how it is viewed.

Views of the landscape are described in terms of what is seen in the foreground, middleground, and background distances. In the foreground, an area within 0.5 mile of the observer, details of objects are easily distinguished. In the middleground, from 0.5 mile to 4 miles from the observer, objects may be distinguishable, but their details are weak and tend to merge into larger patterns. In the distant part of the landscape, the background, details, and colors of objects are not normally discernible unless they are especially large, standing alone, or have a substantial color contrast. In this assessment, the background is measured as 4 to 10 miles from the observer. Visual and aesthetic impacts associated with an action

may occur because of the introduction of a feature that is not consistent with the existing viewshed. Consequently, the visual character of an existing site is an important factor in evaluating potential visual impacts.

For the purposes of this visual assessment, the project area as described under the proposed Action Alternative is defined as the area encompassing the two transmission lines that would service BTES' planned substation. The project area is comprised of level to gently rolling terrain. The landscape is characterized by moderate rural development including commercial development, residential development, agricultural fields and pastures, roadways, existing utility corridors, and pockets of dense forest. Thus, the project vicinity consists of a combination of natural elements and human development.

The composition and patterns of vegetation are the prominent natural features of the landscape within the project area. Apart from crop fields and pasture, vegetation consists of a variety of brush and trees, which are predominantly deciduous. The forms, colors, and textures of the natural features of the project area are typical of northeastern Tennessee and are not considered to have distinctive visual quality. Therefore, scenic attractiveness of the project area is considered common, due to the ordinary or common visual quality in the foreground, middleground, and background (Table 3-10). The scenic integrity is considered moderate due to noticeable human alteration, including commercial, residential, agricultural, and transportation uses. The scenic value class of a landscape is determined by combining the levels of scenic attractiveness, scenic integrity, and visibility and can be excellent, good, fair, or poor. Based on the criteria used for this analysis, the overall scenic value class for the project area is good.

Table 3-10. Visual Assessment Ratings for Project Area

	Existing Landscape	
View Distance	**Scenic Attractiveness**	**Scenic Integrity**
Foreground	Common	Moderate
Middleground	Common	Moderate
Background	Common	Moderate

In a visual impact assessment, sensitive receptors generally include any scenic vistas, scenic highways, residential viewers, and public facilities or recreational areas located in the project's viewshed. The proposed transmission lines would be visible to passing motorists from US-19E, TN-44, TN-358, TN-394, and various local roads. Other sensitive visual receptors in the foreground include scattered residences and farmsteads, as well as recreationists on portions of South Holston River. In addition, a few churches, cemeteries, schools, parks, trails, natural areas, and recreational areas are within the viewshed of the proposed transmission lines (Figure 3-1). Most of these occur within the middleground, but six churches and five cemeteries are located within the foreground. In addition, Morril's Cave State Natural Area (also known as Worley's Cave), Overmountain Victory National Historic Trail, a Land Trust for Tennessee conservation easement, and Whitetop Creek Park are also located within the foreground. The closest of these are Blessed Redeemer Baptist, located approximately 100 feet northeast of the western end of the proposed Sullivan-South Bristol Transmission Line, and the Morril's Cave State Natural Area that is also crossed by this transmission line.

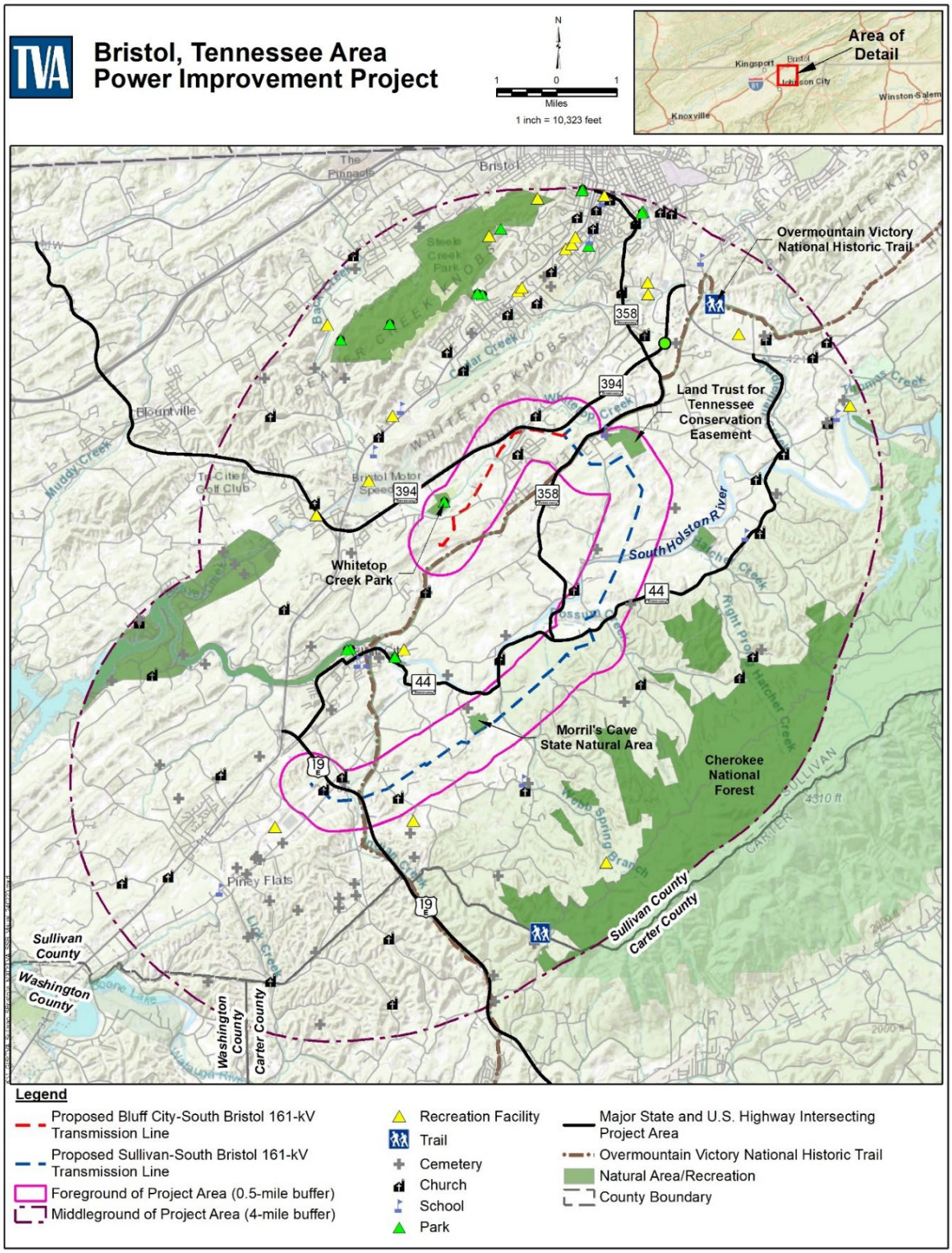

Figure 3-1. Sensitive Visual Receptors Within the Foreground and Middleground of the Proposed Bluff City-South Bristol/Sullivan-South Bristol 161-kV Transmission Lines in Sullivan County, Tennessee

3.9.1.2. Environmental Consequences

The potential impacts to the visual environment from a given action are assessed by evaluating the potential for changes in the scenic value class ratings based upon landscape scenic attractiveness, integrity, and visibility. Sensitivity of viewing points available to the general public, their viewing distances, and visibility of the proposed action are also considered during the analysis. These measures help identify changes in visual character based on commonly held perceptions of landscape beauty and the aesthetic sense of place. The extent and magnitude of visual changes that could result from the proposed alternatives were evaluated based on the process and criteria outlined in the scenic management system as part of the environmental review required under NEPA.

3.9.1.2.1. Alternative A – No Action

Under the No Action Alternative, TVA would not acquire new ROW to construct the new transmission lines, expand existing ROW, or construct new access roads. Thus, landscape character and integrity would remain in its current state and no impacts to visual resources in the project area would occur as a result of TVA actions associated with the proposed project. However, changes to visual resources are anticipated to continue to occur from the cumulative effects of surrounding land use development.

3.9.1.2.2. Alternative B – Action Alternative

Under the Action Alternative, construction of the proposed transmission lines would result in both short-term and long-term impacts to visual resources. During the construction period (approximately 22 weeks for Sullivan-South Bristol and 8 weeks for Bluff City-South Bristol), there would be some visual discord from existing conditions due to an increase in personnel and equipment coupled with disturbances of the current site characteristics. However, this would be contained within the immediate vicinity of the construction activities and would only last until all project activities have been completed and the disturbed areas have been seeded and restored using standard BMPs (TVA 2022). Because of their temporary nature, construction-related impacts to local visual resources are expected to be minor. In addition, there may be some visual discord associated with permanent access roads required for construction and maintenance activities. Where possible, these access roads would utilize existing roadways and existing utility ROW. However, new roads may be established to support the construction and maintenance of the transmission lines. Sensitive visual receptors located along the access roads would experience some minor visual discord during construction and maintenance activities. These impacts would be greater in areas with new access roads, compared to access established on existing roads and utility ROW. The access roads would mainly be utilized during the short-term construction period and then periodically utilized for maintenance activities. Given the rural but residential development of the area, construction and utilization of the access roads would have a minor impact on sensitive receptors and scenic quality.

Long-term impacts consist of the visible alterations associated with new transmission structures, overhead wires, ROW clearing, and access road maintenance and use. The most visible elements of the electric transmission system are the transmission structures and the permanent removal of woody vegetation within the ROW that creates a visible corridor. However, the addition of lines on or near existing structures or within existing ROWs increases compatibility with the landscape and minimizes visual impacts. Therefore, on the portions of the Sullivan-South Bristol Transmission Line (approximately 7.7 miles) and Bluff City-South Bristol Transmission Line (approximately 1.6 miles) where the proposed project would parallel existing ROW, changes to the viewshed would be minimized, as the project would slightly expand the existing corridor feature rather than

create a new visible corridor. Within the remaining 3.1 miles of the Sullivan-South Bristol Transmission Line and 1.8 miles of the Bluff City-South Bristol Transmission Line, the removal of forested areas and the installation of 88-foot double-circuit steel poles and overhead wires would add discordantly contrasting elements and colors to the environment. Although much of the proposed transmission lines would not be visible to the public due to the distance from developed areas and presence of forested buffers, they would be visible in the foreground to motorists on nearby roadways, a number of residences, and recreationists on portions of South Holston River at the proposed crossing. Recreationists on the river and observers would be indirectly impacted by the visual intrusion of the proposed Sullivan-South Bristol Transmission Line. However, as existing transmission lines are present adjacent to the proposed ROW, the proposed construction of the new transmission lines would be noticeable but would not significantly alter the recreational use of the river or views for observers along the river.

As noted above, several residents reside in close proximity to the proposed transmission lines ROW. Areas where ROW is being introduced would create a new visible corridor and would be visible in the foreground to a number of these residences and to motorists. Although tree and woody vegetation removal would occur along some of the new ROW, much of the proposed transmission lines would be located in previously disturbed areas and located near major roadways and existing commercial development. As a majority of the proposed ROW is adjacent to existing transmission line ROW and transportation development, the introduction of the proposed transmission lines would be minor. While the proposed transmission lines would add discordant visual elements to the existing landscape, the view of these elements would be partially limited by existing transmission line ROW and human development adjacent to sensitive receptors and residential receptors in the immediate foreground. The transmission lines are anticipated to be somewhat absorbed into the overall landscape character near existing utility corridors and roadways.

In addition to nearby residents, motorists, and recreationists, sensitive visual receptors, including six churches and five cemeteries are located within the foreground of the project area. Furthermore, Morril’s Cave State Natural Area, Overmountain Victory National Historic Trail, a Land Trust for Tennessee conservation easement, and Whitetop Creek Park are also located within the foreground of the project area (Figure 3-1). Morril’s Cave State Natural Area, which would be intersected by the proposed ROW, and Blessed Redeemer Baptist Church are the closest sensitive visual receptors of the proposed Sullivan-South Bristol Transmission Line. Both visual receptors are located within the foreground of the Sullivan-South Bristol Transmission Line. The presence of an existing transmission line ROW, which runs directly adjacent to these facilities, increases the visual compatibility for the construction of the proposed Sullivan-South Bristol Transmission Line and prevents significant changes to the viewshed. Approximately 0.61 acres of forested area would be cleared; however, it is adjacent to the existing transmission line ROW. The view of the existing transmission line ROW and the proposed Sullivan-South Bristol Transmission Line from accessible areas of Morril’s Cave State Natural Area would remain partially obstructed by mature vegetation. The remaining church and cemeteries within the foreground of the project area are located 500 feet or more from the transmission lines ROW and are either shielded from view by dense vegetation and/or topography or have views of existing transmission line ROW and transportation corridors. Overmountain Victory National Historic Trail stretches 330 miles through four states and intersects the proposed Sullivan-South Bristol Transmission Line ROW. The historic trail in this portion of the project area is considered a Commemorative Motor Route. Within the foreground of the proposed ROW the historic trail is located on and adjacent to Weaver Pike and Pleasant Grove Road,

two developed roadways. Therefore, impacts of the proposed transmission lines would be minimal, as multiple resident and commercial developments are located along these roads. For visual receptors located at further distances, in the middleground and background, the proposed transmission lines would be less visible and obtrusive as it would largely fall into an observer's view where objects are less distinguishable.

The human alterations already in place within the project area, including commercial development, roadways, and existing transmission system elements, currently contribute some visual discord with the natural landscape. These elements contribute to the landscape's ability to absorb negative visual change. Therefore, while the forms, colors, and textures of the landscape that make up the scenic attractiveness would be affected by the construction of the transmission lines, it would still remain common or ordinary (Table 3-11). Impacts to scenic integrity are anticipated to be greatest in the foreground along the proposed transmission lines. At this distance, scenic integrity would be reduced from moderate to low, as visual alterations associated with the proposed transmission lines (transmission structures, lines, and clear-cut ROW corridors that disrupt the tree canopy) would be dominant features on the landscape. However, there would be no change in the ratings for the middleground and background as the alterations associated with the transmission lines would not be substantive enough to dominate the view from these distances (Table 3-11). Based on the criteria used for this analysis, the scenic value class for the affected environment after the proposed modifications would be reduced to fair in the foreground along the length of the proposed transmission lines but would remain classified as good in the middleground. While the Action Alternative would contribute to a minor decrease in visual integrity of the landscape, the existing scenic class would not be reduced by two or more levels, which is the threshold of significance of impact to the visual environment. Therefore, visual impacts resulting from the implementation of the Action Alternative would be minor.

Table 3-11. Visual Assessment Ratings for Project Area Resulting From Action Alternative

	Resulting Landscape	
View Distance	**Scenic Attractiveness**	**Scenic Integrity**
Foreground	Common	Low
Middleground	Common	Moderate
Background	Common	Moderate

3.9.2. Noise

3.9.2.1. Affected Environment

Noise is unwanted or unwelcome sound usually caused by human activity and added to the natural acoustic setting of a locale. It is further defined as sound that disrupts normal activities or that diminishes the quality of the environment. Community response to noise is dependent on the intensity of the sound source, its duration, the proximity of noise-sensitive land uses, and the time of day the noise occurs (i.e., higher sensitivities would be expected during the quieter overnight periods).

Sound is measured in logarithmic units called decibels (dB). Given that the human ear cannot perceive all pitches or frequencies of sound, noise measurements are typically

weighted to correspond to the limits of human hearing. This adjusted unit of measure is known as the A-weighted decibel (dBA) which filters out sound in frequencies above and below human hearing. A noise level change of 3 dBA or less is barely perceptible to average human hearing. However, a 5 dBA change in noise level is clearly noticeable. The noise level associated with a 10 dBA change is perceived as being twice as loud; whereas the noise level associated with a 20 dBA change is four times as loud and would therefore represent a “dramatic change” in loudness.

To account for sound fluctuations, environmental noise is commonly described in terms of the equivalent sound level. The equivalent sound level is the constant noise level that conveys the same noise energy as the actual varying instantaneous sounds over a given period. Fluctuating levels of continuous, background, and/or intermittent noise heard over a specific period are averaged as if they had been a steady sound. The day-night sound level (L_{dn}), expressed in dBA, is the 24-hour average noise level with a 10-dBA correction penalty for the hours between 10 p.m. and 7 a.m. to account for the increased sensitivity of people to noises that occur at night. Typical background day-night noise levels for rural areas are anticipated to range between an L_{dn} of 35 and 50 dB, whereas higher-density residential and urban areas background noise levels range from 43 dB to 72 dB (EPA 1974). Common indoor and outdoor noise levels are listed in Table 3-12.

There are no federal, state, or locally established quantitative noise-level regulations specifying environmental noise limits for the proposed transmission lines or the surrounding area. However, the EPA noise guideline recommends outdoor noise levels do not exceed Ldn of 55 dBA, which is sufficient to protect the public from the effect of broadband environmental noise in typical outdoor and residential areas. These levels are not regulatory goals but are “intentionally conservative to protect the most sensitive portion of the American population” with “an additional margin of safety” (EPA 1974). The U.S. Department of Housing and Urban Development (HUD) considers an Ldn of 65 dBA or less to be compatible with residential areas (HUD 1985).

Table 3-12. Common Indoor and Outdoor Noise Levels

Common Outdoor Noises	Sound Pressure Levels (dB)	Common Indoor Noises
	110	Rock Band at 5 m (16.4 ft)
Jet Flyover at 300 m (984.3 ft)		
	100	Inside Subway Train (New York)
Gas Lawn Mower at 1 m (3.3 ft)		
	90	Food Blender at 1 m (3.3 ft)
Diesel Truck at 15 m (49.2 ft)		Garbage Disposal at 1 m (3.3 ft)
	80	Shouting at 1 m (3.3 ft)
Gas Lawn Mower at 30 m (98.4 ft)	70	Vacuum Cleaner at 3 m (9.8 ft)
Commercial Area		Normal Speech at 1 m (3.3 ft)
	60	Large Business Office
	50	Dishwasher Next Room

Common Outdoor Noises	Sound Pressure Levels (dB)	Common Indoor Noises
Quiet Urban Daytime		
	40	Small Theater, Large Conference Room
Quiet Urban Nighttime		Library
Quiet Suburban Nighttime		
	30	
		Bedroom at Night
Quiet Rural Nighttime		Concert Hall (Background)
	20	
		Broadcast and Recording Studio
	10	
		Threshold of Hearing
	0	

Source: Federal Highway Administration (FHWA), 2018

3.9.2.2. Environmental Consequences

3.9.2.2.1. Alternative A – No Action

Under the No Action Alternative, TVA would not acquire new ROW to construct the new transmission lines, expand existing ROW, or construct new access roads. Therefore, no impacts to noise would occur as a result of TVA actions associated with the proposed project.

3.9.2.2.2. Alternative B – Action Alternative

Under the Action Alternative, construction activities of the proposed Sullivan-South Bristol and Bluff-City-South Bristol Transmission Lines would last approximately 22 weeks and eight weeks, respectively, and would generally be limited to daytime hours. During construction, noise would be generated by a variety of equipment including standard pick-up trucks, dump trucks, concrete trucks, feller-bunchers, bulldozers, excavators, graders, pile-drivers, augers, and rollers. Typical noise levels are expected to be 85 dBA or less at 50 feet from the construction equipment, except for pile-drivers which may produce noise levels of up to 95 dBA at 50 feet (Federal Highway Administration [FHWA] 2016). The actual observed noise would likely be lower in the field where vegetation and topography would cause further noise attenuation. Thus, typical construction noise would fall below the recommended EPA outdoor noise guideline of 55 dBA at all sensitive receptors. Additionally, pile driver use would be a short-term and relatively infrequent occurrence that would not contribute to typical background noise levels.

There is also a potential for indirect noise impacts associated with a temporary increase in traffic related to the workforce vehicle traffic, transport of construction equipment, and transport of spoil and borrow material. Roadway traffic noise is not usually a serious problem for people who live more than 500 feet from heavily traveled freeways or more than 100 to 200 feet from lightly traveled roads (FHWA 2011).

Due to the nature of the decibel scale and the attenuating effects of noise with distance, a doubling of traffic volume would result in an approximately 3 dBA increase in noise level, which would not normally be a perceptible noise increase (FHWA 2011).

During construction, operation, and maintenance of the proposed transmission lines, equipment could generate noise above ambient levels (Appendix E). As all construction noise would be temporary in nature and limited to daytime hours, noise impacts from construction of the proposed transmission lines would be minor.

Operational Noise

For similar reasons, noise related to periodic line maintenance is also expected to be insignificant. Transmission lines may produce minor noise during operation under certain atmospheric conditions.

Under certain wet weather conditions, high-voltage transmission lines may produce an audible low-volume hissing or crackling noise from corona discharge (the electrical breakdown of air into charged particles). Corona noise is composed of both broadband noise, characterized as a crackling noise, and pure tones, characterized as a humming noise. Under normal conditions, corona-generated noise is not audible, and during rain showers, the corona noise would likely not be readily distinguishable from background noise. During very moist, non-rainy conditions, such as heavy fog, the resulting corona noise may produce a very minor increase in background noise levels, but due to distance, it is not expected to result in perceptible changes in noise level at the closest sensitive receptors. Off of the ROW, corona noise is below the level that would interfere with speech.

3.10. Archaeological and Historic Resources

3.10.1. Affected Environment

Federal agencies are required by Section 106 of the National Historic Preservation Act and by NEPA to consider the possible effects of their proposed actions (or undertakings) on historic properties. The term “historic property” includes any historic or prehistoric site, district, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP) maintained by the NPS. “Undertaking” means any project, activity, or program that has the potential to have an effect on a historic property and that is under the direct or indirect jurisdiction of a federal agency or is licensed or assisted by a federal agency. To determine an undertaking’s possible effects on historic properties, a four-step review process is conducted.

These steps include:

- Initiation (defining the undertaking and the APE and identifying the parties to be consulted in the process).
- Identification of historic properties within the APE.
- Assessment of effects to historic properties.
- Resolution of adverse effects by avoidance, minimization, or mitigation.

To be eligible for listing on the NRHP if the cultural resource meets one of the following criteria:

- Criterion A: made a significant contribution to American history; for example, literature, ethnic heritage, health/medicine, and transportation.
- Criterion B: related to the life of significant persons; examples of NRHP properties nominated under Criterion B include George Washington's Mt. Vernon estate.
- Criterion C: embodied distinctive characteristics of a type, period, or method of construction including works of a master or buildings that possess high artistic value.
- Criterion D: yielded important information about history or prehistory. This category is typically the most relevant criterion for archaeological resources. "Undertaking" means any project, activity, or program that has the potential to have an effect on a historic property and that is under the direct or indirect jurisdiction of a federal agency or is licensed or assisted by a federal agency.

During the Section 106 process, the agency must consult with the appropriate SHPO, federally recognized Indian tribes that have an interest in the undertaking, and any other party with a vested interest in the undertaking. If avoidance or minimization are not feasible, measures to mitigate the adverse effect must be taken.

TVA recommends that the APE for the current undertaking includes the following:

- The approximately 14.2 miles, 100-feet-wide planned ROW occupying about 166.5 acres and 8.8 miles (approximately 19.8 acres) of planned access routes.
- All areas in which the project would be visible within a half-mile radius of the proposed transmission line.

3.10.1.1. Archaeological Resources

A background and literature search found no archaeological resources within the APE. Ten cemeteries: Baker-Denton Cemetery, Crockett Cemetery, Crumley Cemetery, McKinney Cemetery, Morrell Cemetery I, Morell Cemetery II, Mountain View Cemetery, Rockhold Cemetery, Simerly Cemetery, and Weaver Cemetery, are documented within the 0.5-mile background study area, although none of these were within the APE. TVA contracted with Tennessee Valley Archaeological Research (TVAR) to conduct a cultural resources survey of the 14.2-mile-long transmission line corridor and access routes to be used during construction.

TVAR's archaeological survey resulted in the investigation of 19 cultural resources including six archaeological sites (40SL509, 40SL510, 40SL511, 40SL512, 40SL513, and 40SL514), one above-ground stone feature (AGSF, 40SL515), nine non-site cultural resources (NSCRs), and three isolated finds (Ifs) (Table 3-13) (Dison et al. 2023a, Dison et al. 2023b, Dison et al. 2024). Archaeological investigations were confined to the survey area and it is possible that the archaeological sites were not fully delineated. For that reason, TVAR recommends that the NRHP status of all investigated sites are unknown. TVA recommends the nine NSCRs and three Ifs as ineligible for NRHP listing under Criteria A, B, and C.

Table 3-13. Recorded Archaeological Resources within the Area of Potential Effect

Archaeological Resource	Resource Type	NRHP Eligibility	TVAR Recommendation
40SL509	Twentieth Century house site	Unknown	No further work
40SL510	Cave with Middle Archaic occupation	Unknown	Avoidance/additional work
40SL511	Lithic scatter, unknown temporal affiliation	Unknown	No further work
40SL512	Lithic scatter, unknown temporal affiliation	Unknown	No further work
40SL513	Lithic scatter, unknown temporal affiliation	Unknown	Avoidance/additional work
40SL514	Lithic scatter, unknown temporal affiliation	Unknown	No further work
40SL515	Above ground stone feature, unknown temporal affiliation	Unknown	Avoidance/additional work
NSCR 1	Chert debitage	Not eligible	No further work
NSCR 2	Whiteware sherd	Not eligible	No further work
NSCR 3	Chert debitage	Not eligible	No further work
NSCR 4	Log cabin remains, modern	Not eligible	No further work
NSCR 5	Chert debitage	Not eligible	No further work
NSCR 6	Spare lithic scatter and historic artifact scatter	Not eligible	No further work
NSCR 7	Spring house	Not eligible	No further work
NSCR 8	Linear stone feature, ferrous metal and concrete	Not eligible	No further work
NSCR 9	Cinder block foundation and concrete pad	Not eligible	No further work
IF 1	Historic artifact isolate	Not eligible	No further work
IF 2	Historic artifact isolate	Not eligible	No further work
IF 3	Historic artifact isolate	Not eligible	No further work

Due to an inability to yield important information about history or prehistory, as well as insufficient integrity, TVA recommends no additional work or avoidance at archaeological sites 40SL509, 40SL511, 40SL512, and 40SL514, NSCRs 1 to 9, and IFs 1 to 3. However, sites 40SL510, 40SL513, and 40SL515 represent precontact sites that have the potential to yield important information concerning the precontact occupation of the area. TVA recommends the boundaries of sites 40SL510, 40SL513, and 40SL515 plus a 30-meter buffer be added to the exclusion area of the project site. While site 40SL515 and the 30-meter buffer could be avoided, potential impacts to sites 40SL510 and 40SL513 could be reduced but not avoided altogether. In order to assess potential adverse effects, limited Phase II archaeological testing was conducted by TVAR within a portion of sites 40SL510 and 40SL513 in locations where potential impacts could not be avoided. As a result of the limited Phase II testing, no significant deposits with the potential to yield significant information were identified in the portions of the sites where potential impacts could not be avoided.

3.10.1.2. Architectural Resources

During the cultural resources study of the TL corridor, TVAR also conducted an architectural assessment of the APE. According to NRHP records, there are 50 NRHP-listed properties in Sullivan County, none of which are located within the APE. Furthermore, three previously recorded architectural resources are located within the APE (SL-6622, SL-6701, and SL-6749).

TVAR recorded 162 architectural resources (SL-662, SL6702, SL-6749, and HS-1 to HS-159), of which four are recommended as eligible for listing in the NRHP under Criteria A (HS-1, HS-2, HS-3, and HS-159), B, and C (HS-2, HS-3, and HS-159) (Table 3-14) (Rael et al. 2023, Rael et al. 2024). TVAR recommends that the visual impact fails to prevent any of the resources found to be eligible for listing in the NRHP from conveying their respective areas of significance. Furthermore, TVAR recommends that the remaining 158 properties are considered ineligible for NRHP listing under Criteria A, B, or C.

Table 3-14. List of Recorded Architectural Resources within the Area of Potential Effect

Inventory Number	Date/Architectural Style	NRHP Eligibility
SL-6622	1900 I-house	Not Eligible
SL-6701	1920 center hall house	Not Eligible
SL-6749	1933 mass-plan house	Not Eligible
HS-1	Southern Railroad	Eligible
HS-2	1790 Weaver Cemetery	Eligible
HS-3	Ca. 1880 Greek Revival/Italianate I-House	Eligible
HS-4	1940 bungalow house	Not Eligible
HS-5	1959 two-story house	Not Eligible
HS-6	1910 High Point School	Not Eligible
HS-7	1792 Crumley Cemetery	Not Eligible
HS-8	1961-1973 Pine Ridge Ranch house subdivision	Not Eligible
HS-9	1967 Compact Ranch house	Not Eligible
HS-10	1964 Compact Ranch house	Not Eligible
HS-11	1961 Compact Ranch house	Not Eligible
HS-12	1964 Compact Ranch house	Not Eligible
HS-13	1964 Compact Ranch house	Not Eligible
HS-14	1961 Compact Ranch house	Not Eligible
HS-15	1962 Compact Ranch house	Not Eligible
HS-16	1964 Compact Ranch house	Not Eligible
HS-17	1962 Compact Ranch house	Not Eligible
HS-18	1964 Compact Ranch house	Not Eligible
HS-19	1961 Compact Ranch house	Not Eligible
HS-20	1964 Compact Ranch house	Not Eligible
HS-21	1963 Compact Ranch house	Not Eligible
HS-22	1962 Compact Ranch house	Not Eligible
HS-23	1962 Compact Ranch house	Not Eligible
HS-24	1962 Compact Ranch house	Not Eligible
HS-25	1962 Compact Ranch house	Not Eligible
HS-26	1963 Compact Ranch house	Not Eligible
HS-27	1964 Compact Ranch house	Not Eligible
HS-28	1964 Compact Ranch house	Not Eligible
HS-29	1973 Split-level Ranch house	Not Eligible
HS-30	1958-1971 Crestview Ranch house	Not Eligible
HS-31	1971 Linear Ranch house	Not Eligible
HS-32	1964 Compact Ranch house	Not Eligible
HS-33	1970 Compact Ranch house	Not Eligible
HS-34	1970 Linear Ranch house	Not Eligible
HS-35	1962 Compact Ranch house	Not Eligible
HS-36	1960 Compact Ranch house	Not Eligible
HS-37	1962 Linear Ranch house	Not Eligible
HS-38	1968 Compact Ranch house	Not Eligible
HS-39	1965 Linear Ranch house	Not Eligible
HS-40	1966 Compact Ranch house	Not Eligible
HS-41	1964 Linear Ranch house	Not Eligible
HS-42	1962 Linear Ranch house	Not Eligible
HS-43	Ca. early 1900s Crumley Farms	Not Eligible
HS-44	Ca. 1970 Sullivan 500kV Substation	Not Eligible
HS-45	Ca. 1961 Bluff City 161kV Substation	Not Eligible
HS-46	1870 Morrell Cemetery	Not Eligible
HS-47	1863 Baker-Denton Cemetery	Not Eligible
HS-48	Ca. 1970 culvert	Not Eligible
HS-49	1917 hall-and-parlor house	Not Eligible
HS-50	1973 Linear Ranch house	Not Eligible
HS-51	Ca. 1960 Mountain View Church of Christ	Not Eligible
HS-52	1937 rectangular house	Not Eligible

Inventory Number	Date/Architectural Style	NRHP Eligibility
HS-53	1962 Linear Ranch house	Not Eligible
HS-54	1933 bungalow house	Not Eligible
HS-55	Ca. 1930 culvert	Not Eligible
HS-56	Ca. 1923 hall-and-parlor house	Not Eligible
HS-57	Ca. 1930 stringer bridge	Not Eligible
HS-58	1933 bungalow house	Not Eligible
HS-59	1942 Minimal Traditional house	Not Eligible
HS-60	1961 Bungalow Ranch house	Not Eligible
HS-61	1964 Linear Ranch house	Not Eligible
HS-62	1962 Linear Ranch house	Not Eligible
HS-63	1960 Compact Ranch house	Not Eligible
HS-64	1926 bungalow house	Not Eligible
HS-65	1960 Linear Ranch house	Not Eligible
HS-66	1970 Compact Ranch house	Not Eligible
HS-67	1965 Compact Ranch house	Not Eligible
HS-68	1930 center hall house	Not Eligible
HS-69	1931 massed-plan bungalow house	Not Eligible
HS-70	1962 rectangular house with double gables	Not Eligible
HS-71	1940-1959 Walnut Grove Church	Not Eligible
HS-72	1944 massed-plan house	Not Eligible
HS-73	1939 hall-and-parlor house	Not Eligible
HS-74	1972 Linear ranch house	Not Eligible
HS-75	1920 massed-plan bungalow	Not Eligible
HS-76	1954 Half Courtyard Ranch house	Not Eligible
HS-77	1900 I-House	Not Eligible
HS-78	1971 Linear Ranch house	Not Eligible
HS-79	Ca. 1950 square house with rectangular addition	Not Eligible
HS-80	1968 Compact Ranch house	Not Eligible
HS-81	Ca. 1930 massed-plan house	Not Eligible
HS-82	1971 Compact Ranch house	Not Eligible
HS-83	1969 Linear Ranch house	Not Eligible
HS-84	1967 Compact Ranch house	Not Eligible
HS-85	1914 bungalow house	Not Eligible
HS-86	1940 bungalow house	Not Eligible
HS-87	1948 massed-plan house	Not Eligible
HS-88	1931 massed-plan bungalow	Not Eligible
HS-89	1953 massed-plan house	Not Eligible
HS-90	1913 1.5 story log cabin	Not Eligible
HS-91	1938-1960 former farmstead	Not Eligible
HS-92	1955 Linear Ranch house	Not Eligible
HS-93	1939 gable-front-and-wing	Not Eligible
HS-94	1950 bungalow house	Not Eligible
HS-95	Ca. 1950 massed-plan house	Not Eligible
HS-96	1933 I-House	Not Eligible
HS-97	1948 Minimal Traditional house	Not Eligible
HS-98	1953 bungalow house	Not Eligible
HS-99	1965 Linear Ranch house	Not Eligible
HS-100	1943 massed-plan house	Not Eligible
HS-101	1938 bungalow house	Not Eligible
HS-102	1930 hall-and-parlor	Not Eligible
HS-103	1973 Linear Ranch house	Not Eligible
HS-104	1920 I-House	Not Eligible
HS-105	1900 I-House	Not Eligible
HS-106	1948 gable-front-and-wing	Not Eligible
HS-107	1940 rectangular house	Not Eligible
HS-108	1901 hall-and-parlor house	Not Eligible
HS-109	1910 hall-and-parlor house	Not Eligible
HS-110	1900 hall-and-parlor house	Not Eligible

Inventory Number	Date/Architectural Style	NRHP Eligibility
HS-111	1960 Minimal Traditional house	Not Eligible
HS-112	1925 Minimal Traditional house	Not Eligible
HS-113	1962 bungalow house	Not Eligible
HS-114	Ca. 1950 Linear Ranch house	Not Eligible
HS-115	1959 Compact Ranch house	Not Eligible
HS-116	1930 pyramidal house	Not Eligible
HS-117	1957 Compact Ranch house	Not Eligible
HS-118	1965 Compact Ranch house	Not Eligible
HS-119	1900 hall-and-parlor house	Not Eligible
HS-120	1966 Compact Ranch house	Not Eligible
HS-121	Ca. 1950 Linear Ranch house	Not Eligible
HS-122	1952 bungalow house	Not Eligible
HS-123	1966 Linear Ranch house	Not Eligible
HS-124	1968 Compact Ranch house	Not Eligible
HS-125	1967 Linear Ranch house	Not Eligible
HS-126	1964 Linear Ranch house	Not Eligible
HS-127	1971 Raised Ranch house	Not Eligible
HS-128	Ca. 1900 vernacular Queen Anne	Not Eligible
HS-129	1948 massed-plan house	Not Eligible
HS-130	1960 Linear Ranch house	Not Eligible
HS-131	1900 center hall house	Not Eligible
HS-132	Ca. 1900 gable-front-and-wing	Not Eligible
HS-133	1945 rectangular house	Not Eligible
HS-134	1957 Compact Ranch house	Not Eligible
HS-135	1946 Minimal Traditional house	Not Eligible
HS-136	1905 I-House	Not Eligible
HS-137	Ca. 1930 bungalow house	Not Eligible
HS-138	1960 Linear Ranch house	Not Eligible
HS-139	Ca. 1962-1970 Linear Ranch house	Not Eligible
HS-140	Ca. 1962-1970 Linear Ranch house	Not Eligible
HS-141	1960 Linear Ranch house	Not Eligible
HS-142	1960 Linear Ranch house	Not Eligible
HS-143	1960 Compact Ranch house	Not Eligible
HS-144	1960 Compact Ranch house	Not Eligible
HS-145	1968 house remnants	Not Eligible
HS-146	1944 bungalow house	Not Eligible
HS-147	1960 Linear Ranch house	Not Eligible
HS-148	Ca. 1968-1978 cabin	Not Eligible
HS-149	1973 Compact Ranch house	Not Eligible
HS-150	1953 bungalow house	Not Eligible
HS-151	1967 commercial building	Not Eligible
HS-152	1958 Compact Ranch house	Not Eligible
HS-153	1962 Split-Level Ranch house	Not Eligible
HS-154	1926 massed-plan house	Not Eligible
HS-155	1948 bungalow house	Not Eligible
HS-156	1948 Minimal Traditional house	Not Eligible
HS-157	1945 massed-plan house	Not Eligible
HS-158	Ca. 1960 Brookside Baptist Church	Not Eligible
HS-159	Ca. 1830-1850 log house	Eligible

3.10.2. Environmental Consequences

3.10.2.1. Alternative A – No Action

Under the No Action Alternative, existing land use would be expected to remain unchanged. Ground disturbing agricultural practices would continue to potentially impact intact cultural resources at the surface or within the first 8 to 10 inches of soil. However, no adverse effect to cultural resources would be anticipated from TVA actions.

3.10.2.2. Alternative B – Action Alternative

TVA, in consultation with the Tennessee SHPO and federally recognized Indian tribes, found that the project would not negatively impact any listed or eligible NRHP-listed archaeological or architectural sites. The SHPO concurred with TVA's findings in letters dated November 20, 2023 (for the transmission line ROWs), March 25, 2024 (for the access routes), and February 26, 2024 (for the results of the Phase II testing and architectural addendum survey) (Appendix A). TVA received comments from two federally recognized Indian tribes. TVA received concurrence for no adverse effect from the Eastern Shawnee Tribe of Oklahoma for the transmission line ROWs on December 12, 2023, concurrence on the findings of the Phase II testing from Shawnee Tribe on February 28, 2024, and concurrence for the findings of the access routes survey from the Eastern Shawnee on March 27, 2024, and the Shawnee Tribe on April 15, 2024.

Should previously undiscovered cultural resources be identified during Project Site construction or operations, a TVA archaeologist and consulting parties will be consulted before any further action is taken. Therefore, TVA finds that the undertaking i.e., implementing the Action Alternative, would have no adverse effect to historic properties.

3.11. Recreation, Parks, and Managed Areas

3.11.1. Affected Environment

This section describes recreational opportunities and natural areas near the proposed transmission lines ROW. Managed areas include lands held in public ownership that are managed by an entity (e.g., TVA, USDA, USFS, State of Tennessee) to protect and maintain certain ecological and/or recreational features. Natural areas include ecologically significant sites; federal, state, or local park lands; national or state forests; wilderness areas; scenic areas; wildlife management areas; recreational areas; greenways; trails; Nationwide Rivers Inventory streams; and wild and scenic rivers. Ecologically significant sites are either tracts of privately owned land that are recognized by resource biologists as having significant environmental resources or identified tracts on TVA lands that are ecologically significant but not specifically managed by TVA's Natural Areas program.

There are 39 recreational areas that occur within 3 miles of the proposed project area (Tables 3-15 and 3-16). These recreational opportunities are a mix of indoor and outdoor developed recreation. Additionally, some informal recreation activities, such as horseback riding, nature observation, golfing, fishing, boating, and hiking may occur in the vicinity of the proposed transmission lines.

Table 3-15. Recreational Areas within Three Miles of the Proposed Sullivan-South Bristol 161-kV Transmission Line

Recreation Area	Distance from Project Area
Sullivan-South Bristol 161-kV Transmission Line	
Overmountain Victory National Historic Trail	Overlap with Sullivan-South Bristol Transmission Line
Worley's Cave (also known as Morril's Cave State Natural Area)	0.21 miles (Overlap with Sullivan-South Bristol Transmission Line)
Weaver Cemetery	0.45 miles
J. Forrest Thomas Access Area	0.5 miles
Webb Cemetery	0.83 miles

Recreation Area	Distance from Project Area
Sullivan-South Bristol 161-kV Transmission Line	
Backyard Terrors and Dinosaur Park	0.92 miles
Boy Cemetery	0.92 miles
The Monarch Maiden	1.04 miles
Big Springs Boat Ramp	1.07 miles
Van Over Cemetery	1.23 miles
Sunrise Cemetery	1.42 miles
Blue Ridge Equestrian	1.54 miles
Lakeview RV Park and Resort	1.54 miles
Calbough Cemetery	1.61 miles
Island Park	1.68 miles
McLaney Cemetery	1.87 miles
Bare Cemetery	1.92 miles
Curtis Cemetery	2 miles
Nellie Pratt Swinging Bridge	2.05 miles
Shipley Cemetery	2.22 miles
Jones Cemetery	2.31 miles
Cross Cemetery	2.58 miles
Pursuit Farms	2.87 miles

Table 3-16. Recreational Areas within Three Miles of the Proposed Bluff City-South Bristol 161-kV Transmission Line

Recreation Area	Distance from Project Area
Bluff City-South Bristol 161-kV Transmission Line	
Overmountain Victory National Historic Trail	0.25 miles
Whitetop Creek Park	0.48 miles
Bristol Campground	0.57 miles
Dave and Kaye's Family Campground	0.59 miles
Copperhead Ridge Glamping and Resort	0.76 miles
Pleasant Grove Cemetery	0.84 miles
Pinnacle Speedway in Lights	0.86 miles
Pole Position Campground	0.86 miles
Bristol Dragway	1.18 miles
The Cedar Golf Course	1.28 miles
Twin City Drive-In Theatre	1.8 miles
Steele Creek Park	2.3 miles
Rooster Front Park	2.37 miles
Appalachian Bouldering	2.63 miles
Glenwood Cemetery	2.42 miles
Holston Valley Golf Course	2.89 miles

There are five recreational areas within 0.5 miles of the proposed project:

- Overmountain Victory National Historic Trail stretches 300 miles through Tennessee, Virginia, North Carolina, and South Carolina and traces the route used by patriot militia during the Kings Mountain campaign of 1780. The trail includes walkable pathways, a Commemorative Motor Route, affiliated historic sites and museums, and wayside exhibits. The portion of the trail within the project area is part of the Commemorative Motor Route and is located on and adjacent to developed roadways. The trail is currently owned and operated by the NPS (U.S. National Park Service 2024).
- Worley's Cave, also known as Morril's Cave State Natural Area, is a living, wet cave located in Bluff City, Tennessee. The cave has over 4,000 feet of caverns and tunnels, offers guided spelunking tours and camping adventures, and is open year-round for recreationists (Discover Bristol.org 2024).
- Weaver Cemetery is located at the Weaver Union Church in Bristol and is managed by the Weaver Cemetery Association.
- J. Forrest Thomas Access Area is a year-round public boat ramp and kayak/canoe launch point into the South Fork Holston River. This boat ramp is also used by recreation fishermen (Tennessee Department of Tourist Development 2023).
- Whitetop Creek Park is a 55.8-acre park located off Highway 394 in Bristol. The park was opened in 2003 and has the following amenities for recreation users: 1-mile walking trail, 1.5-acre pond, 4 soccer fields, 4 softball fields, basketball court, concession stand, multi-purpose field, pavilion with restrooms, and a playground. The park is owned and operated by the City of Bristol (City of Bristol 2024).

Several of the proposed Sullivan-South Bristol 161-kV Transmission Line pole structures would be adjacent to and/or span the South Fork Holston River. South Fork Holston River is a popular recreation destination for trout fishing, with over 18 miles of fishable water (Irby 2018).

A review of the TVA Regional Natural Heritage database identified 10 managed and natural areas within three miles of the proposed project area (Table 3-17).

Table 3-17. Managed and Natural Areas within Three Miles of the Proposed Project Area

Natural Area	Acres	County	State	Distance/Direction from Project Area
Morril's Cave State Natural Area (also known as Worley's Cave)	46.05	Sullivan (TN)	TN	overlap
Overmountain Victory National Historic Trail	1304.11	Multiple	Multiple	overlap
Land Trust for Tennessee conservation easement	113.94	Sullivan (TN)	TN	0.1 mi north (adjacent)
Cherokee National Forest	656051.3	Multiple	Multiple	0.8 mi east

Natural Area	Acres	County	State	Distance/Direction from Project Area
Cherokee National Forest Ownership Boundaries	656051.3	Multiple	Multiple	0.8 mi east
North Cherokee NF and Wildlife Management Area	334706.5	Multiple	Multiple	0.8 mi east
Boone Reservoir Reservation	4908.52	Multiple	TN	1.6 mi north
Thomas Cave (SD Dean Site)	26.23	Sullivan (TN)	TN	1.7 mi south
Steele Creek Park Registered State Natural Area and Arboretum	1268.07	Sullivan (TN)	TN	2.3 mi northwest
Slagle Hollow Knobs/Steele Creek Park Registered State Natural Area	1230.65	Sullivan (TN)	TN	2.8 mi northwest

3.11.2. Environmental Consequences

3.11.2.1. Alternative A – No Action

Under the No Action Alternative, the proposed project would not be implemented and no direct, indirect, or cumulative impacts from TVA project-related actions on natural areas or recreational areas would be anticipated.

3.11.2.2. Alternative B – Action Alternative

Under the Action Alternative, construction of the proposed transmission lines could cause temporary disruption to recreational areas adjacent to or within a 0.5-mile radius of the project area. However, these impacts would be temporary and minor to recreational activities. Minor noise, transportation, and visual impacts could occur during construction. Because most of the proposed transmission lines would be built parallel to existing transmission lines, long-term impacts on recreational areas within and in the immediate vicinity would be insignificant.

Construction of transmission line span over the South Fork Holston River could cause some minor shifts in recreation use patterns in the immediate vicinity of the proposed Sullivan-South Bristol Transmission Line ROW. The extent of any such impacts should be temporary, minor, and insignificant. Recreationists utilizing portions of the South Fork Holston River may be indirectly impacted by view obstructions. However, as the new transmission line would be adjacent to existing ROW, visual impacts to water recreation users (boaters, paddlers, and fishermen) would not significantly impact river recreation or river views.

The Overmountain Victory National Historic trail (Commemorative Motor Route) would intersect two points of the proposed Sullivan-South Bristol ROW (Figure 3-2). However, because the section of this trail is part of the Commemorative Motor Route, major impacts from the proposed project are not expected due to the trail existing on and adjacent to developed roadways.

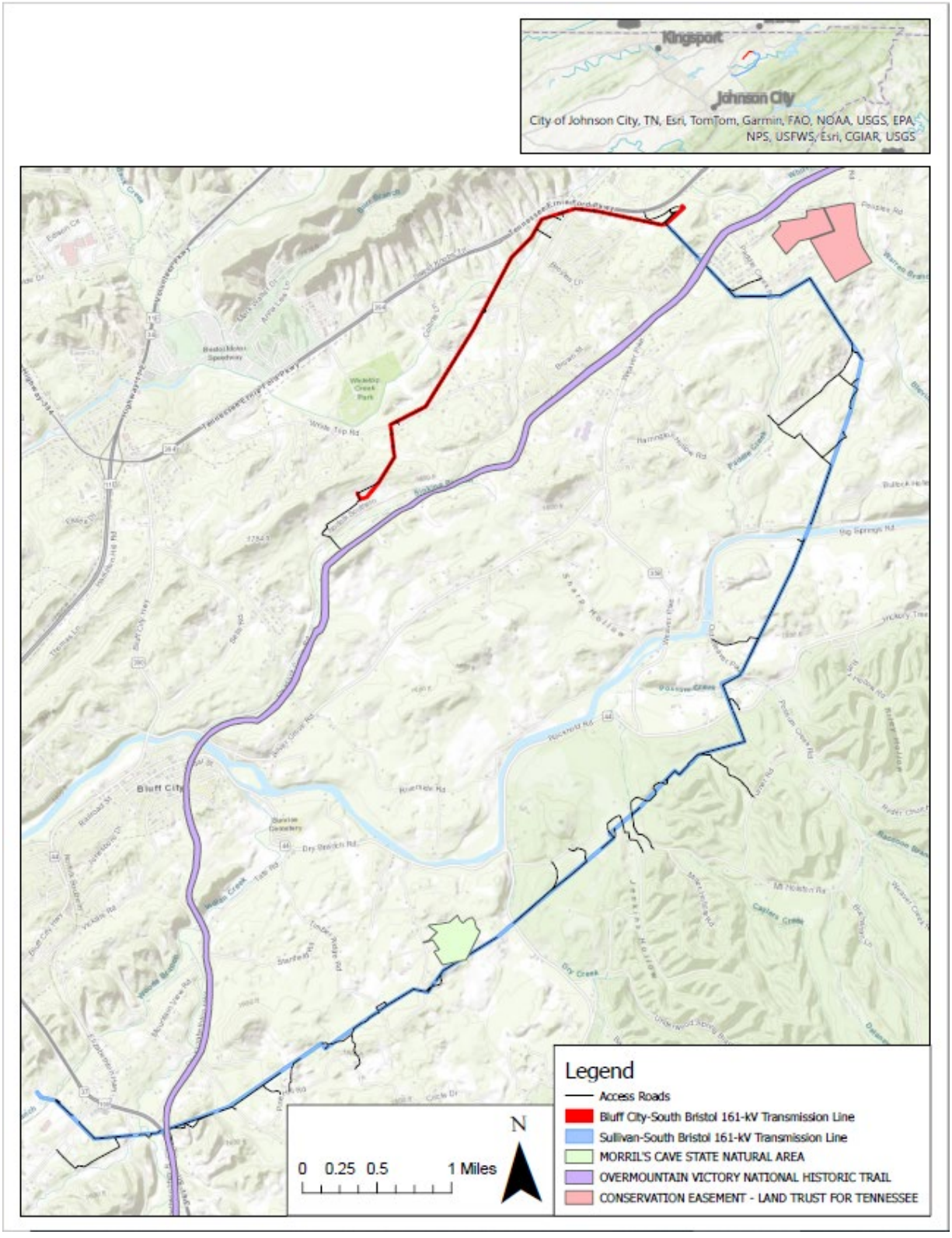

Figure 3-2. Managed and Natural Areas within Three Miles of the Proposed Project Area that Could be Directly Impacted by the Proposed Project Located in Sullivan County, Tennessee

In addition, BMPs would be implemented to minimize or avoid any impacts resulting from construction and operation. The remaining recreational areas are a sufficient distance from the project area that no direct or major impacts are expected.

Under the Action Alternative, ground disturbance and clearing activities associated with construction could directly impact two managed and natural areas, Overmountain Victory National Historic Trail and Morril's Cave State Natural Area. While it is unlikely, a Land Trust for Tennessee conservation easement could be indirectly impacted (Figure 3-2).

Morril's Cave State Natural Area (also known as Worley's Cave), a Land Trust for Tennessee conservation easement, and the Overmountain Victory National Historic Trail Commemorative Motor Route are adjacent to or overlap with the proposed project area. The Morril's Cave State Natural Area is managed for unique and natural resources. The Overmountain Victory National Historic Trail, managed by the National Park Service, crosses four states (TN, VA, NC, and SC). Morril's Cave State Natural Area and the Overmountain Victory National Historic Trail, which overlap with the project area, could be directly impacted by ground disturbance and clearing activities. However, BMPs would be used, and TVA would coordinate with the land managers of these areas prior to any construction, for guidance to minimize these potential impacts. The Land Trust for Tennessee conservation easement is on private property. This is an adjacent area roughly within a tenth of a mile from the proposed project and could be indirectly impacted during the construction phase of the project. Overall, impacts would be temporary and minor. The remaining natural areas are a sufficient distance from the project area that no direct or major impacts are expected, given the nature of the proposed project.

3.12. Socioeconomics and Environmental Justice

3.12.1. Affected Environment

As detailed in Section 3.12.2.2, impacts associated with the proposed project consist of temporary disturbances during construction (i.e., noise, traffic, and fugitive dust) as well as long-term visual and property value impacts, all of which are limited to communities in the immediate vicinity of the project footprint. There would be no emissions or releases of air pollutants or hazardous materials that would impact human health or welfare in the surrounding area. Thus, the study area for the socioeconomic and environmental justice analysis is limited to the 14 census block groups located in a 1-mile radius of the centerline of the new transmission lines (see Figure 3-3). As the study area is located within Sullivan County, this county and the state of Tennessee are included as appropriate secondary geographic areas of reference. Comparisons at multiple spatial scales provide a more detailed characterization of populations that may be affected by the proposed actions, including any environmental justice populations (e.g., minority and low-income). Demographic and economic characteristics of populations within the study area were assessed using the most recent U.S. Census Bureau (USCB) data available, including 2020 Decennial Census counts (USCB 2020) for total population and racial characteristics, and 2017-2021 American Community Survey (ACS) 5-year estimates (USCB 2021) for the remaining datasets.

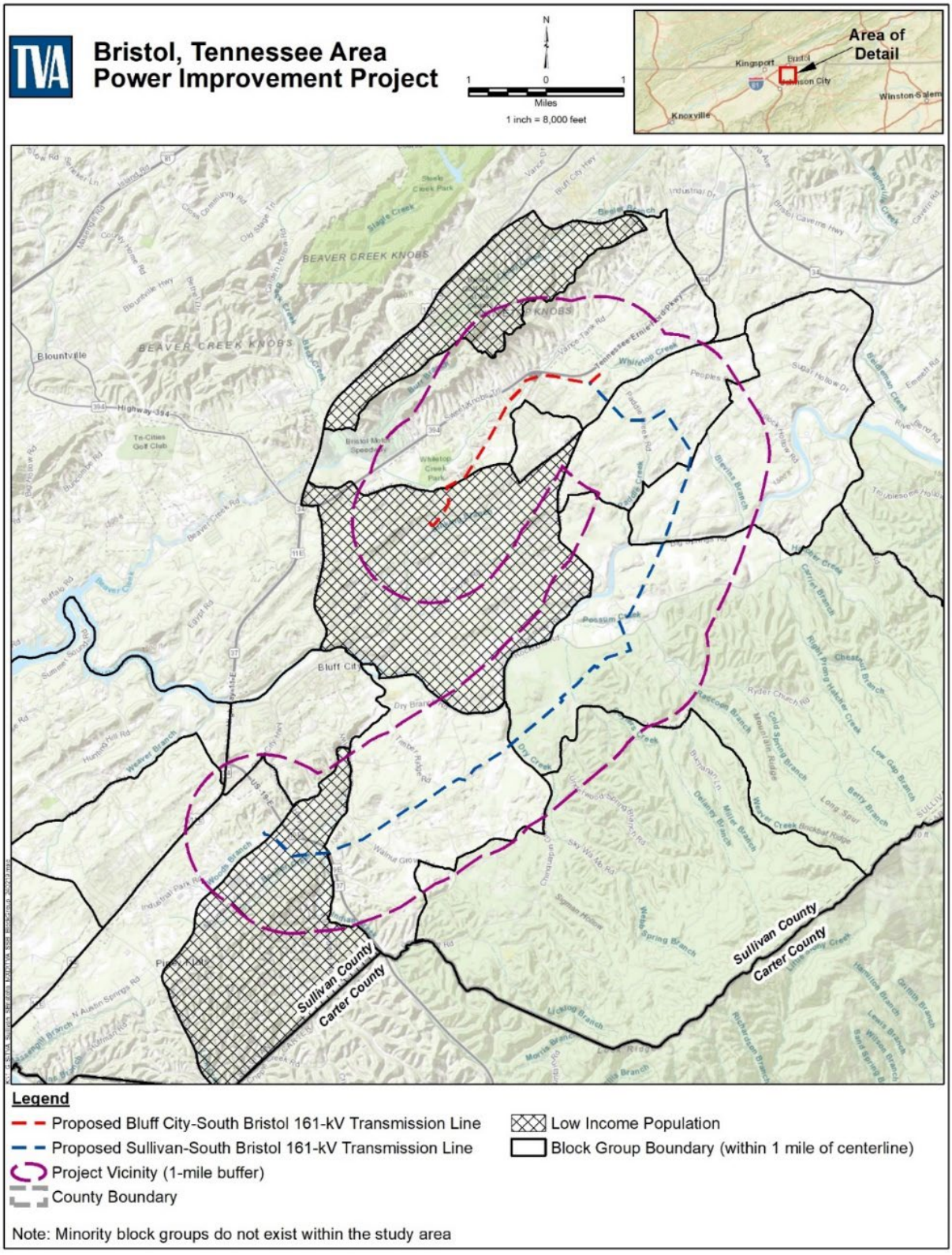

Figure 3-3. Environmental Justice Populations Within the Study Area

3.12.1.1. Demographic and Economic Conditions

Demographic and economic characteristics of the block groups that make up the study area and of the secondary reference geographies are summarized in Table 3-18. The proposed study area has a resident population of 18,347 and is characterized by low-density residential and suburban development associated with the cities of Bluff City and Bristol. Since 2010, the study area population has declined by approximately 1 percent, in contrast to the population growth in Sullivan County of approximately 1.2 percent and to the population growth rate of almost 9 percent experienced at the state level.

Table 3-18. Demographic and Socioeconomic Characteristics[1]

	Study Area (14 Census Block Groups within 1 mile of Proposed Transmission Lines)	Sullivan County, Tennessee	State of Tennessee
Population[1,2,3]			
Population, 2020	18,347	158,163	6,910,840
Population, 2010	18,530	156,283	6,346,105
Percent Change 2010-2020	-1.0%	1.2%	8.9%
Persons under 18 years, 2021	21.2%	19.4%	22.4%
Persons 65 years and over, 2021	19.4%	21.7%	16.3%
Racial Characteristics[1]			
Not Hispanic or Latino			
White alone, 2020[(a)]	93.8%	90.6%	70.9%
Black or African American, 2020[(a)]	0.6%	2.0%	15.7%
American Indian and Alaska Native, 2020[(a)]	0.2%	0.2%	0.2%
Asian, 2020[(a)]	0.5%	0.8%	1.9%
Native Hawaiian and Other Pacific Islander, 2020[(a)]	0.0%	0.0%	0.1%
Some Other Race alone, 2020[(a)]	0.2%	0.3%	0.3%
Two or More Races, 2020	3.3%	3.8%	3.9%
Hispanic or Latino, 2020	1.5%	2.2%	6.9%
Income and Employment[3]			
Per capita income, 2021	$34,752	$31,300	$32,908
Persons below poverty level, 2021	13.3%	15.6%	14.3%
Persons below low-income threshold, 2022[(b)]	34.7%	35.7%	33.2%
Civilian Labor Force, 2021	8,013	72,407	3,380,708
Percent Employed, 2021	95.8%	93.3%	94.7%
Percent Unemployed, 2021	4.2%	6.7%	5.3%

[1] Source: 1. USCB 2011, 2. USCB 2020, 3. USCB ACS 2021
[2] (a) Includes persons reporting only one race.
[3] (b) Low-income threshold is defined as two times the poverty level

The majority of the population within the study area (approximately 94 percent) is white; correspondingly, minority populations in the study area are relatively small. Minorities in the study area include: persons who identified as two or more races (3.3 percent); Hispanic or Latino (1.5 percent); Black or African American (0.6 percent); and small numbers who are American Indian and Alaska Native, Asian, Native Hawaiian and other Pacific Islander, and persons who identify as some other race. Minority population percentages in the study area are notably lower than those of Sullivan County and the state of Tennessee.

The average per capita income within the study area is $34,752, which is higher than both Sullivan County ($31,300) and Tennessee ($32,908). The percentage of the study area population falling below the poverty level (13.3 percent) is lower than that in both the county (15.6 percent) and the state (14.3 percent). The civilian labor force within the study area is 8,013, with the unemployment rate at 4.2 percent. This unemployment rate is slightly lower than both the unemployment rate of Sullivan County (6.7 percent) as well as the state of Tennessee (5.3 percent) (Table 3-18).

3.12.1.2. Community Facilities and Services

Community facilities and services include public or publicly funded facilities such as police protection and other emergency services (ambulance/fire protection), schools, hospitals and other health care facilities, libraries, schools, churches, recreation areas and parks, community centers, and one airport. To identify facilities and emergency services that could be potentially impacted by proposed project activities or emergency incidents along the length of the transmission lines, the study area is identified as the service area of various providers, where applicable, or the area within a 1-mile radius of the proposed project.

Based on a review of aerial imagery and online information including the USGS Geographic Names Information System database (USGS 2023c), community facilities and services available within a 1-mile radius of the proposed transmission lines include approximately eight churches, 10 cemeteries, one school, and one fire department. Additionally, the project is also served by the East Sullivan County Volunteer Fire Department, Bristol Tennessee Fire and Police Departments, and Bluff City Volunteer Fire Department.

3.12.1.3. Environmental Justice

TVA's activities reflect the TVA commitment to carrying out a statutory mission that benefits all the people of the Valley, including environmental justice and disadvantaged communities. Consistent with TVA's mission to serve the people of the Valley, TVA directs substantial resources to provide opportunities for disadvantaged communities within the TVA region to benefit from a variety of programs including Home Uplift, School Uplift, Small Business Uplift, Strategic Energy Management, Workforce Development, Generating Justice, and Connected Communities.

Environmental Justice has been defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation and enforcement of environmental laws, regulations, and policies (EPA 2022) and seeks to ensure that minority and low-income populations do not bear disproportionately high and adverse human health or environmental effects from federal programs, policies, and activities. On February 11, 1994, President Clinton signed EO 12898 Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. EO 12898 mandates some federal-executive agencies to consider environmental justice as part of the NEPA process. On January 27, 2021, President Biden issued EO 14008 Tackling the Climate Crisis at Home and Abroad.

Amongst other objectives, the EO calls for the federal government to make the climate crisis and environmental justice essential elements of domestic policy by developing programs, policies, and activities to address current and historic injustices, and by investing and building a clean energy economy that spurs economic opportunity for disadvantaged communities. In addition, President Biden issued EO 14096, Revitalizing Our Nation's Commitment to Environmental Justice for All, on April 21, 2023, to supplement the foundational efforts of EO 12898 and pursue a comprehensive governmental approach to environmental justice (FR 2023).

Guidance for addressing environmental justice is provided by the Council on Environmental Quality (CEQ) Environmental Justice Guidance under NEPA (CEQ 1997). The CEQ defines minority as any race and ethnicity, as classified by the USCB, that is: Black or African American; American Indian or Alaska Native; Asian; Native Hawaiian and Other Pacific Islander; some other race (not mentioned above); two or more races; or a race whose ethnicity is Hispanic or Latino (CEQ 1997).

Identification of minority populations requires analysis of individual race and ethnicity classifications as well as comparisons of all minority populations in the region. Minority populations exist if either of the following conditions is met:

- The minority population of the impacted area exceeds 50 percent of the total population.
- The ratio of minority population is meaningfully greater (i.e., greater than or equal to 20 percent) than the minority population percentage in the general population or other appropriate unit of geographic analysis (CEQ 1997).

The nationwide poverty level is determined annually by the USCB and varies by the size of family and number of related children under 18 years of age. The 2022 USCB Poverty Threshold for an individual under the age of 65 is an annual income of $15,225, and for a family of four with two children, it is an annual income of $26,678 (USCB 2023). For the purposes of this assessment, low-income individuals are those whose annual household income is less than two times the poverty level. More encompassing than the base poverty level, this low-income threshold, also used by EPA in their delineation of low-income populations, is an appropriate measure for environmental justice consideration because current poverty thresholds are often too low to adequately capture the populations adversely affected by low-income levels, especially in high-cost areas (EPA 2019). According to EPA, the effects of income on baseline health and other aspects of susceptibility are not limited to those below the poverty thresholds. For example, populations having an income level from one to two times the poverty level also have worse health overall than those with higher incomes (Centers for Disease Control and Prevention 2013). A low-income environmental justice population exists if either of the following two conditions is met:

- The low-income population exceeds 50 percent of the total population.
- The ratio of low-income population significantly exceeds (i.e., by greater than or equal to 20 percentage points) that of the general population or other appropriate geographic areas of analysis.

Based on a review of the EPA's EJSCREEN tool, the proposed project is not located in an area with high concentrations of minority residents. However, as EJSCREEN did identify some communities within the study area with appreciable percentages of low-income residents, TVA conducted a more detailed evaluation using 2020 USCB Decennial Census data and 2017-2021 ACS data to identify specific block groups within the study area that exceed environmental justice thresholds. Figure 3-3 identifies the block groups within the study area that meet the specified criteria as environmental justice low-income populations.

Total minority populations (i.e., all non-white and Hispanic or Latino racial groups combined) comprise approximately 29 percent of the population of Tennessee and approximately 9 percent of Sullivan County, both of which are comparatively higher than the study area which has a total minority population percentage of approximately 6 percent. Additionally, none of the 14 block groups within the study area have minority populations that either exceed 50 percent of the total population or significantly exceed the minority percentage of any of the reference geographies. Therefore, none of the block groups meet the criterion for consideration as minority population groups subject to environmental justice considerations.

The percentage of the population of Tennessee living below the low-income threshold is 33.2 percent while the percentage in Sullivan County is slightly higher at 35.7 percent. Generally consistent with the reference geographies, approximately 34.7 percent of people living within the study area are considered low-income, with percentages for individual block groups ranging from approximately 13.6 to 55.1 percent of the population. Three block groups have low-income populations that either exceed 50 percent of the total population or significantly exceed the low-income percentage of one or more of the reference geographies. Figure 3-3 identifies these block groups determined to meet the criterion for consideration as low-income population groups subject to environmental justice considerations.

3.12.2. Environmental Consequences

3.12.2.1. Alternative A – No Action

Under the No Action Alternative, TVA would not acquire new ROW to construct the proposed transmission lines, expand existing ROW, or construct new access roads. Therefore, there would be no change in local demographics, socioeconomic conditions, or community services, and there would be no impacts to environmental justice populations in association with the proposed action.

3.12.2.2. Alternative B – Action Alternative

3.12.2.2.1. Demographic and Economic Impacts

Under the Action Alternative, the proposed transmission line construction activities would occur over approximately 22 weeks for Sullivan-South Bristol Transmission Line and eight weeks for Bluff City-South Bristol Transmission Line and would entail the use of mobile crews comprised of contractors and/or full-time TVA staff. The construction workforce would total 30 workers at a given time for each transmission line, and it is anticipated that most of these workers would be drawn from the labor force that currently resides in the region; however, some specialty workers and laborers not available within the area may be needed to support construction activities. Following construction, work crews would be present in the study area for occasional operation and maintenance activities. In both cases, given the relatively small workforce and that most workers needed would likely be drawn from the existing labor force, impacts to demographics and local employment would be minor.

Potential economic impacts associated with the proposed project relate to direct and indirect effects of property acquisition, construction, and operations. Under the Action Alternative, TVA would acquire approximately 128 acres across 94 parcels (92 acres comprised of 69 parcels on the Sullivan-South Bristol Transmission Line and 36 acres comprised of 25 parcels on the Bluff City-South Bristol Transmission Line) for the development of the transmission line ROW. These easements would give TVA the right to construct, operate, and maintain the transmission system across the property owners' lands. TVA expects to utilize existing and/or new temporary access roads to access the ROW. Access roads would typically be located on privately-owned land for which TVA would acquire easement rights. In each case, landowners are compensated for the value of such rights and easements. There would be no displacements required for development of the ROW easements and access roads. Construction and maintenance activities would also result in minor but beneficial impacts to the local economy through the purchases of materials and supplies, potential procurement of contract workers or additional services, and expenditure of the wages earned by the transient workforce in the local communities.

There is also the potential for a decrease in property value for those parcels in the vicinity of transmission lines. However, most of the new construction would take place along existing transmission line ROWs and in agricultural or forested areas; residential properties have been avoided to the greatest extent possible. As most homes in the area already have views of existing transmission line ROW or are separated from these structures by a vegetated buffer, any effects to local property values would be minor.

In addition, the implementation of the Action Alternative would provide additional power sources in the Bristol area to alleviate loading concerns. The current electric supply available in the vicinity of Bristol is not capable of supporting a large industrial load. The proposed alternative would allow TVA to meet the foreseeable power demand for the area as well as providing BTES with additional operating flexibility and would ensure a continuous, reliable source of electric power in Bristol, resulting in long-term indirect economic benefits to the area.

3.12.2.2.2. Community Facilities and Services

Direct impacts to community facilities occur when a community facility is displaced or access to the facility is altered. Neither the construction or operation of the transmission lines nor associated access roads would result in the displacement of community facilities or impede access to any facilities. Therefore, there would be no direct impacts to community facilities or services under the Action Alternative.

Indirect impacts occur when a proposed action or project results in a population increase that would generate greater demands for services and/or affect the delivery of such services. As the transmission line construction and maintenance would not result in notable impacts to local demographics, increased demands for services such as schools, churches, and healthcare facilities are not anticipated. In the event of an emergency at BTES' planned substation or along the ROW, local law enforcement, fire, and/or emergency medical services response would likely be required. One fire station is located within a 1-mile radius of the proposed transmission lines. Additionally, Sullivan, Bristol, and Bluff City operate fire and police departments which could respond in the event of an emergency. As such, there are extensive emergency services available in the event of an emergency. In addition, the need for emergency services along the ROWs is anticipated to be a rare occurrence. Therefore, implementation of the Action Alternative would not have a notable impact on the demand for emergency services in the area.

3.12.2.2.3. Environmental Justice

Three block groups within the study area meet the criteria for consideration as environmental justice populations under EO 12898 (see Figure 3-3). Under the Action Alternative, the proposed transmission lines in Sullivan County could result in minor impacts to nearby residents, including temporary impacts such as increased traffic, noise, fugitive dust, and air emissions during the construction period, as well as long-term visual impacts and the potential for decreased property values. However, the proposed transmission lines would not result in any substantial long-term emissions or releases of air pollutants, noise, or hazardous materials that would have a direct impact on human health or welfare.

Portions of the proposed project encompass areas determined to meet the criteria for consideration as low-income environmental justice populations (Table 3-18; Figure 3-3). Under the Action Alternative, impacts to nearby residents may include temporary impacts such as increased noise, fugitive dust, and air emissions during the construction period, as well as long-term visual impacts, land use limitations, and potential for decreased property value. However, construction activities would be temporary and would typically have minimal impact on area residents due to the distance between residences and the proposed ROW. Long-term impacts such as decreased visual impacts, property value, and land use limitations have been minimized through community and landowner involvement in the selection of the proposed transmission line routes, including utilizing existing ROWs. In addition, the proposed transmission lines would not result in any substantial long-term emissions or releases of air pollutants, noise, or hazardous materials that would have a direct impact on human health or welfare. Therefore, impacts to environmental justice populations associated with the proposed project would be minor and would not be disproportionate, as impacts would be consistent across all communities (i.e., environmental justice and non-environmental justice) living along TVA's transmission line network across the Valley.

3.13. Long-term and Cumulative Impacts

The presence of the proposed transmission lines would present long-term visual effects to the mostly rural character of the local area. However, because the proposed lines would traverse mostly rural areas and run parallel to existing transmission lines for significant portions of each respective route, the transmission lines would not be especially prominent in the local landscape. Likewise, the establishment of easements for the proposed ROW with local landowners would pose a long-term encumbrance on the affected properties, but the proposed routes would utilize existing transmission line easement (40 feet on the Sullivan-South Bristol Transmission Line and 25 feet on the Bluff-City-South Bristol Transmission Line) to the extent practical. Various agricultural land uses could be practiced within the ROW, but any timber production within the ROW would be foregone for the life of the transmission line.

The availability of a reliable power supply is one factor in improving the overall infrastructure in the local area, which over time could make the area more attractive to additional commercial and residential development. However, the extent and degree of such development depends on a variety of factors and cannot be predicted accurately. Cumulative impacts of the construction, maintenance, and operation of the proposed transmission lines have been examined to the extent practicable in resource sections above. Thus, residential and commercial growth of this mainly rural area would be a minor, long-term and cumulative consequence of the proposed transmission system improvements.

3.13.1. Postconstruction Effects

3.13.1.1. Electric and Magnetic Fields

Transmission lines, like all other types of electrical wiring, generate both electric and magnetic fields (i.e., EMFs). The voltage on the conductors of a transmission line generates an electric field that occupies the space between the conductors and other conducting objects such as the ground, transmission line structures, or vegetation. A magnetic field is generated by the current (i.e., the movement of electrons) in the conductors. The strength of the magnetic field depends on the current, the design of the line, and the distance from the line.

The fields from a transmission line are reduced by mutual interference of the electrons that flow around and along the conductors and between the conductors. The result is even greater dissipation of the low energy. Most of this energy is dissipated on the ROW, and the residual very low amount is reduced to background levels near the ROW or energized equipment.

Magnetic fields can induce currents in conducting objects. Electric fields can create static charges in ungrounded, conducting materials. The strength of the induced current or charge under a transmission line varies with: (1) the strength of the electric or magnetic field, (2) the size and shape of the conducting object, and (3) whether the conducting object is grounded. Induced currents and charges can cause shocks under certain conditions by making contact with objects in an electric or magnetic field.

The proposed transmission lines have been designed to minimize the potential for such shocks. This is done, in part, by maintaining sufficient clearance between the conductors and objects on the ground. Stationary conducting objects, such as metal fences, pipelines, and highway guardrails that are near enough to the transmission lines to develop a charge (typically these would be objects located within the ROW) would be grounded by TVA to prevent them from being a source of shocks.

Under certain weather conditions, high-voltage transmission lines, such as the proposed 161-kV, may produce an audible low-volume hissing or crackling noise (Appendix F). This noise is generated by the corona resulting from the dissipation of energy and heat as high voltage is applied to a small area. Under normal conditions, corona-generated noise is not audible. The noise may be audible under some wet conditions, but the resulting noise level away from the ROW would be well below the levels that can produce interference with speech. Corona is not associated with any adverse health effects in humans or livestock.

Other public interests and concerns have included potential interference with AM radio reception, television reception, satellite television, and implanted medical devices. Interference with radio or television reception is typically due to unusual failures of power line insulators or poor alignment of the radio or television antenna and the signal source. Both conditions are readily correctable.

Implanted medical devices historically had a potential for power equipment strong-field interference when they came within the influence of low-frequency, high-energy workplace exposure. However, older devices and designs (i.e., those beyond five to 10 years old) have been replaced with different designs and different shielding that prevent potential for interference from external field sources up to and including the most powerful magnetic resonance imaging medical scanners. Unlike high-energy radio frequency devices that can still interfere with implanted medical devices, low-frequency, and low-energy powered electric or magnetic devices no longer potentially interfere (Journal of the American Medical Association 2007).

Research has been done on the effects of EMFs on animal and plant behavior, growth, breeding, development, reproduction, and production. Research has been conducted in the laboratory and under environmental conditions, and no adverse effects or effects on health or the above considerations have been reported for the low-energy power frequency fields (World Health Organization [WHO] 2007a). Effects associated with ungrounded, metallic objects' static charge accumulation and with discharges in dairy facilities have been found when the connections from a distribution line meter have not been properly installed on the consumer's side of a distribution circuit.

There is some public concern as to the potential for adverse health effects that may be related to long-term exposure to EMF. A few studies of this topic have raised questions about cancer and reproductive effects on the basis of biological responses observed in cells or in animals or on associations between surrogate measures of power line fields and certain types of cancer. Research has been ongoing for several decades.

The consensus of scientific panels reviewing this research is that the evidence does not support a cause-and-effect relationship between EMFs and any adverse health outcomes (e.g., American Medical Association 1994; National Research Council 1997; National Institute of Environmental Health Sciences 2002). Some research continues on the statistical association between magnetic field exposure and a rare form of childhood leukemia known as acute lymphocytic leukemia. A recent review of this topic by the WHO (International Association for Research on Cancer 2002) concluded that this association is very weak, and there is inadequate evidence to support any other type of excess cancer risk associated with exposure to EMFs.

TVA follows medical and health research related to EMFs, along with media coverage and reports that may not have been peer reviewed by scientists or medical personnel. No controlled laboratory research has demonstrated a cause-and-effect relationship between low-frequency electric or magnetic fields and health effects or adverse health effects even when using field strengths many times higher than those generated by power transmission lines. Statistical studies of overall populations and increased use of low-frequency electric power have found no associations (WHO 2007b).

Neither medical specialists nor physicists have been able to form a testable concept of how these low-frequency, low-energy power fields could cause health effects in the human body where natural processes produce much higher fields. To date, there is no agreement in the scientific or medical research communities as to what, if any, electric or magnetic field parameters might be associated with a potential health effect in a human or animal. There are no scientifically or medically defined safe or unsafe field strengths for low-frequency, low-energy power substation or line fields.

The current and continuing scientific and medical communities' position regarding the research and any potential for health effects from low-frequency power equipment or line fields is that there are no reproducible or conclusive data demonstrating an effect or an adverse health effect from such fields (WHO 2007c). In the U.S., national organizations of scientists and medical personnel have recommended no further research on the potential for adverse health effects from such fields (American Medical Association 1994; U.S. Department of Energy 1996; National Institute of Environmental Health Sciences 1998).

Although no federal standards exist for maximum EMF field strengths for transmission lines, two states (New York and Florida) do have such regulations. Florida's regulation is the more restrictive of the two with field levels being limited to 150 milligauss at the edge of the ROW for lines of 230-kV and less. The expected magnetic field strengths at the edge of the proposed ROW would fall well within these standards. Consequently, the construction and operation of the proposed transmission line connectors are not anticipated to cause any significant impacts related to EMF.

EMFs would be produced along the length of the proposed transmission line. The strength of the fields within and near the ROW varies with the electric load on the line and with the terrain. Nevertheless, EMF strength attenuates rapidly with distance from the line and is usually equal to local ambient levels at the edge of the ROW. Thus, public exposure to EMFs would be minimal, and no significant impacts from EMFs are anticipated.

3.13.1.2. Lightning Strike Hazard

TVA transmission lines are built with overhead ground wires that lead a lightning strike into the ground for dissipation. Thus, a safety zone is created under the ground wires at the top of structures and along the line, for at least the width of the ROW. The NESC is strictly followed when installing, repairing, or upgrading TVA lines or equipment. Transmission line structures are well grounded, and the conductors are insulated from the structure. Therefore, touching a structure supporting a transmission line poses no inherent shock hazard.

3.13.1.3. Transmission Structure Stability

TVA transmission lines are designed to meet standards specified by the NESC. TVA designs their transmission lines such that a risk analysis of seismic hazards specifically for transmission line construction is not necessary. NESC states that as long as the design meets the wind and ice loading conditions that would create the most effect on the line, the transmission line would provide sufficient capacity to withstand seismic loading.

Single and double steel-pole structures similar to those shown in Figure 2-1 would be used for the proposed 161-kV transmission lines. These structures have demonstrated a good safety record. They are not prone to rot or crack like wooden poles, nor are they subject to substantial storm damage due to their low cross-section in the wind.

Additionally, all TVA transmission structures are examined visually at least once a year. Thus, the proposed structures do not pose any significant physical danger. For this reason, TVA does not typically construct barricades or fences around structures.

3.14. Unavoidable Adverse Environmental Impacts

The following unavoidable effects would result from implementing the proposed actions as described under the Action Alternative in Section 2.1.2.

- Clearing associated with construction of the proposed transmission line could result in a small amount of localized siltation.
- Trees would not be permitted to grow within the transmission line ROW or to a determined height adjacent to the ROW that would endanger the transmission line. In areas where the ROW would traverse forested areas, this would cause a change in the visual character of the immediate area and would segment some forested areas.

- Clearing and construction would result in the disruption and/or loss of some plant and wildlife, and the permanent loss of about 62.2 acres of forested habitat.
- Any burning of cleared material would result in some short-term air pollution. ROW construction would involve tree clearing and conversion of 0.41 acre of forested wetland to emergent or scrub-shrub wetland habitat.
- The proposed transmission line would result in minor, long-term visual effects on the landscape in the immediate local area.

3.15. Relationship of Local Short-Term Uses and Long-Term Productivity

Land within the ROWs of the proposed transmission lines would be committed to use for electrical system needs for the foreseeable future. The proposed ROWs would support the two separate 161-kV transmission lines (see Figure 1-1), with use of existing access roads outside the ROWs. Agricultural uses of the ROWs could and would likely continue. However, periodic clearing of the ROWs would preclude forest management within the ROWs for the operational life of the transmission line. These losses of long-term productivity with respect to timber production and as wildlife habitat are minor both locally and regionally.

3.16. Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those uses of resources that cannot be reversed. An example of an irreversible commitment is the mining and use of an ore, which once mined, cannot be replaced. Irretrievable commitments of resources are those that may occur over a period of time but that may be recovered. For example, filling a wetland area for a parking lot would irretrievably commit the property for as long as the parking lot remains.

The materials used for construction of the proposed transmission lines would be committed for the life of the line. Some materials, such as ceramic insulators and concrete foundations, may be irrevocably committed, but the metals used in equipment, conductors, and supporting steel structures could be recycled. The useful life of steel-pole transmission structures or laced-steel towers is expected to be at least 60 years. Thus, recyclable materials would be irretrievably committed until they are eventually recycled.

The ROW used for the transmission lines would constitute an irretrievable commitment of onsite resources, such as wildlife habitat, forest resources, and forested wetlands in that the approximate previous land use and land cover could be returned upon retirement of these facilities. In the interim, compatible uses of the ROW for the transmission lines could continue.

CHAPTER 4 – LIST OF PREPARERS

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Appendix A – Coordination & Consultation Correspondence

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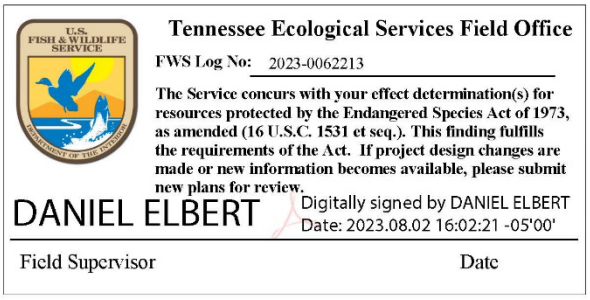


Tennessee Ecological Services Field Office

FWS Log No: 2023-0062213

The Service concurs with your effect determination(s) for resources protected by the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.). This finding fulfills the requirements of the Act. If project design changes are made or new information becomes available, please submit new plans for review.

DANIEL ELBERT

Digitally signed by DANIEL ELBERT
Date: 2023.08.02 16:02:21 -05'00'

Field Supervisor Date

TENNESSEE VALLEY AUTHORITY

400 West Summit Hill Drive, Knoxville, Tennessee 37902

May 5, 2023

Mr. Dan Elbert
U.S. Fish and Wildlife Service
Tennessee Ecological Services Field Office
446 Neal Street
Cookeville, Tennessee 38501

Dear Mr. Elbert,

TENNESSEE VALLEY AUTHORITY (TVA) - SOUTH BRISTOL, TN DELIVERY POINT - REQUEST FOR CONCURRENCE

Project Name: 41759 South Bristol, TN Delivery Point
Project Code: 2023-0062213

To provide power for a growing load and increase power reliability in Sullivan County, TN, TVA proposes to construct a new Sullivan - South Bristol 161-kV Transmission Line (TL). This TL will be approximately 10.8 miles long. The new Sullivan - South Bristol 161-kV TL will parallel two existing TVA TLs for about 7.7 miles: a 161-kV TL for about 0.5 mile, and a 500-kV TL for about 7.2 miles. TVA will utilize 12.5 feet of existing right of way (ROW) and purchase 87.5 feet of new ROW adjacent to the 161-kV TL, and 40 feet of existing ROW and purchase 60 feet of new ROW adjacent to the 500-kV TL. TVA also proposes to build a Bluff City - South Bristol 161-kV TL. This TL will be approximately 3.4 miles long and will require new 100-foot-wide ROW.

Project actions would include clearing trees to establish the new ROW, followed by the installation of transmission poles, conductors and optical ground wire. Temporary construction access will utilize existing access roads to the extent possible or be within the existing ROW and may require improvement. Laydown areas will also be established to stage materials and equipment. Temporary culverts may be used at stream and wetland crossings and minor erosion control measures such as gravel, riprap, and revegetation may also be required.

Environmental field surveys of the transmission line ROW occurred on January 10, 11, and 20, 2023. Surveys of four caves within 0.25 miles of the proposed project occurred on December 20, 2022. Habitat within the project footprint consisted of forested areas including deciduous, evergreen, and mixed forest types, early successional areas including pastures and mowed fields, and disturbed/developed areas. Aquatic features within the project footprint included ponds, the South Holston River, perennial and intermittent streams, and wetlands.

Direct impacts of the project would include clearing approximately 62.2 acres of forest to establish the new ROW. Ground disturbance from vehicles and equipment may impact individual animals, nests or burrows. Holes 8'-15' deep and 3'-5' in diameter will be drilled to install transmission poles. A temporary increase in disturbance from human presence and noise will occur in the project area during construction.

Indirect impacts of the project would include loss and fragmentation of forested habitat and an increase in early successional habitat within the ROW. Use of culverts at stream crossings may temporarily alter hydrology. Any potential ground disturbance within the proposed project area would be minimized, and all work conducted in accordance with Best Management Practices (BMPs) as outlined in *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities, Revision 3.* These BMPs are designed in part to minimize erosion and subsequent sedimentation. Therefore, with proper implementation of BMPs, no long-term impacts from the associated action are anticipated to endangered, threatened, or special status species.

A review of the TVA Regional Natural Heritage database and the U.S. Fish and Wildlife Service Information for Planning and Consultation (IPaC) website was performed on November 8th, 2022, prior to field survey, identifying six species listed as federally endangered, threatened, proposed endangered, or candidate for listing under the Endangered Species Act (ESA) that have the potential to occur within the project area in Sullivan County, TN. These species include one clam (Cumberland monkeyface), one insect (monarch butterfly), and four mammals (gray bat, Indiana bat, northern long-eared bat [NLEB], and tricolored bat) that have the potential to occur within the project area based on historic range, proximity to known occurrence records, biological characteristics, and/or physiographic characteristics. No federally designated critical habitats for these species are present within or adjacent to the project action area, therefore no adverse modification of critical habitats would occur.

TVA is making a No Effect determination for Cumberland monkeyface. No listed aquatic species or designated critical habitats are known from the Beaver Creek (0601010205) and Boone Lake-South Fork Holston River (0601010206) 10-digit HUC watersheds encompassing the proposed project area. Therefore, with appropriate implementation of BMPs during site preparation activities, no impacts to the Cumberland monkey face are anticipated to occur as a result of the proposed TVA action.

Due to site specific stipulations and the overall project duration, this project does not qualify for the Interim Consultation Framework for NLEB or TVA's Programmatic Strategy for Routine Actions that May Affect Endangered or Threatened Bats. Approximately 62.2 forested acres will be cleared for the ROW. This area includes approximately 37.2 acres of suitable roosting habitat for Indiana bats and northern long-eared bats. Clearing will occur during the inactive season between November 1st and March 15th to avoid direct impacts to bat species. Records of approximately 28 caves are known within 3 miles of the project footprint. Eight of these records are within 0.25 miles of the project footprint. Four of these were surveyed by TVA biologists in December 2022. Three other caves have been filled, and the final one was owned by landowners who could not be reached.

Mr. Dan Elbert
Page 3
May 5, 2023

Two of the four caves surveyed contained tricolored bats and one of these also has records of northern long-eared bats and gray bats. Project activities will not be completed by the April 1, 2024 date mentioned in the NLEB Interim Consultation Framework. TVA requests guidance on possible implications related to this date. Within the 0.25 mile buffer, the project will require drilling for one 2-pole structure adjacent to the existing 500-kV TL which has an already cleared 200-foot-wide ROW. This new structure will be located at latitude: 36.4549, longitude: -82.2261 (see drawing BHS-1G in consultation package). Timing of the drilling is flexible and TVA requests guidance on the least impactful dates to perform this work considering records of northern long-eared bat use during winter and gray bat use during winter and summer. This cave is open to the public and receives heavy visitation. Drilling is not expected to cause a significant disturbance given the frequent human presence. Approximately 1.5 acres of tree clearing will occur between 0.21 and 0.25 miles from the entrance. This area is adjacent to an existing transmission line and only one tree suitable for roosting by Indiana bat and northern long-eared bat was observed within this area. Due to the results of field surveys, the lack of suitable roosting habitat, and the seasonal clearing restrictions that are proposed, TVA has determined that the proposed project May Affect but is Not Likely to Adversely Affect gray bat, Indiana bat, and northern long-eared bat. Additionally, TVA has determined that the proposed project would not jeopardize the continued existence of the tricolored bat.

TVA has determined that the project would not jeopardize the continued existence of the monarch butterfly. There are no records known within 3 miles and no individuals were present during field surveys. This species has not been tracked historically but is likely to be present within the project footprint. Early successional habitat (primarily pastures and hay fields) is common within the proposed ROW footprint. Individual caterpillars may be impacted during construction, however, creation of new ROW may benefit this species by converting forest to early successional foraging habitat.

We respectfully request concurrence with our determination. Should you have any questions or wish to discuss the project in more detail, please contact Jesse Troxler by email, jctroxler@tva.gov.

Sincerely,

W. Douglas White
Manager
Biological Compliance

JCT:ABM
Enclosures

wetlands | flood control | water quality
WATER RESOURCES

October 19, 2023

Joe Melton
Program Manager
Transmission Projects Environmental Support
Tennessee Valley Authority; Chattanooga Office Complex
1101 Market Street
Chattanooga, TN. 37402

Dear Mr. Melton:

This letter is to confirm that there is 0.51credits reserved for TVA – South Bristol Transmission Line Project. These credits will be provided from the Lick Creek Wetland Mitigation Bank Number 2.

If you have any questions please do not hesitate to call.

Sincerely,

Richard McLean, Ph.D.
President

865-603-8481 - 5923 Kingston Pike, Suite 365, Knoxville, TN 37919

From: TN Help <tnhelp@service-now.com>
Sent: Monday, November 20, 2023 4:56 PM
To: Beliles, Emily <ebeliles@tva.gov>
Cc: Osborne, James W Jr <jwosborn@tva.gov>; Dirnberger, Zachary Weslie <zwdirnberger@tva.gov>
Subject: South Bristol 161-kV Delivery Point Project, TVA Tracking Number- CRMS 46968607817 - Project # SHPO0002537

TENNESSEE HISTORICAL COMMISSION
STATE HISTORIC PRESERVATION OFFICE
2941 LEBANON PIKE
NASHVILLE, TENNESSEE 37243-0442
OFFICE: (615) 532-1550
www.tnhistoricalcommission.org

2023-11-20 12:14:26 CST

James Osborne
Tennessee Valley Authority
jwosborn@tva.gov

RE: Tennessee Valley Authority (TVA), South Bristol 161-kV Delivery Point Project, TVA Tracking Number- CRMS 46968607817, Project#: SHPO0002537, Sullivan County, TN

Dear James Osborne:

In response to your request, we have reviewed the documents you submitted regarding your proposed undertaking. Our review of and comment on your proposed undertaking are among the requirements of Section 106 of the National Historic Preservation Act. This Act requires federal agencies or applicants for federal assistance to consult with the appropriate State Historic Preservation Office before they carry out their proposed undertakings. The Advisory Council on

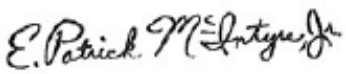
Historic Preservation has codified procedures for carrying out Section 106 review in 36 CFR 800 (Federal Register, December 12, 2000, 77698-77739).

Based on the information provided, we concur that no historic architectural properties will be adversely affected by this undertaking. Please see the attached pdf for further comments regarding the architectural survey report.

Sites 40SL510 (cave), 40SL513, and 40SL515 (stone feature) should be avoided or subjected to additional archaeological evaluation. We concur with the archaeological testing proposal for sites 40SL510 and 40SL513. Please submit a shapefile for the survey area included in the submitted report.

Upon receipt of the survey report, we will continue our review of this undertaking as expeditiously as possible. Until such time as this office has rendered a final comment on this project, your Section 106 obligation under federal law has not been met. Please inform this office if this project is canceled or not funded, licensed, or permitted by the federal agency. Provide your Project # when submitting additional materials regarding this undertaking. Questions and comments may be directed to Kelley Reid, who drafted this response, at Kelley.Reid@tn.gov, +16157701099. Your cooperation is appreciated.

Sincerely,



E. Patrick McIntyre, Jr.
Executive Director and
State Historic Preservation Officer

Ref:MSG10987355_eeV8WJv1E5vprvFHMHJ

From: TN Help <tnhelp@service-now.com>
Sent: Monday, February 26, 2024 3:51 PM
To: Beliles, Emily
Cc: Osborne, James W Jr; Babin, Mark Holden; Angst, Michael G
Subject: South Bristol 161-kV Delivery Point Project, TVA Tracking Number- CRMS 46968607817 - Project # SHPO0002537

TENNESSEE HISTORICAL COMMISSION
STATE HISTORIC PRESERVATION OFFICE
2941 LEBANON PIKE
NASHVILLE, TENNESSEE 37243-0442
OFFICE: (615) 532-1550
www.tnhistoricalcommission.org

2024-02-26 14:19:15 CST

James Osborne
Tennessee Valley Authority
jwosborn@tva.gov

RE: Tennessee Valley Authority (TVA), South Bristol 161-kV Delivery Point Project, TVA Tracking Number- CRMS 46968607817, Project#: SHPO0002537, Sullivan County, TN

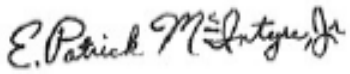
Dear James Osborne:

In response to your request, we have reviewed the architectural survey report and accompanying documentation submitted by you regarding the above-referenced undertaking. Our review of and comment on your proposed undertaking are among the requirements of Section 106 of the National Historic Preservation Act. This Act requires federal agencies or applicants for federal assistance to consult with the appropriate State Historic Preservation Office before they carry out their proposed undertakings. The Advisory Council on Historic Preservation has codified procedures for carrying out Section 106 review in 36 CFR 800 (Federal Register, December 12, 2000, 77698-77739).

Based on the information provided, we find that HS-159 is eligible for listing in the National Register of Historic Places under Criterion C and agree with the boundary in the report. We find that the project as currently proposed will not adversely affect HS-159, the Wassom Cabin and Corn Cribs, due to the presence of an existing transmission line on the property. We further find that the project as currently proposed will not affect any archaeological resources that are eligible for listing in the NRHP.

This office has no objection to the implementation of this project as currently planned. If project plans are changed or previously unevaluated archaeological resources are discovered during project construction, please contact this office to determine what further action, if any, will be necessary to comply with Section 106 of the National Historic Preservation Act. Please provide your Project # if you submit additional information regarding this undertaking. Questions and comments may be directed to Kelley Reid, who drafted this response, at Kelley.Reid@tn.gov, +16157701099. We appreciate your cooperation.

Sincerely,



E. Patrick McIntyre, Jr.
Executive Director and
State Historic Preservation Officer

Ref:MSG12585904_fxtshN9rQNnyL7P0wMr

From: TN Help <tnhelp@service-now.com>
Sent: Monday, March 25, 2024 2:40 PM
To: Babin, Mark Holden; Beliles, Emily
Subject: South Bristol 161-kV Delivery Point Project, TVA Tracking Number- CRMS 46968607817 - Project # SHPO0002537

TENNESSEE HISTORICAL COMMISSION
STATE HISTORIC PRESERVATION OFFICE
2941 LEBANON PIKE
NASHVILLE, TENNESSEE 37243-0442
OFFICE: (615) 532-1550
www.tnhistoricalcommission.org

03-25-2024 13:38:18 CDT

Mark Babin
TVA
mhbabin@tva.gov

RE: Tennessee Valley Authority (TVA), South Bristol 161-kV Delivery Point Project, TVA Tracking Number- CRMS 46968607817, Project#: SHPO0002537, Sullivan County, TN

Dear Mark Babin:

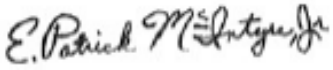
In response to your request, we have reviewed the archaeological report of investigations and accompanying documentation submitted by you regarding the proposed access roads for the above-referenced undertaking. Our review of and comment on your proposed undertaking are among the requirements of Section 106 of the National Historic Preservation Act. This Act requires federal agencies or applicants for federal assistance to consult with the appropriate State Historic Preservation Office before they carry out their proposed undertakings. The Advisory Council on Historic Preservation has codified procedures for carrying out Section 106 review in 36 CFR 800 (Federal Register, December 12, 2000, 77698-77739).

Considering the information provided, we concur with your agency that no archaeological resources eligible for listing in the National Register of Historic Places will be affected by the proposed access roads for this undertaking. If project plans are changed or archaeological remains are discovered during project construction, please contact this office to determine what further action, if any, will be necessary to comply with Section 106 of the National Historic Preservation Act. Complete and/or updated Tennessee Site Survey Forms should be submitted to the Tennessee Division of

Archaeology for all sites recorded and/or revisited during the current investigation. Please provide your Project # when submitting any additional information regarding this undertaking. Questions or comments may be directed to Jennifer Barnett, who drafted this response, at Jennifer.Barnett@tn.gov, +16156874780.

Your cooperation is appreciated.

Sincerely,



E. Patrick McIntyre, Jr.
Executive Director and
State Historic Preservation Officer

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Appendix B – Transmission Environmental Protection Procedures Right-Of-Way Vegetation Management Guidelines (Rev. (9) February 2022)

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Transmission Environmental Protection Procedures
Right-Of-Way Vegetation Management Guidelines

1.0 Overview

A. The Tennessee Valley Authority (TVA) must manage the vegetation on its rights-of-way and easements to ensure emergency maintenance access and routine access to structures, switches, conductors, and communications equipment. In addition, TVA must maintain adequate clearance, as specified by the National Electrical Safety Code, between conductors and tall growing vegetation and other objects. This requirement applies to vegetation within the right-of-way (ROW) as well as to trees located off the right-of-way.

B. Each year TVA assesses the conditions of the vegetation on and along its rights-of-way. This is accomplished by aerial inspections, ground inspections, periodic field inspections, aerial photography, LiDAR data and information from TVA personnel, property owners andthe general public. TVA utilizes this data to evaluate vegetation clearances and identifies vegetation on and off ROW that does or could potentially pose a risk to reliability.

C. TVA transmission foresters develop a vegetation re-clearing plan that is specific to each line segment and is based on terrain conditions, species mix, growth, and density.

2.0 Right-of-Way Management Methods

A. TVA takes an Integrated Vegetation Management (IVM) approach that is based on a carefully planned, multi-dimensional strategy developed in consultation with forestry and habitat experts. Integrated vegetation management aims to improve safety and prevent power outages by creating healthy and self-sustaining ecosystems in ROWs while ensuring compliance with regulatory standards (NERC 2006). These ecosystems foster beneficial, attractive and low-maintenance habitat while discouraging tall, woody species and other, more benign forms of vegetation can thrive. Integrated vegetation management encourages early successional native habitats that pose less threat to power reliability yet offer safe havens for desirable plants and animals.By combining selective use of herbicides with physical removal, integrated vegetation management can more thoroughly eradicate unsuitable vegetation and allow more compatible species to fill in, making it more difficult for tall-growing trees to re-establish.

TVA executes its transmission vegetation maintenance on a 3-year cycle based on data that is acquired by various inspection methods. LiDAR, ground inspection andaerial inspection data are utilized to evaluate the next year's scheduled work to determine the annual vegetation maintenance work scope. LiDAR technology provides a detailed vegetation threat analysis that can be used to assess risk as well as prioritize vegetation management work plans. This detailed analysis supports TVA's efforts to target incompatible species as well as promote the growth of compatible vegetation. This precision management approach is effective in reducing overall environmental impact by limiting work to specific areas of incompatibility.

B. TVA uses a variety of herbicides specific to the species present with a variety of possible application techniques. The method most often implemented is selective application from the ground with backpack sprayers or vehicle-mounted sprayers. However, other techniques and methods, such as those described in section 3.0, may be utilized when circumstances dictate. Any herbicides used are applied in accordance with applicable state and federal laws and regulations. Only herbicides registered with the United States Environmental Protection Agency (USEPA) are used.

C. In very steep terrain, in sensitive environmental areas, in extensive wetlands, at stream banks, and in sensitive property owner land use areas, hand clearing may be utilized. Hand clearing is recognized as one of the most hazardous occupations documented by the Occupational Health and Safety Administration.

D. TVA does not encourage tree re-clearing by individual property owners because of the high hazard potential of hand clearing, possible interruptions of the line, and electrical safety considerations for untrained personnel that might do the work.

E. Mechanical mowers not only cut the tall saplings and seedlings on the right-of-way, it also shatters the stump and the supporting near-surface root crown. The tendency of resistant species to re-sprout from the root crown and shattered stumps can produce a multi-stem dense stand in the immediate area. Repeated use of mowers on short cycle re-clearing with many original stumps re-growing in the above manner can create a single species thicket or monoculture. With the original large root system and multiple stems, the resistant species can produce re-growth at the rate of 5-10 feet in a year. In years with high rainfall, the growth can reach 12-15 feet in a single year. These dense, monoculture stands can become nearly impenetrable for even large tractors. Such stands have low diversity, little wildlife food or nesting potential, and become a property owner concern. Selective herbicide application may be used to control monoculture stands.

3.0 Herbicide Program

A. TVA has worked with universities (such as Mississippi State University, University of Tennessee, Purdue University and others), chemical manufacturers, other utilities, U.S. Department of Transportation, U.S. Fish and Wildlife Service (USFWS), and U.S. Forest Service (USFS) personnel to explore options for vegetation control. The results have provided strong recommendations to use species-specific, low volume herbicide applications in more situations. Research, demonstrations, and other right-of-way programs show a definite improvement of rights-of-way treated with selective low-volume applications of new herbicides using a variety of application techniques and timing. Table 1 below identifies herbicides currently used on TVA rights-of-way.Table 2 identifies pre-emergent herbicides currently being used on bare ground areas on TVA rights-of-way and in substations. Table 3 identifies TGRs that may be used on tall trees that have special circumstances that require trimming on a regular cycle, e.g., restrictions on complete removal. The rates of application utilized are those listed on the U.S. Environmental Protection Agency (USEPA) approved label and consistent with utility standard practice throughout the Southeast.

Table 1 - Herbicides Currently Used on TVA Rights-of-Way

Trade Name	Active Ingredient	Label Signal Word
Accord/Accord XRT II	Glyphosate/Liquid	Caution
Arsenal	Imazapyr/Liquid/Granule	Caution
Chopper	Imazapyr/RTU	Caution
Clearstand	Imazapyr/Metsulfuron Methyl/Liquid	Caution
Escort	Metsulfuron Methyl/Dry Flowable	Caution
Garlon 4 Ultra	Triclopyr/Liquid	Caution
Habitat	Imazapyr/Liquid	Caution
Krenite S	Fosamine Ammonium	Caution
Milestone VM	Aminopyralid/Liquid	Caution
Pathfinder II	Triclopyr/RTU	Caution
Polaris	Imazapyr/Liquid	Caution
Rodeo	Glyphosate/Liquid	Caution
Roundup	Glyphosate/Liquid	Caution
Roundup Pro	Glyphosate	Caution
Stalker	Imazapyr/Liquid	Caution
Streamline	Aminocyclopyrachlor/ Metsulfuron Methyl/Liquid	Caution
Transline	Clopyralid/Liquid	Caution
Viewpoint	Imazapyr/Aminocyclopyrachlor/ Metsulfuron Methyl/Liquid	Caution

Table 2 - Pre-Emergent Herbicides Currently Used for Bare Ground Areas TVA Rights-of-Way

Trade Name	Active Ingredients	Label Signal Word
Arsenal 5G	Imazapyr/Granule	Caution
Sahara	Diuron/Imazapyr	Caution
SpraKil SK-26	Tebuthiuron/Diuron/Granules	Caution
SpraKil S-5	Tebuthiuron/Granules	Caution
Topsite	Diuron/Imazapyr	Caution

Table 3 - Tree Growth Regulators (TGRs) Currently Used on TVA Rights-of-Way

Trade Name	Active Ingredients	Label Signal Word
Profile 2SC	TGR-paclobutrazol	Caution
TGR	Flurprimidol	Caution

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B. The herbicides listed in Table 1 and 2 and TGRs listed in Table 3 have been evaluated in extensive studies in support of registration applications and label requirements. Many have been reviewed in the USFS vegetation management environmental impact statements (EISs), and those evaluations are incorporated here by reference (USFS 1989a, 1989b, 2002a, and 2002b). Electronic copies can be accessed at https://cdxnodengn.epa.gov/cdx-enepa-public/action/eis/search. The result of these reviews has been a consistent finding of limited environmental impact beyond that of control of the target vegetation. All the listed herbicides have been found to be of low environmental toxicity when applied by trained applicators that are following the label and registration procedures, including prescribed measures, such as buffer zones, to protect threatened and endangered species.

C. Low volume herbicide applications are recommended since research demonstrates much wider plant diversity after such applications. There is better ground erosion protection and more wildlife food plants and cover plants develop. In most situations, there is increased development of wild flowering plants, pollinator plants and shrubs. In conjunction with herbicides, the diversity and density of low-growing plants provide control of tall-growing species through competition.

D. Herbicides are used in place of rotary mowing to avoid damage to nesting and tunneling wildlife. This method retains ground cover year around with a better mix of food species and associated high- protein insect populations for birds in the right seasons. Most also report less damage to soils (even when compared with rubber-tired equipment).

E. Best Management Practices (BMPs) governing application of herbicides are contained within *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities* (TVA 2017) which is incorporated by reference. Herbicides can be liquid, granular, or powder and can be applied aerially or by ground equipment and may be selectively applied or broadcast, depending on the site requirements, species present, and condition of the vegetation.Water quality considerations include measures taken to keep herbicides from reaching streams whether by direct application or through runoff of or flooding by surface water. "Applicators" must be trained, licensed, and follow manufacturers' label instructions, USEPA guidelines, and respective state regulations and laws.

F. When herbicides are used, their potential adverse impacts are considered in selecting the compound,formulation, and application method. Herbicides that are designated "Restricted Use" by USEPA require application by or under the supervision of applicators certified by the respective state control board. Applications are done either by TVA or by contractors in accordance with the following guidelines identified in the TVA BMP manual (TVA 2017):

1. The sites to be treated are selected and application directed by the appropriate TVA official.
2. A pre-flight walking or flying inspection is made within 72 hours prior to applying herbicides aerially. This inspection ensures that no land use changes have occurred, that sensitive areas are clearly identified to the pilot, and that buffer zones are maintained.
3. Aerial application of liquid herbicides will normally not be made when surface wind speeds exceed 5 miles per hour, in areas of fog, or during periods of temperature inversion.

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4. Pellet application will normally not be made when the surface wind speeds exceed 10 miles per hour or on frozen or water saturated soils.
5. Herbicide application should follow manufacturers' label specifications.
6. Application during unstable, unpredictable, or changing weather patterns is avoided. Equipment and techniques are used that are designed to ensure maximum control of the spray swath with minimum drift.
7. Herbicides are not applied to surface water or wetlands unless specifically labeled for aquatic use. Filter and buffer strips will conform at least to federal and state regulations and any label requirements. The use of aerial or broadcast application of herbicides is not allowed within a streamside management zone (SMZ) adjacent to perennial streams, ponds, and other water sources containing sensitive aquatic resources. Hand application of aquatic use herbicides are used only selectively for use within SMZs containing sensitive aquatic resources.
8. For aerial applications, buffers and filter strips (200 feet minimum width) are maintained next to agricultural crops, gardens, farm animals, orchards, apiaries, horticultural crops, and other valuable vegetation.
9. Herbicides are not applied in the following areas or times: (a) in city, state, and national parks or forests or other special areas without written permission and/or required permits; (b) off the right-of-way; and (c) during rainy periods or during the 48-hour interval prior to rainfall predicted with a 20 percent or greater probability by local forecasters when soil active herbicides are used.

G. TVA currently uses primarily low volume applications of foliar and basal applications, e.g., Accord (Glyphosate), Arsenal (Imazapyr), Clearstand (Imazapyr/ Metsulfuron Methyl), Milestone VM (Aminopyralid) and Streamline (Aminocyclopyrachlor / Metsulfuron Methyl).

4.0 Benefits

A. Proper maintenance—including vegetation management—of the ROW and its supporting facilities is crucialto ensuring the reliable transmission of affordable electrical power. Unmanaged and poorly maintained vegetation can cause electricity outages, wildfires, soil erosion, and water quality issues. Utility companies that adopt long-term IVM approaches often benefit from significant vegetation management cost savings, which can be reflected in customer rates.

B. ROW also provides important wildlife habitats. As wildlife habitats in the United States are lost to development, these ROWs become increasingly important. The IVM approach can create natural, diverse, and sustaining ecosystems, such as a meadow transition habitat. A variety of wildlife species (including threatened and endangered species) consider these habitats home, such as butterflies, songbirds, small mammals, and deer. These habitats also encourage the growth of native plant species and can increase plant diversity.

C. Invasive and exotic species are often a problem on the ROW, and, consequently, the surrounding land. IVM techniques (such as selective herbicide application) can minimize this problem, while ensuring native and endangered species are not affected.

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5.0 References

Integrated Vegetation Management (IVM) on Rights-of-Way Fact Sheet. (2012, May) Retrieved from http://www.epa.gov/pestwise/htmlpublications/row_fact_sheet.html

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Appendix C – Stream Crossings Along the Proposed Transmission Line and Access Roads

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Appendix C - Stream Crossings within the Proposed 161-kV Sullivan-South Bristol and Bluff City-South Bristol Transmission Line Rights-of-Way

Sequence ID	Stream Type	Streamside Management Zone Category	Stream Name	Field Notes	Coordinates*	
					Begin	End
S001	Perennial	Category A (50 ft)	Unnamed tributary to Whitetop Creek	3-foot-wide x 1-foot-deep stream. Duck weed. Moderate sinuosity. Fish and caddisflies present.	36.5129901 -82.22455881	36.51287424 -82.22416129
S002	Intermittent	Category A (50 ft)	Unnamed tributary to Whitetop Creek	3-foot-wide x 1-foot-deep stream. Bottomland. Hydric soils	35.885585 -84.379832	35.885569 -84.379815
S003	Perennial	Category A (50 ft)	Whitetop Creek	15-foot-wide x 5-foot-deep. Perennial stream. Blue line and fish present. Beaver dam	36.51954812 -82.21875279	36.52001868 -82.219428
S004	Intermittent	Category A (50 ft)	Unnamed tributary to Whitetop Creek	1-foot-wide x 1-foot-deep stream. Weak-moderate sinuosity. Debris present. Aquatic vegetation	36.52216204 -82.21754118	36.5218791 -82.21730564
S005	Intermittent	Category A (50 ft)	Unnamed tributary to Whitetop Creek	1-foot-wide x 1-foot-deep Weak sinuosity. Moderate bed and bank. Weak upland vegetation in thalweg. Moderate grade controls	36.52273222 -82.21650767	36.52305609 -82.21668353
S006	Perennial	Category A (50 ft)	Unnamed tributary to Whitetop Creek	3-foot-wide x 1-foot-deep stream. Fish present	36.52359807 - 82.21537802	36.52401748 -82.21542233
S007	Intermittent	Category A (50 ft)	Unnamed tributary to Whitetop Creek	3-foot-wide x 1-foot-deep stream. Weak bed and bank. Moderate leaves in channel. Iron oxidizing bacteria. Moderate sinuosity. Strong grade controls. Strong natural valley.	36.5251119 -82.21435475	36.52463193 -82.21405868
S008	Perennial	Category A (50 ft)	Unnamed tributary to Whitetop Creek	2-foot-wide x1 foot-deep perennial spring with fish present.	36.5261132 - 82.2123573	36.5264437 -82.21247725
S009	Perennial	Category A (50 ft)	Whitetop Creek	20 foot-wide x5-foot-deep gravel bottom, fish present, blue line on topo	36.52721418 -82.2109125	36.52607419 -82.21230025

Sequence ID	Stream Type	Streamside Management Zone Category	Stream Name	Field Notes	Coordinates*	
					Begin	End
S010	Perennial	Category A (50 ft)	South Holston River	Right descending bank	36.49499983 -82.18240386	36.4950219 -82.18294228
S010	Perennial	Category A (50 ft)	South Holston River	Left descending bank	36.49447995 -82.18263259	36.49449349 -82.18323802
S011	Perennial	Category A (50 ft)	Possum Creek	5-foot-wide x1-foot-deep perennial side channel of possum creek. Fish present.	36.47996372 -82.19336493	36.47992231 -82.19357318
S011b	Perennial	Category A (50 ft)	Possum Creek	20-foot-wide x5-foot-deep. Fish Present	36.48013254 -82.19340535	36.47998036 -82.19378182
S011c	Intermittent	Category A (50 ft)	Possum Creek	3-foot-wide x 1-foot-deep side channel of Possum Creek	36.47973484 -82.19346793	36.47972481 -82.1936466
S012	Perennial	Category A (50 ft)	Unnamed tributary to Miller Branch	4-foot-wide x 1-foot-deep stream	36.47409106 -82.1959606	36.47385631 -82.19516052
S013	Intermittent	Category A (50 ft)	Unnamed tributary to Miller Branch	1-foot-wide x 1-foot-deep stream. Weak bed and bank. Wetland vegetation. Hydric soils. Weak sinuosity	36.47085336 -82.20127276	36.47128916 -82.20138677
S014	Intermittent	Category A (50 ft)	Unnamed tributary to Miller Branch	2-foot-wide x 1-foot-deep stream. Weak sorting. Weak-moderate sinuosity and grade controls.	36.46922019 -82.2033976	36.46938793 -82.20372366
S015	Perennial	Category A (50 ft)	Miller Branch	15-foot-wide x 2-foot-deep stream. Fish present.	36.46817077 -82.20566947	36.46768861 -82.20558582
S016	Perennial	Category A (50 ft)	Dry Creek	10-foot-wide x 5-foot-deep. Fish present.	36.45799998 -82.21968562	36.45841699 -82.22002127
S017	Perennial	Category A (50 ft)	Unnamed tributary to Indian Creek	3-foot-wide x 2-foot-deep stream with flow, strong bed and bank, strong natural valley, sorting, wrack lines. consolidates to a single stream feature below row. Fish present in stream just below ROW.	36.44117786 -82.25655697	36.4409497 -82.25615756

Sequence ID	Stream Type	Streamside Management Zone Category	Stream Name	Field Notes	Coordinates*	
					Begin	End
S018	Intermittent	Category A (50 ft)	Unnamed tributary to Indian Creek	2-foot-wide x 1-foot-deep feature with bed and bank. Wrack lines of leaves. Flowing more than 48 hours after rainfall, amount of water in channel means likely ephemeral feature. Spring fed. No biota.	36.4394695 -82.25972871	36.44043191 -82.25917885
S019	Perennial	Category A (50 ft)	Indian Creek	10-foot-wide x 3-foot-wide stream. Fish present.	36.43861976 -82.2648307	36.43922099 -82.26503985
S020	Perennial	Category A (50 ft)	Booher Creek	5-foot-widex 2-foot-wide stream. Fish present.	36.43931407 -82.26594077	36.43880362 -82.26661723
S021	Perennial	Category A (50 ft)	Woods Branch	3-foot-wide x 2-foot-wide culverted stream.	36.44283867-82.27668589	36.44264431 -82.27683004
S100R	Perennial	Category A (50 ft)	Whitetop Creek	Culverted	36.52482358 -82.21364267	36.52482358 -82.21364267
S101R	Perennial	Category A (50 ft)	Paddle creek.	Culverted. Fish present. 2-foot-wide x 1-foot-wide channel	36.50640289 -82.18683733	36.50615256 -82.18690365
S102R	Intermittent	Category A (50 ft)	Unnamed tributary to South Holston River	2-foot-wide x 1-foot-wide intermittent stream.	36.48496311 -82.19477474	36.48440181 -82.19422532
S103R	Perennial	Category A (50 ft)	Unnamed tributary to Miller Branch	3-foot-wide x 1-foot-wide culverted perennial stream. Crayfish, frogs, aquatic invertebrates	36.47225718 -82.19375539	36.47265406 -82.19383349
S104R	Intermittent	Category A (50 ft)	Unnamed tributary to Miller Branch	2-foot-wide x 1-foot-wide culverted intermittent stream.	36.47317835 -82.19487625	36.47305918 -82.19511199
S105R	Perennial	Category A (50 ft)	Unnamed tributary to Miller Branch	3-foot-wide x 1-foot-wide perennial steam. Frogs and aquatic invertebrates	36.46938498 -82.2037113	36.46984127 -82.20474839
P001	Pond	Category A (50 ft)		Storm water detention pond	36.52636783 -82.19734424	36.52649974 -82.19732125

Sequence ID	Stream Type	Streamside Management Zone Category	Stream Name	Field Notes	Coordinates*	
					Begin	End
P002	Pond	Category A (50 ft)		Farm pond	36.5177632 -82.18447337	36.51777332 -82.18448417
P003	Pond	Category A (50 ft)		Farm pond	36.51214269 -82.17604607	36.51213826 -82.17605007
P100A	Pond	Category A (50 ft)		Pond encroaches access road polygon	36.50958411 -82.17874619	36.50958258 -82.17874542

*Denotes extent of reach assessed.

Appendix D – Floodplain Crossings Along the Proposed Transmission Lines and Access Roads

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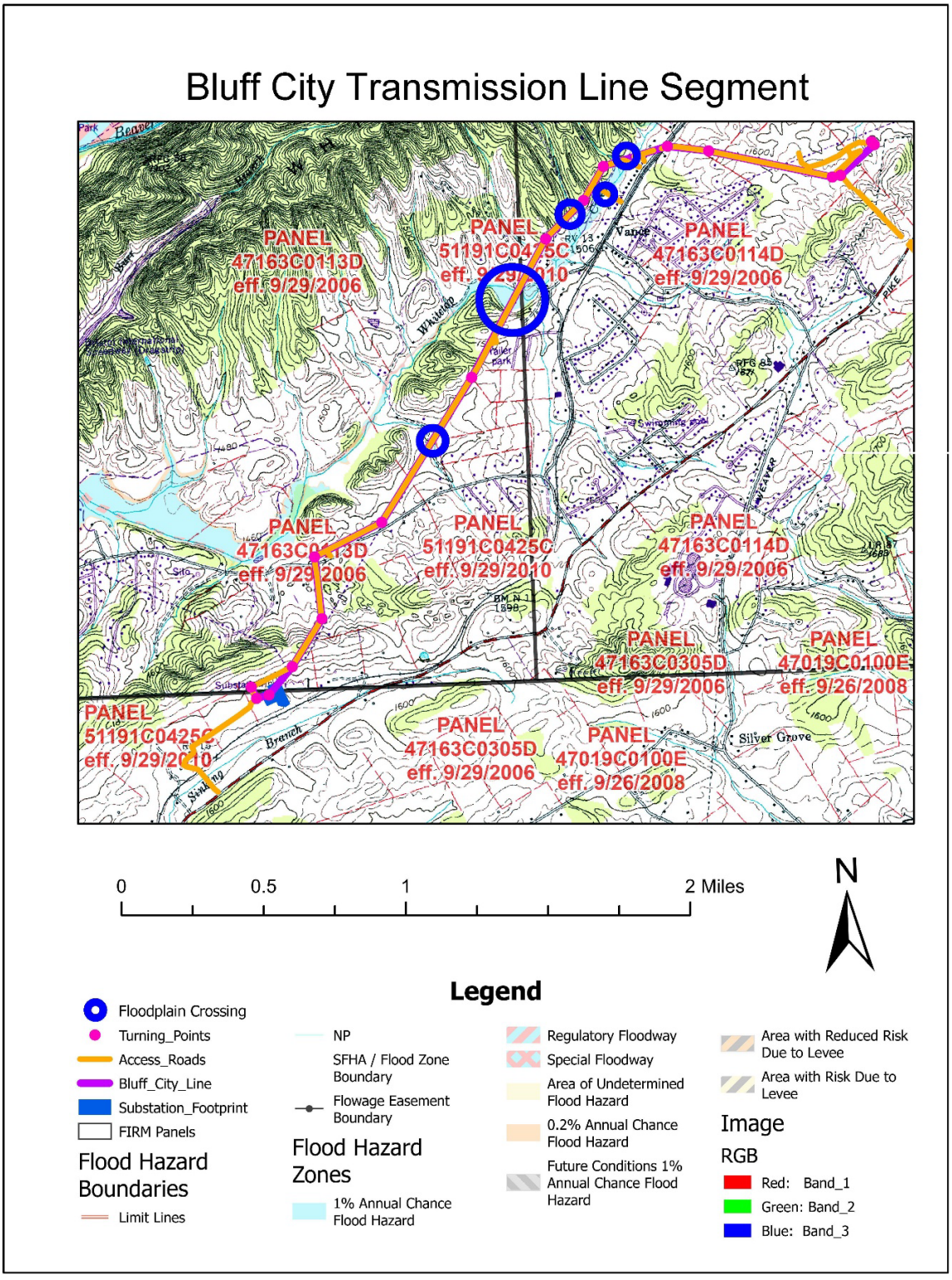

Figure D-1. Locations where the project crosses 100-year floodplains.

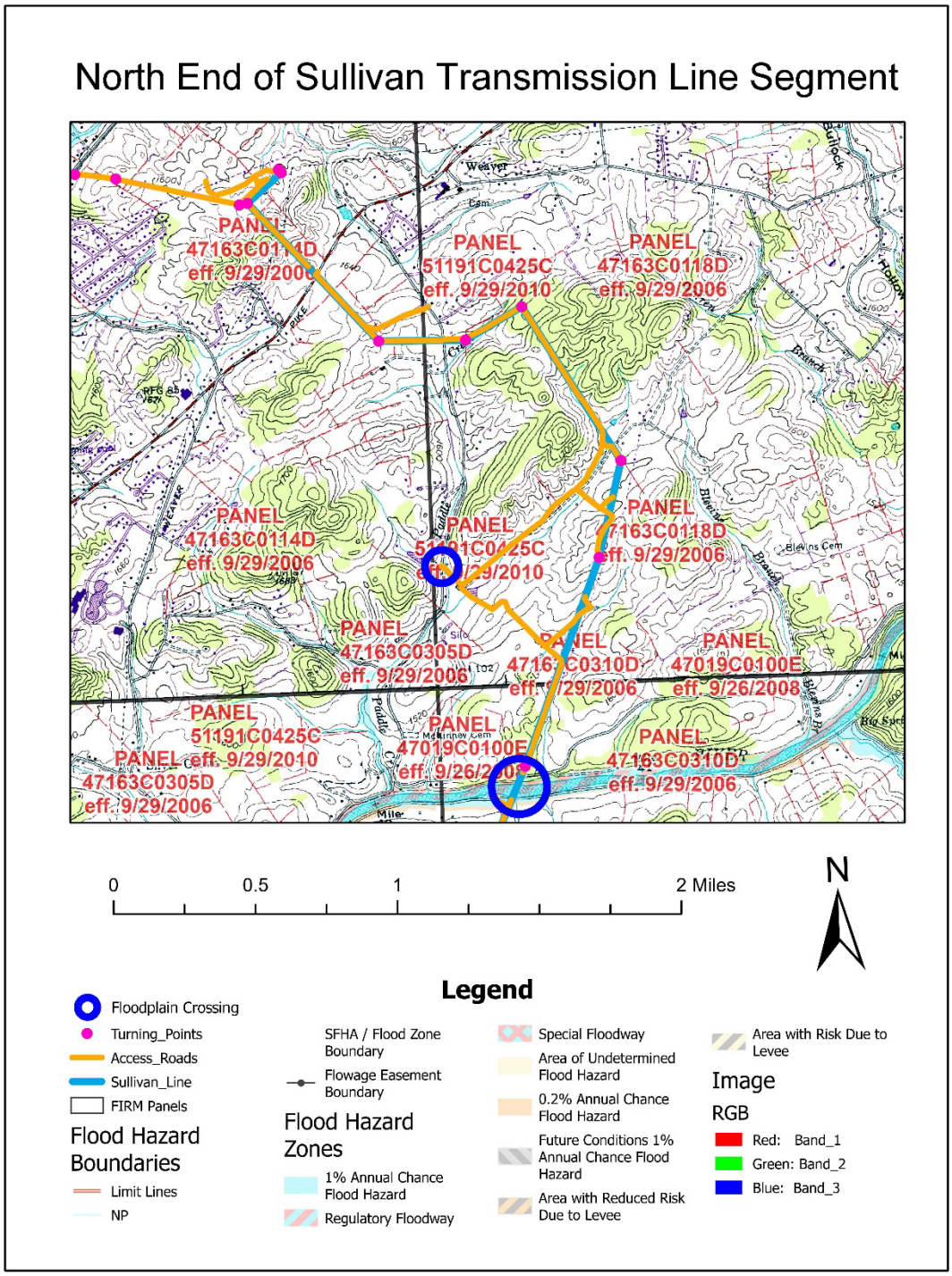

Figure D-2. Locations where the project crosses 100-year floodplains.

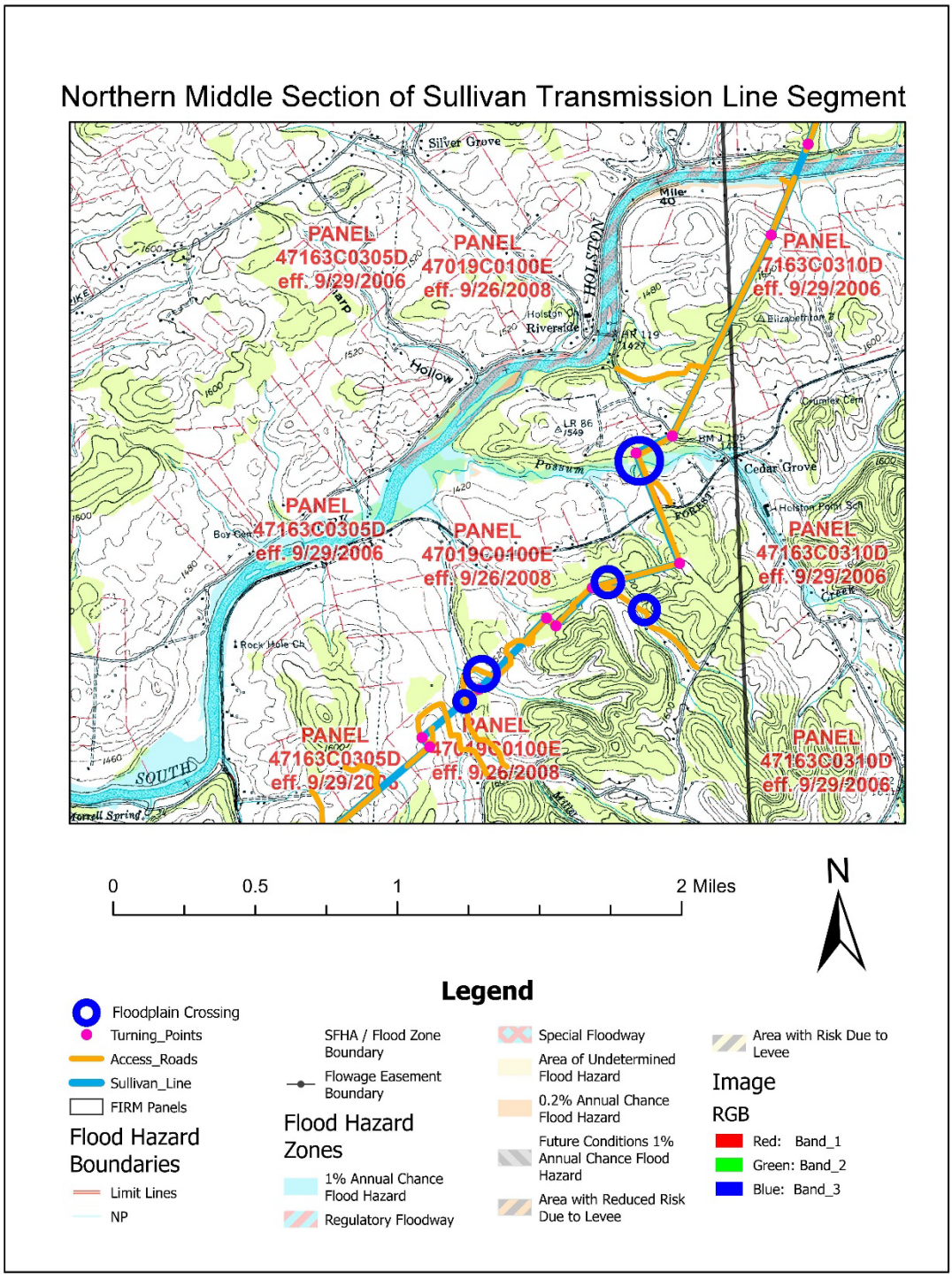

Figure D-3. Locations where the project crosses 100-year floodplains.

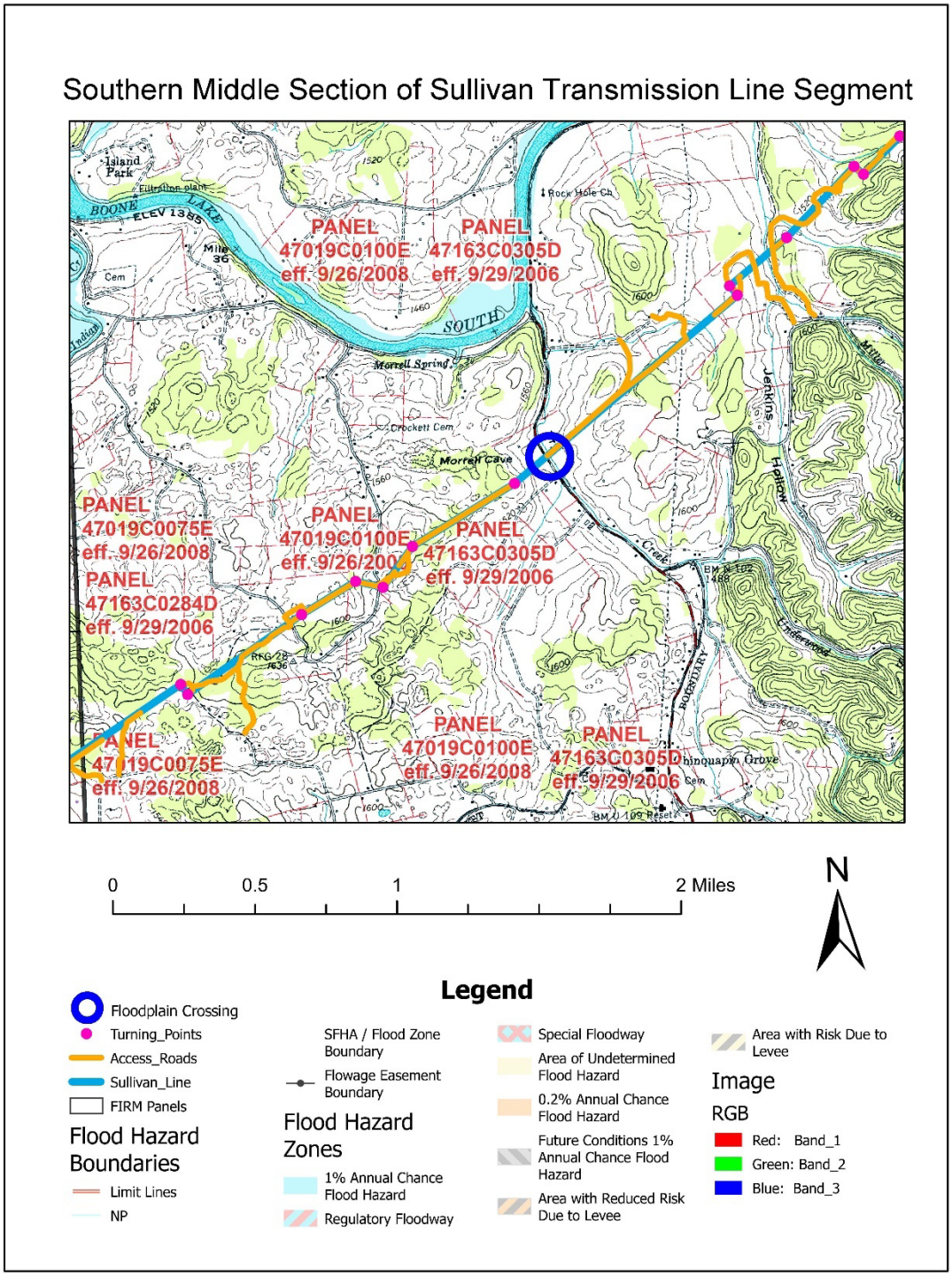

Figure D-4. Locations where the project crosses 100-year floodplains.

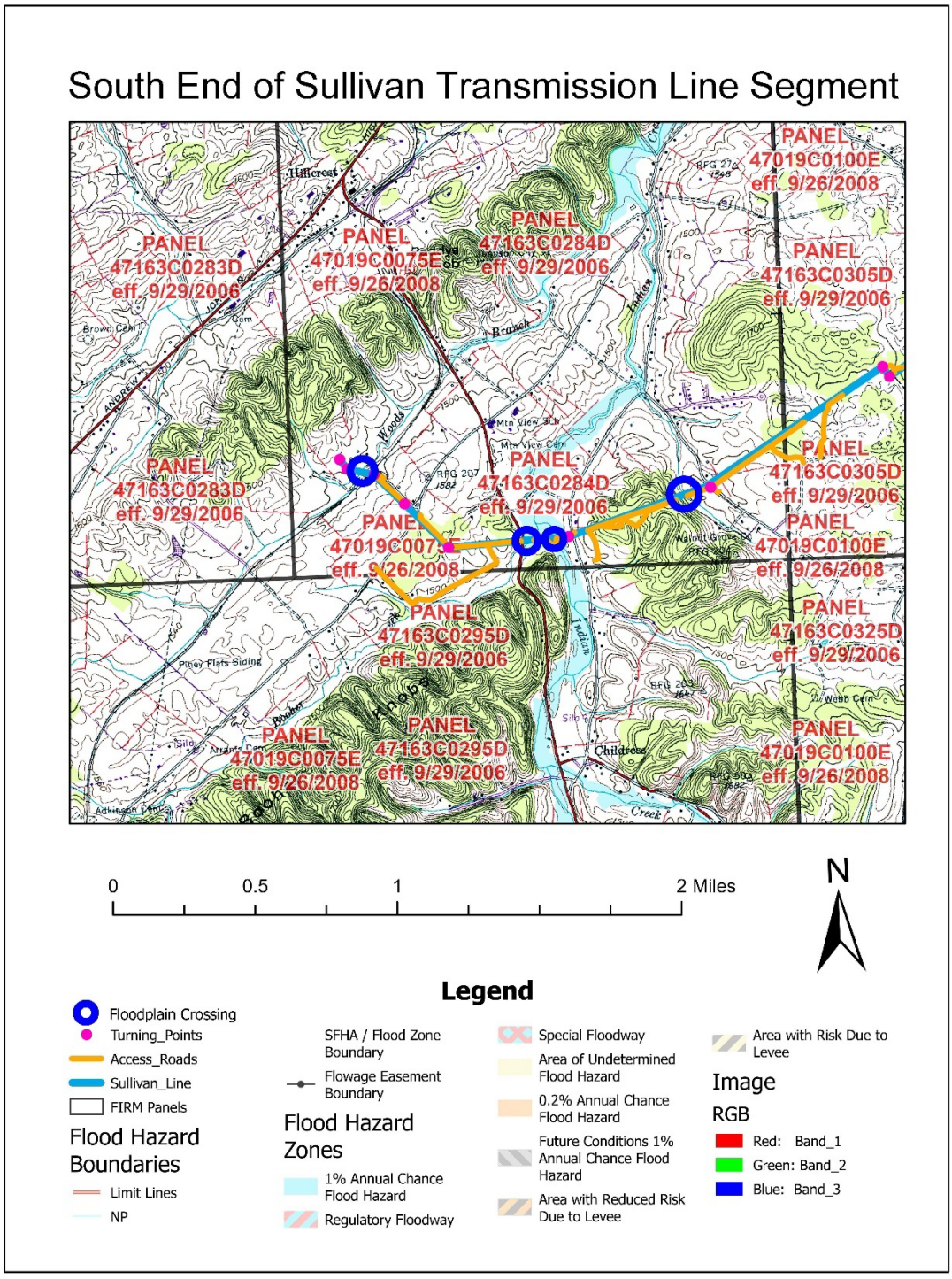

Figure D-5. Locations where the project crosses 100-year floodplains.

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Appendix E – Noise During Transmission Line Construction and Operation

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Appendix E - Noise During Transmission Line and Substation Construction and Operation

At high levels, noise can cause hearing loss; at moderate levels, noise can interfere with communication, disrupt sleep, and cause stress; and at low levels, noise can cause annoyance. Noise is measured in decibels (dB), a logarithmic unit, so an increase of 3 dB is just noticeable, and an increase of 10 dB is perceived as a doubling of sound level. Because not all noise frequencies are perceptible to the human ear, A-weighted decibels (dBA), which filter out sound in frequencies above and below human hearing, are typically used in noise assessments.

Both the U.S. Environmental Protection Agency (EPA) and the Department of Housing and Urban Development (HUD) have established noise guidelines. EPA guidelines are based on an equivalent day/night average sound level (DNL), which is a 24-hour average sound level with 10 dB added to hours between 10 p.m. and 7 a.m., since people are more sensitive to nighttime noise. USEPA recommends a guideline of DNL less than 55 dBA to protect the health and well-being of the public with an adequate margin of safety. HUD guidelines use an upper limit DNL of 65 dBA for acceptable residential development and an upper limit DNL of 75 dBA for acceptable commercial development. TVA generally uses the USEPA guideline of 55 dBA DNL at the nearest residence and 65 dBA at the property line in industrial areas to assess the noise impact of a project. In addition, TVA considers the Federal Interagency Committee on Noise (FICON) 1992 recommendation that a 3-dB increase indicates possible impact, requiring further analysis when the existing DNL is 65 dBA or less.

Annoyance from noise is highly subjective. The FICON used population surveys to correlate annoyance and noise exposure (FICON 1992). Table G-1 gives estimates of the percentage of typical residential populations that would be highly annoyed from a range of background noise and the average community reaction description that would be expected.

Table G-1. Estimated Annoyance from Background Noise (FICON 1992)

Day/Night Level (dBA)	Percent Highly Annoyed	Average Community Reaction
75 and above	37	Very severe
70	25	Severe
65	15	Significant
60	9	Moderate
55 and below	4	Slight

For comparative purposes, typical background DNLs for rural areas range from about 40 dBA in undeveloped areas to 48 dBA in mixed residential/agricultural areas (Cowan 1993). Noise levels are typically higher in higher-density residential and urban areas. Background noise levels greater than 65 dBA can interfere with normal conversations, requiring people to speak in a raised voice to carry on a normal conversation.

Construction Noise

Construction noise impacts would vary with the number and specific types of equipment on the job, the construction methods, the scheduling of the work, and the distance to sensitive noise receptors such as houses. Typical construction activities for a transmission line are described in Section 2.2. Maximum noise levels generated by the various pieces of construction equipment typically range from about 70 to 85 dBA at 50 feet (Bolt et al. 1971). An exception would be the use of track drills for building roads and installing foundations in rocky areas; track drills have a typical maximum noise level of 98 dBA at 50 feet. Use of track drills is not expected to be widespread.

Project-related construction noise levels would likely exceed background noise levels by more than 10 dBA at distances from within 500 feet in developed areas to over 1,000 feet in rural areas with little development. These distances are without the use of track drills; drilling activities could increase the distances by an additional 500 feet. A 10-dBA increase would be perceived as a large increase over the existing noise level and could result in annoyance to adjacent residents. The residential noise level guideline of 55 dBA could also be temporarily exceeded for residences near construction activities.

Construction activities would be limited to daylight hours. Because of the sequence of construction activities, construction noise at a given point along the transmission line connections would be limited to a few periods of a few days each. The temporary nature of construction would reduce the duration of noise impacts on nearby residents.

Operational Noise

Transmission lines can produce noise from corona discharge, which is the electrical breakdown of air into charged particles. Corona noise is composed of both broadband noise, characterized as a crackling noise, and pure tones, characterized as a humming noise. Corona noise is greater with increased voltage and is also affected by weather. It occurs during all types of weather when air ionizes near irregularities, such as nicks, scrapes, dirt, and insects on the conductors. During dry weather, the noise level is low and often indistinguishable off the ROW from background noise. In wet conditions, water drops collecting on the conductors can cause louder corona discharges.

For 500-kV transmission lines, this corona noise when present, is usually about 40-55 dBA. The maximum recorded corona noise has been 60-61 dBA (TVA unpublished data). During rain showers, the corona noise would likely not be readily distinguishable from background noise. During very moist, non-rainy conditions, such as heavy fog, the resulting small increase in the background noise levels is not expected to result in annoyance to adjacent residents.

Periodic maintenance activities, particularly vegetation management, would produce noise comparable to that of some phases of transmission line construction. This noise, particularly from bush-hogging or helicopter operation, would be loud enough to cause some annoyance. It would, however, be of very short duration and very infrequent occurrence.

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