

EAGLE CREEK 161-KV TRANSMISSION LINE

ENVIRONMENTAL ASSESSMENT

Calloway County, Kentucky and Henry 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
APE	Area of potential effect
ARAP	Aquatic Resource Alteration Permit
BMP	Best management practice or accepted construction practice designed to reduce environmental effects
CAA	Clean Air Act
CFR	Code of Federal Regulation
circuit	A section of conductors (three conductors per circuit) capable of carrying electricity to various points
conductors	Cables that carry electrical current
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
dB	Decibel
dBA	A-weighted decibel
DCH	Designated critical habitat
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
EIS	Environmental Impact Statement
EMF	Electromagnetic field
EPA	U.S. Environmental Protection Agency
endangered species	A species in danger of extinction throughout all or a significant part of its range
EO	Executive Order
ephemeral stream	Watercourses or ditches that only have water flowing after a rain event; also called a wet-weather conveyance
ESA	Endangered Species Act
extant	In existence; still existing; not destroyed or lost
feller-buncher	A piece of low-ground pressure 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
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
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
HUC	Hydrologic unit code
HUD	U.S. Department of Housing and Urban Development
IPaC	Information for Planning and Consultation database (USFWS)
KDOW	Kentucky Division of Water
kV	Symbol for kilovolt (1 kV equals 1,000 volts)
Ldn	Day-Night Sound Level
LiDAR	Light Detection and Ranging
load	That portion of the entire electric power in a network consumed within a given area; also synonymous with “demand” in a given area
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
NESC	National Electric Safety Code
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
O-SAR	TVA’s “office-level sensitive area review” process used to identify the need for site-specific field surveys and particular tool use when an area contains documented sensitive environmental resources or has the potential for the presence of such resources.
outage	An interruption of the electric power supply to a user
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 Office
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	Storm Water Pollution Prevention Plan
TDEC	Tennessee Department of Environment and Conservation
threatened species	A species likely to become endangered within the foreseeable future
TVA	Tennessee Valley Authority

TRAM	Tennessee Rapid Assessment Method, designed by the state of Tennessee to categorize wetland function
USACE	U.S. Army Corps of Engineers
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 ephemeral stream)

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CHAPTER 1 – PURPOSE AND NEED FOR ACTION

1.1 Proposed Action – Improve Power Supply

The Paris Board of Public Utilities (Paris BPU), a local power company (LPC) and distributor of Tennessee Valley Authority (TVA) power, plans to locate a new substation in Eagle Creek, Tennessee (Henry County). To provide power to the planned substation, as well as to support the growing electrical load and to increase power reliability in the Paris, Tennessee and Murray, Kentucky areas, TVA proposes to build approximately 16-miles of single-circuit transmission line utilizing steel-pole structures (Figure 1-1). The new transmission line would begin at TVA's Murray 161-kV Substation in Calloway County, Kentucky. It then extends southeast mostly parallel TVA's Marshall-Cumberland 500-kV Transmission Line, ending at the Paris BPU's planned Eagle Creek 161-kV Substation near Tennessee Highway 140 in Henry County.

TVA's proposed Eagle Creek 161-kV Transmission Line would parallel 14.5 miles of the existing Marshall-Cumberland Transmission Line. An additional 60-foot-wide section of right-of-way (ROW) would be required. The remaining 1.5 miles of the proposed transmission line would require a new 100-foot-wide ROW. A total of approximately 188 acres of new ROW and associated access roads would be required.

In addition, TVA would install a new switch house, two new breakers and associated relays at TVA's Murray 161-kV Substation. The existing switch house is owned by Paris BPU and does not have adequate space to accommodate TVA's new equipment. To accommodate the new switch house the fencing in the switchyard would be extended to encompass approximately 1.8 acres of the southeast corner of the substation property. TVA would also provide the standard metering package for Paris BPU to install at their planned Eagle Creek 161-kV Substation. The TVA map board display at TVA's System Operations Center and Regional Operations Center would be updated to reflect this work. The proposed in-service date for the proposed transmission line is October 2021.

1.2 Need for the Proposed Action

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

Currently, all Paris BPU's electrical load is served through their Paris 161-kV Substation, which utilizes a single, three-phase transformer to provide power across their transmission system. For back-up, there are four, single-phase transformers, which can be utilized if the single, three-phase transformer fails. However these four backup transformers are over 50 years old and have been out-of-service for more than 10 years. A failure at the Paris Substation could result in a significant outage until the three-phase transformer and other equipment was inspected/repaired.

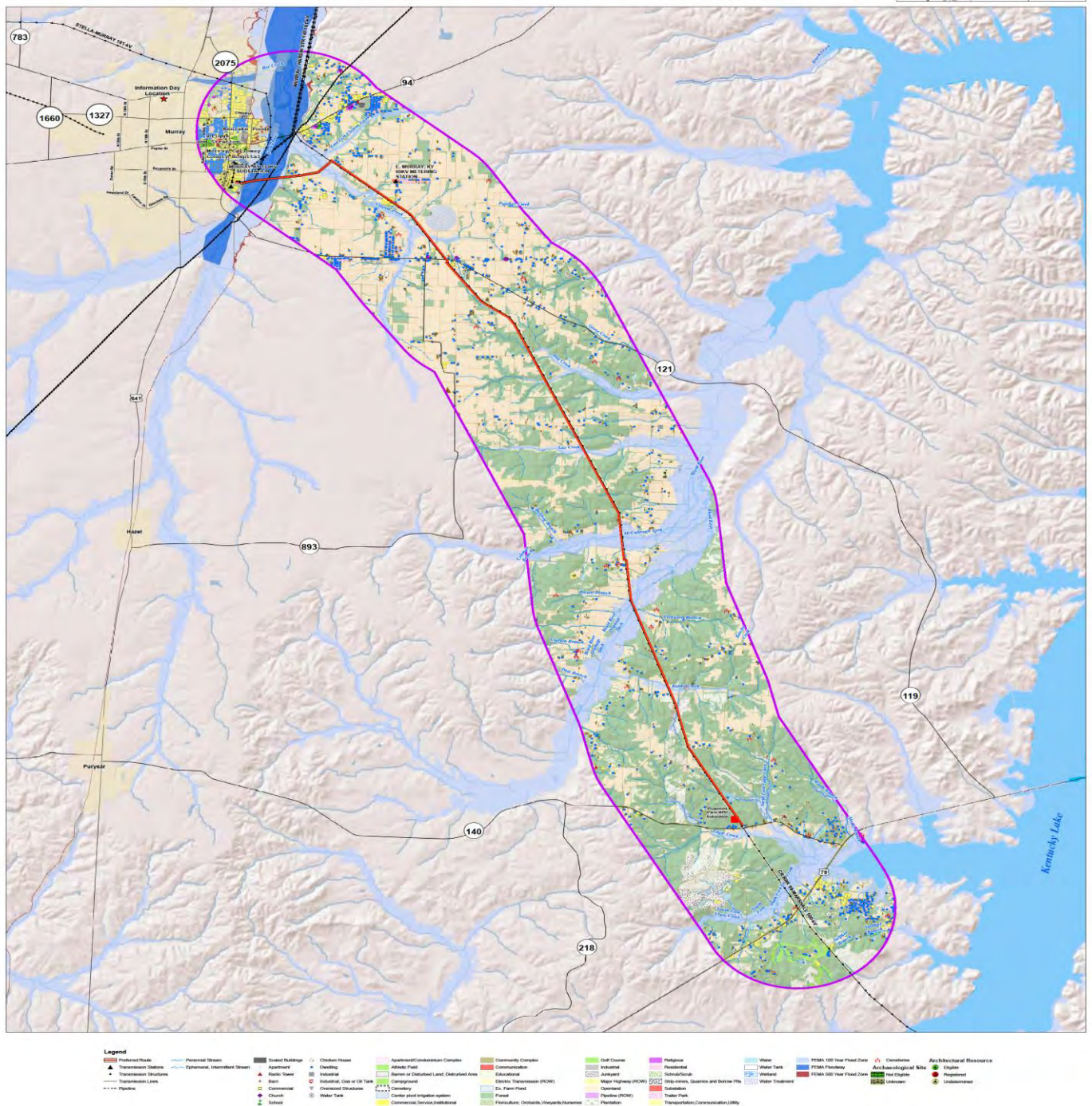


Figure 1-1. Proposed Eagle Creek 161-kV Transmission Line Location in Calloway County, Kentucky and Henry County, Tennessee

Slight load growth in the Kentucky Lake/Paris Landing portion of Paris BPU's service area along with the aging infrastructure currently in place has necessitated the need for improvements to the existing transmission system. Unless action is taken, the increasing power loads caused by commercial and residential growth in the project area would result in overloaded transformers and other electrical equipment damage or failure. Overloading a transmission line can cause alternating heating and cooling of the conductor material thus weakening the transmission line over time. Thermal overloading can also cause a transmission line to sag in excess of design criteria, resulting in inadequate clearance between the transmission line and the ground. If a transformer and/or transmission line fail, the result is a power outage.

To ensure the Calloway County, Kentucky and Henry County, Tennessee areas are supplied with a continuous, reliable source of electric power for its future load growth, TVA needs to provide a new electric service to Paris BPU's planned Eagle Creek Substation. The construction of a new transmission line would meet these needs by:

- Providing an updated reliable power supply to the Paris BPU service area; thus solving the overloading issues associated with the Paris 161-kV Substation.
- Allowing TVA to meet the reliability criteria established by the NERC.

1.3 Decisions to be Made

The primary decision before TVA is whether to construct a new 161-kV transmission line to provide a more reliable electric power source and to accommodate the load growth within Paris BPU's service area. If the proposed transmission line is to be built, other secondary decisions are involved. These include the following considerations:

- Timing of the proposed improvements;
- Most suitable route for a proposed transmission line; and
- 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 June 2019, TVA completed an Integrated Resource Plan (IRP) that provides direction for how TVA will reliably meet the long-term energy needs of the Tennessee Valley region (TVA 2019a). The IRP creates a more flexible power-generation system that can successfully integrate increasing amounts of renewable energy sources and distributed energy resources. This document and the associated Environmental Impact Statement (TVA 2019b) evaluate how TVA will provide low-cost, reliable and clean electricity; support environmental stewardship; and foster economic development in the Tennessee Valley for the next 20 years. It discusses ways that TVA can meet future electricity demand economically while supporting TVA's equally important mandates for environmental stewardship and economic development across the Valley. TVA released its Record of Decision in September 2019 (84 FR 48987).

In August 2019, TVA released the final Transmission System Vegetation Management Programmatic EIS (TVA 2019c). This programmatic level document encompassed ROW vegetation management across TVA's transmission system. Four alternatives were evaluated. TVA's preferred alternative (Alternative C) includes an initial re-clearing of

vegetation; thereafter, the full extent of the actively managed transmission ROW would be maintained in a meadow-like end-state. This alternative is considered to provide the best balance in enhancing system reliability and safety, minimization of environmental impacts, and cost effectiveness. Current vegetation management practices are restricted under an injunction order currently in place in the *Sherwood v. TVA* litigation under which TVA has stopped removing woody vegetation except for trees that are an immediate hazard (see Appendix A). TVA released its Record of Decision in October 2019 (84 FR 55995).

1.5 Scoping Process & Public and Agency Involvement

TVA contacted the following federal and state agencies, as well as federally recognized Indian tribes and other consulting parties, concerning the proposed action:

- Absentee Shawnee Tribe of Indians of Oklahoma
- Cherokee Nation
- Chickasaw Nation
- Delaware Nation
- Eastern Band of Cherokee Indians
- Eastern Shawnee Tribe of Oklahoma
- Jena Band of Choctaw Indians
- Kentucky State Historic Preservation Office (SHPO)
- Kialegee Tribal Town
- Shawnee Tribe
- Tennessee SHPO
- The Muscogee (Creek) Nation
- Thlopthlocco Tribal Town
- United Keetoowah Band of Cherokee Indians in Oklahoma
- U.S. Army Corps of Engineers (USACE)
- 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 proposed transmission line route and numerous feedback mechanisms for additional questions or information. TVA held an open house at Murray State University in Murray, Kentucky on June 21, 2018 to inform officials and the public of TVA's proposal and to seek public and agency input on the scope of the proposed transmission line. Eighty-two letters were sent to property owners in the area in invitation to the public information day. TVA also used local news outlets and notices placed in local newspapers to notify other interested members of the public. The open house was attended by 42 people.

At the open house, TVA presented maps with the proposed transmission line route (see Figure 1-1). There was only one alternative route identified due to TVA's ability to utilize an existing TVA transmission line ROW corridor between the planned substation and the power source (Murray 161-kV Substation). Larger scale tax maps were located throughout the meeting-space to allow attendees to review specific locations and properties within the project area. A variety of TVA personnel were in attendance to answer questions about the project ranging from details concerning new transmission line easement purchase process, as well as the construction of the proposed transmission line route. A summary of the proposed transmission line route was given to participants along with a toll-free phone number, facsimile number, and an email address to facilitate additional questions.

A variety of interests were expressed by those who attended the open house including the effects of the proposed transmission line to the individual landowners, including impacts on development and/or property values. Some individuals also questioned the need for the project. Landowners also voiced concerns relative to impacts of the proposed transmission line on public health, visual quality, and natural, historical, and cultural resources.

TVA announced the proposed transmission line route as preferred to the public in February 2019 (see Figure 1-1). Letters were sent to affected property owners and information was provided to the public through TVA's website.

1.6 Issues to be Addressed

TVA prepared this environmental assessment (EA) to comply with the National Environmental Policy Act (NEPA) and regulations promulgated by the Council of Environmental Quality and TVA to implement NEPA (TVA 1983). The EA investigates the construction, operation, and maintenance of a new Eagle Creek 161-kV Transmission Line, including the purchase of transmission line ROW easements, comparing the impacts of those actions to the No Action alternative.

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, noise, and odors)
- Archaeological and historic resources
- Land use
- Recreation, parks, and managed areas
- Socioeconomics and environmental justice

Potential effects on health and safety were considered in conjunction with related resource assessments included within this EA for resources such as water quality, environmental justice, transportation, and transmission line post-construction effects.

The early internal review process also considered the potential effects related to air quality/global climate change and for solid and hazardous waste. 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.

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 as amended by 13751 (Invasive Species), and applicable laws including the Farmland Protection Policy Act, the National Historic Preservation Act (NHPA), the Endangered Species Act (ESA) as amended, the Clean Air Act (CAA), and the Clean Water Act (CWA).

1.7 Necessary Permits and Licenses

Permits would be required from the States of Tennessee and Kentucky and/or the local municipality for the discharge of construction site storm water associated with the construction of the transmission line. TVA would prepare the required erosion and sedimentation control plans and coordinate them with the appropriate state and local authorities. A permit may also be required if removed trees or other vegetation are disposed of through burning during construction of the proposed transmission line. A Section 401 Water Quality Certification 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 United States. A permit would be obtained from Tennessee and Kentucky Departments of Transportation for any modification or crossing of state highways or federal interstates during transmission line construction. A general permit for application of pesticides, as part of construction or maintenance activities, would be obtained from both the Kentucky Department of Environmental Quality and the Tennessee Department of Environment and Conservation (TDEC). Correspondence received from agencies related to these and other approvals is included in Appendix B.

CHAPTER 2 – ALTERNATIVES INCLUDING THE PROPOSED ACTION

As described in Chapter 1, TVA proposes to build the approximate 16-mile Eagle Creek 161-kV Transmission Line to power the new Paris BPU's Eagle Creek Substation. A description of the proposed action is provided below in Section 2.1.2. Additional background information about the construction, operation, and maintenance of a transmission line is also provided in Appendix C and would be applicable if TVA undertakes the proposed action.

This chapter has five major sections:

1. A description of alternatives;
2. An explanation of the transmission line siting process;
3. A comparison of anticipated environmental effects by alternative;
4. Identification of mitigation measures; and
5. Identification of the preferred alternative.

2.1 Alternatives

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

2.1.1 Alternative A: The No Action Alternative

Under Alternative A, TVA would not construct the proposed 161-kV transmission line. As a result, the TVA power system within the Henry County, Tennessee and Calloway County, Kentucky areas would continue to operate under the current conditions, increasing the risk of voltage and thermal loading problems, loss of service, and occurrences of violations to NERC reliability criteria. TVA's ability to provide reliable service within the TVA Power Service Area would be jeopardized, which would not support TVA's overall mission.

Considering TVA's obligation to provide reliable electric service and support economic development within the Valley, TVA has determined 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 Alternative B: TVA Provides a Power Supply to the Paris Board of Public Utilities Eagle Creek 161-kV Substation

Under Alternative B, TVA would construct, operate, and maintain an approximate 16-mile single-circuit transmission line to power Paris BPU's new Eagle Creek 161-kV Substation. The proposed transmission line would cross through Henry County, Tennessee, and Calloway County, Kentucky, and would utilize a combination of new and existing ROW. An approximate 14.5-mile section of the transmission line would be located adjacent to TVA's Marshall-Cumberland 500-kV Transmission Line. This section would utilize both existing

ROW and new ROW (60-foot-wide). The remaining 1.5-mile section of new transmission line would be centered on new 100-foot-wide ROW.

In addition to the proposed transmission line, TVA would install a new switch house, two breakers and associated relays at TVA's Murray 161-kV Substation. The existing switch house is owned by Paris BPU and does not have adequate space to accommodate TVA's new equipment. The fencing in the switchyard would be extended to encompass approximately 1.8 acres of the southeast corner of the substation property to accommodate the new switch house. TVA would also provide the standard metering package for Paris BPU to install at their new Eagle Creek 161-kV Substation. The TVA map board displays would be updated to reflect the new transmission assets.

Additional information describing implementation of the proposed Action Alternative and how the Eagle Creek 161-kV Transmission Line route was determined is provided below in Section 2.2.

The general steps and processes TVA utilizes when planning, siting, constructing, operating and maintaining its transmission system are well-established. TVA has developed and follows standard procedures and guidance documents to avoid, minimize and mitigate impacts. In addition to project specific siting information found below, many of these standard procedures and guidelines can be found on TVA's Transmission website (TVA 2020). Supplementary descriptive information pertaining to the implementation of the proposed Action Alternative can be found in Appendix C, including siting, construction, operation, and maintenance of transmission lines, access roads, and construction assembly areas.

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 options would not meet the project needs.

2.1.3.1 Upgrade Existing Paris Board of Public Utilities Facilities and Distribution Lines

Under this alternative, Paris BPU would upgrade their existing Paris 161-kV Substation by installing a new transformer along with a new bay and breaker. Additionally, Paris BPU would need to construct approximately 30 miles of new 69-kV transmission line and rebuild/reconductor portions of their existing transmission line distribution system. These upgrades would require extensive electrical system outages resulting in the loss of power to customers for long periods of time.

Implementation of this alternative would resolve the maintenance and reliability concern, but not to the extent of the Action Alternative (Alternative B). Additionally, the cost of this alternative was more than double that of Alternative B. For these reasons, as well as the direct and indirect impacts that would occur to customers as a result of the loss of power, this option was eliminated from further consideration.

2.1.3.2 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.

Although power lines can be buried, most buried transmission lines tend to be low-voltage distribution lines (power 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.

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, special construction methods/equipment that are highly intrusive to the landscape must be used to protect the buried transmission lines from flooding, which could cause an outage. High-voltage underground cables typically require the use of an underground vault that would require extensive excavation along the entire transmission line route for initial installation and would also require excavation to make repairs in the event of a cable fault. Locating an electrical fault in a buried cable can be time consuming and is often exacerbated by the need to perform excavation to locate the damaged section. Roadways and water bodies also increase the difficulties of locating faults, since the cables would be buried under roadways and streams. These issues make the installation of high-voltage underground cables cost prohibitive and impractical.

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 Siting Process

The process of siting the proposed transmission line to supply Paris PBU's new Eagle Creek Substation followed TVA's guidelines as described in Appendix C.

2.2.1 Description of the Study Area

The study area was determined primarily by the geographic boundaries of highways, existing power system assets, and river features (see Figure 1-1). The study area encompasses a total land area of approximately 57 square miles and is located in Henry County, Tennessee and Calloway County, Kentucky. The study area limits are defined by the Paris PBU's new Eagle Creek Substation site to the south and TVA's Murray Substation to the north.

Paris PBU's new substation site is located in the Paris Landing area of Tennessee, just north of State Highway 140. The northern project boundary is represented by TVA's Murray

Substation as a power supply and is located in the southern portion of the city of Murray, KY. This boundary allowed a potential route to be developed away from the densely developed residential areas of the city of Murray, Kentucky. By utilizing the Murray Substation, approximately 14.5 miles of the 16-mile proposed route would be able to utilize a portion of TVA's Marshall-Cumberland 500-kV Transmission Line ROW.

In general the land is mostly hilly terrain. The study area is rural, with forestland and pasture, and mostly larger tracts of land. The agricultural farmland is a mix of both commercial farming (corn, soybeans, and cotton) and pasture used for cattle. Residential homes tend to be built up along the county roads in the area. Several of the parcels affected by the proposed project do not have homes on them. The Upper Clarks, Blood River, and Tennessee River watersheds all lie within the boundary surrounding the existing TVA transmission line.

2.2.2 Structures and Conductors

Most of the proposed 16-mile transmission line would utilize single-steel pole structures (see Figure 2-1). Additionally, three-pole steel structures would be needed to facilitate the proposed 161-kV transmission line crossing under the existing Marshall-Cumberland 500-kV Transmission Line (Figures 2-2). Structure heights would vary according to the terrain, but would range between 70 to 130 feet above ground for the single-pole structures and 50 to 65 feet for the three-pole structures.



Figure 2-1. Typical Single-Circuit Steel-Pole Transmission Line Structure



Figure 2-2. Typical Single-Circuit Steel Three-Pole Transmission Line Structure

2.2.3 Identification of the Preferred Transmission Line Route

TVA's existing Marshall-Cumberland 500-kV Transmission Line and Murray Substation are within close proximity to the Paris BPU's planned Eagle Creek Substation. The location of the existing transmission line corridor would allow for a direct transmission line path between the two substations (see Figure 1-1). As such, only one alternative route was identified. Because the existing transmission line corridor is already established, TVA would be able to parallel the existing transmission line and utilize a portion of this existing ROW thus greatly minimizing the amount of new ROW needed for the proposed delivery point. This 14.5-mile section of the proposed transmission line would require an additional 60-foot-wide easement. In addition, approximately 1.5 miles of new 100-foot-wide ROW would be required to connect the existing corridor to the Murray Substation. The 1.5-mile proposed transmission line section between the Murray Substation and the existing TVA transmission line is within an area of rather large parcels of farmland.

2.3 Comparison of Environmental Effects by Alternative

A summary of the anticipated potential effects of implementing the No Action Alternative or the Action Alternative is provided in Table 2-1.

Table 2-1. Summary and Comparison of Alternatives by Resource Area

Resource Area	Impacts from Implementing the No Action Alternative	Impacts from Implementing the Action Alternative
Air Quality	No effects to air quality are anticipated.	Fugitive dust produced from construction activities would be temporary and controlled by BMPs. Infrequent use of diesel engines during construction and ROW maintenance activities would have <i>de minimis</i> impacts and not lead to exceedance or violation of any applicable air quality standard. Therefore, impacts to air quality would be minor and would not result in significant impacts.
Groundwater and Geology	No effects to local groundwater quality or quantity are expected.	Impacts to groundwater quality or quantity are anticipated to be insignificant.
Surface Water	No changes in local surface water quality are anticipated.	Proper implementation of BMPs and mitigation measures identified in the permitting process are expected to result in only minor and insignificant impacts to surface waters.
Aquatic Ecology	Aquatic life in local streams would not be affected.	With the proper implementation of BMPs, specifications identified by the categories of protection, and mitigation measures identified in the permitting process, effects to aquatic life in local surface waters are expected to be minor and insignificant.
Vegetation	Local vegetation would not be affected along the proposed transmission line ROW. Routine maintenance of existing transmission line vegetation would continue, but overall impacts to vegetation are considered minor.	There would be substantial direct long-term effects to approximately 60 acres of forest habitat which would be converted and maintained as low-growing habitat along the transmission line ROW. With implementation of mitigation commitments, project-related effects would not significantly affect the terrestrial plant ecology of the region.
Wildlife	Local wildlife would not be affected along the proposed transmission line ROW. Routine maintenance of existing transmission line vegetation would continue, but overall impacts to wildlife are considered minor.	Wildlife inhabiting onsite forest, prairie, early successional, and edge habitats along the proposed transmission line ROW would be displaced. Because there are sufficient adjacent local habitats, any effects to wildlife are expected to be minor and insignificant.

Resource Area	Impacts from Implementing the No Action Alternative	Impacts from Implementing the Action Alternative
Endangered and Threatened Species	No effects to endangered or threatened species or any designated critical habitats (DCH) would occur. Routine maintenance of existing transmission line vegetation would continue, but overall impacts to endangered or threatened species would be avoided.	<p>The permanent removal of state-listed Nuttall's oak trees would be insignificant because of the relatively small size of the populations.</p> <p>Tree clearing in the transmission line ROW would remove about 34.7 acres of potentially suitable summer roosting habitat for the federally threatened Indiana and northern long-eared bats. To remove any potential for direct effects to these bat species, TVA would follow the guidelines in its programmatic biological assessment for bats (TVA 2017c).</p> <p>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, the proposed TVA action is expected to have only minor and insignificant effects on federally or state-listed species.</p>
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.
Wetlands	No changes in local wetland extent or function are expected.	Long-term wetland impacts would occur associated with the clearing of a 09.35-acres of forested/scrub-shrub wetland that would be maintained in a meadow-like habitat. Temporary wetland impacts associated with vehicular access along the transmission line ROW would occur to 14.63 acres of additional wetland. With the implementation BMPs and minimization and mitigation measures, there would be no significant impacts.
Visual Resources	Aesthetic character of the area is expected to remain virtually unchanged.	Minor, temporary visual impacts would occur during construction activities. The proposed transmission line would present a minor, long-term visual effect.
Archaeological and Historic Resources	No effects to archaeological or historic resources are anticipated.	TVA determined, in consultation with the Kentucky SHPO, Tennessee SHPO and federally recognized Indian tribes, that no historic properties would be affected by the proposed transmission line. Kentucky SHPO, Tennessee SHPO and tribal comments provided concurrence on the finding of "no historic properties adversely affected". Thus, TVA finds that the proposed undertaking would result in no adverse effects on historic properties.

Resource Area	Impacts from Implementing the No Action Alternative	Impacts from Implementing the Action Alternative
Recreation, Parks, and Natural Areas	No changes in local recreation opportunities or natural areas are expected.	Some minor, temporary shifts in dispersed outdoor recreation in or immediately adjacent could occur during construction. There would be no direct or indirect impacts to natural areas and parks from construction or operation of the proposed transmission line and associated access roads.
Socioeconomics and Environmental Justice	Changes to economics within the project area would continue to follow current trends as the population changes. However, no additional changes to economic conditions in the project area would occur as a result of TVA actions.	There would be minor temporary increases to the local economy during construction of the transmission line. The increased capacity and reliable power supply would support future development opportunities and could result in long-term indirect economic benefits to the area. No long-term impacts to community services are anticipated and there would be no disproportionate impacts to low-income or minority communities in the area.
Transmission Line Post-Construction	There would be no new transmission line constructed, therefore no impacts.	Public exposure to EMFs would be minimal, and no significant impacts from EMFs are anticipated. NESC standards are strictly followed when installing, repairing, or upgrading TVA transmission lines or equipment. Therefore, touching a structure supporting a transmission line poses no inherent shock hazard. The proposed structures do not pose any significant physical danger.

2.4 Identification of Mitigation Measures

TVA employs standard practices when constructing, operating, and maintaining transmission lines, structures, and the associated ROW and access roads. These can be found on TVA's transmission website, <https://www.tva.com/Energy/Transmission-System> (TVA 2020). 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 line, and access roads are as follows:

- TVA would utilize standard BMPs, as described in the BMP manual (TVA 2017a), to minimize erosion during construction, operation, and maintenance activities.
- All flows from impervious surfaces would be properly treated with either implementation of the proper BMPs or an engineered discharge drainage system that could handle any increased flows prior to discharge into the outfall(s).
- Portable toilets provided for the construction workforce 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.
- 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 manual (TVA 2017a).

- Ephemeral streams that could be affected by the proposed construction would be protected by implementing standard BMPs as identified in the BMP manual (TVA 2017a).
- Perennial and intermittent streams would be protected by the implementation of standard stream protection (Category A) as defined in the BMP manual (TVA 2017a).
- Conservation measures and BMPs as listed in the TVA Bat Strategy Project Screening Form would be implemented.
- During vegetation clearing activities, 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 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 2019c), and the BMP manual (TVA 2017a) 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, 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.
- TVA would incorporate the mapped wetlands into O-SAR to ensure wetland BMPs are implemented during future ROW vegetation maintenance activities within the delineated wetland boundaries (TVA 2019b).
- To minimize impacts to wetlands, TVA would implement standard BMPs across all delineated wetlands (TVA 2017a). This includes the use of low ground-pressure equipment, mats, no rutting greater than 12 inches, dry season work, etc. for access across three delineated wetlands along the proposed transmission line ROW.
- To minimize adverse impacts on natural and beneficial floodplain values, the following standard mitigation measures would be implemented:
 - BMPs would be used during construction activities (TVA 2017a).
 - Construction would adhere to the TVA subclass review criteria for transmission line location in floodplains.
 - Road construction and/or improvements outside the Clarks River floodway would be done in such a manner that upstream flood elevations would not be increased by more than one foot.
 - Any fill, gravel or other modifications in the Clarks River floodway that extend above the pre-construction road grade would be removed after completion of the project; would have excess material spoiled outside of the published floodway, and the area would be returned to its pre-construction condition.

- 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 U.S. Environmental Protection Agency (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.
- Any lead pins removed from the retired insulators would be handled according to TVA's Environmental Protection Procedures (TVA 2019c).

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

- To prevent the spread of five-leaf akebia, TVA would remove five-leaf akebia from the ROW. TVA's ROW Forester or Environmental Technician would contact the TVA botanist before and after construction to coordinate application of aquatic approved herbicides to five-leaf akebia vines in the proposed project area during the growing season.
- A protective buffer of 200-foot-radius would be implemented during transmission line construction and maintenance activities around the opening of a possible cave observed in the existing transmission line ROW to prevent vehicle use outside of access roads, herbicide use, and heavy machinery operation.
- During revegetation and maintenance activities along the ROW, no herbicides with groundwater contamination warnings would be used within the State Designated Source Water Protection Area as identified in the office level sensitive area review database (O-SAR).
- TVA would establish a 100-foot protective buffer around the Macedonia Cemetery (15Cw325) for future transmission line maintenance activities. TVA would implement the following restrictions within the buffer area:
 - No new construction or ground disturbance.
 - All vegetation clearing and removal would be carried out by hand and conducted in a manner as to insure no damage to any grave markers or monuments.

2.5 The Preferred Alternative

Alternative B—TVA Provides a Power Supply to the Paris Board of Public Utilities Eagle Creek 161-kV Substation—is TVA's preferred alternative for this proposed project. TVA would purchase ROW easements to accommodate the construction of a new 16-mile 161-kV transmission line.

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 proposed 16-mile transmission line, and access roads is described in this chapter. The descriptions below of the potentially affected environment are based on field surveys conducted between October 2019, 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. Cumulative effects are discussed, as appropriate and necessary, in Section 3.18.

The analysis of potential effects to endangered and threatened species and their habitats included records of occurrence within a three-mile radius for terrestrial animals, a five-mile radius for plants, and within a 10-digit hydrologic unit code¹ (HUC) watershed 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 for archaeological resources is the ROW width for the proposed transmission line route and access roads.

Potential effects related to climate change, public health and safety, and to hazardous and nonhazardous wastes were also considered and are discussed as appropriate in various sections of this EA. However, because of the nature of the action and measures in place dictated by standard operating procedures, the potential for effects to these resources is extremely low. Thus, potential effects to these resources were not analyzed in detail.

3.1 Groundwater and Geology

3.1.1 Affected Environment

The project area is located in the Mississippi Embayment Physiographic Province and according to available mapping is primarily underlain by Quaternary age continental deposits. These sedimentary units are comprised primarily of irregular bedded silt and sand units which were formed by deposition of alluvial sediments in the Mississippi embayment. Coastal Plain sedimentary rocks of this age crop out mostly in off-lapping bands that parallel the perimeter of the Mississippi embayment and dip gently southward toward its axis. The entire Coastal Plain sequence thickens greatly toward the axis of the Mississippi Embayment and the Gulf Coast Geosyncline. There are no significant carbonate rock units contained in these sequences therefore the development of karstic features is very remote.

¹ The U.S. is divided and subdivided into hydrologic units by the U.S. Geological Survey. There are six levels of classification. A 10-digit HUC is the fifth (watershed) level of classification.

According to available information the project area primarily overlies the McNairy-Nacatoch aquifer. These units are components of the Mississippi embayment aquifer system which is the primary water producing aquifer in the region. The water bearing aquifers consists of an interbedded mix of fluvial sand, silt, and clay which are confined by a sequence of clay and marl. These fine grained sediments effectively separate the water bearing units from the overlying rocks of the Mississippi embayment aquifer system (Renken 1998).

Groundwater is abundant throughout the Mississippi embayment. In the project area, public and private wells pump water from several aquifers. Deep wells are used to supply public water systems from deeper aquifers while private wells are usually cased in shallow aquifers. Contamination of groundwater occurs when contaminants such as pesticides and fertilizers from agriculture runoff seep into the aquifer. Most public water sources are protected from contamination due to the depth of the wells which are naturally protected by overlying clay (confining) layers. Groundwater is the primary source for public water supply in the project area (EPA 2019). Several Source Water Protection Areas for public supply wells appear to be located near the proposed transmission Line ROW (MDEQ 2019).

3.1.2 Environmental Consequences

3.1.2.1 Alternative A – The No Action Alternative

Because construction, operation, and maintenance of the proposed project components would not occur under the No Action Alternative, no impacts to groundwater and geologic resources in the project area would occur as a result of TVA actions associated with the proposed project.

3.1.2.2 Alternative B – TVA Provides a Power Supply to the Paris Board of Public Utilities Eagle Creek 161-kV Substation

Under Alternative B, construction of the proposed transmission line would include ground disturbing activities. However, no impacts to geologic resources are anticipated.

Part of the proposed ROW is located near State Designated Source Water Protection Areas for public water supply. TVA would add the location of the State Designated Source Water Protection Area to the O-SAR database. A majority of the project area is underlain by an aquitard which acts as a confining unit by separating the surface area from the aquifers below. This confining unit should provide adequate protection from potential groundwater contamination. However, during revegetation and maintenance activities, herbicides with groundwater contamination warnings would not be used and the use of fertilizers and herbicides would be considered with caution before application and applied according to the manufacturer's label. Best Management Practices (BMPs) as described in *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority* (TVA 2017) would be used to avoid contamination of groundwater in the project area. BMPs for herbicide and fertilizer application would be used and would prevent impacts to groundwater. BMPs would be used to control sediment infiltration from stormwater runoff. With the use of BMPs, impacts to groundwater from the proposed action would be insignificant. No cumulative impacts are anticipated.

3.2 Surface Water

3.2.1 Affected Environment

This proposed project is located within Calloway County, Kentucky and Henry County, Tennessee. The project area drains within the Upper Clarks River (0604000601), Blood River (0604000508), and Tennessee River (0604000509) 10-digit HUC watersheds.

Field and desktop surveys resulted in the identification of a total of 81 aquatic features within the project area. These features included 11 perennial, 17 intermittent, four ponds and 49 ephemeral/wet-weather conveyances (WWCs) streams. The surface water streams in the project area and the vicinity of this project are listed in Table 3-1 and Appendix D.

Precipitation in the general area of the proposed project averages about 56 inches per year. The wettest month is May with approximately 5.8 inches of precipitation, and the driest month is August with 3.5 inches. The average annual air temperature is 59 degrees Fahrenheit, ranging from a monthly average of 49 degrees Fahrenheit to 69 degrees Fahrenheit (US Climate Data 2019). Stream flow varies with rainfall and averages about 20.81 inches of runoff per year (i.e., approximately 1.53 cubic feet per second, per square mile of drainage area) (USGS 2008).

The federal Clean Water Act requires all states to identify all waters where 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. 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.

Rabbit Creek is currently listed as impaired for alteration in stream-side or littoral vegetative covers due to grazing in riparian or shoreline zones. The Blood River is also listed for physical substrate habitat alterations due to non-irrigated crop production and channelization. Table 3-1 provides a listing of local streams with their state (TDEC 2013) designated uses.

Table 3-1. Designations for Streams in the Vicinity of the Proposed Eagle Creek Transmission Line in Tennessee

Stream	Use Classification ¹						
	NAV	DOM	IWS	FAL	REC	LWW	IRR
<u>Blood River Drainage Ditch</u>				X	X	X	X
Bryant Branch				X	X	X	X
Ferguson and Tributaries				X	X	X	X
Rabbit Creek				X	X	X	X
Eagle Creek and Tributaries				X	X	X	X

¹ Codes: DOM = Domestic Water Supply; IWS = Industrial Water Supply; FAL = Fish and Aquatic Life; REC = Recreation; LWW = Livestock Watering and Wildlife; IRR = Irrigation; NAV = Navigation

Portions of Clarks River are listed on the KY 303(d) list for unknown cause for impairment due to unknown source discharges (Kentucky Division of Water [KDOW] 2016). Clayton Creek is listed as impaired for sedimentation/siltation due to loss of riparian habitat and agriculture; total phosphorus due to agriculture; cause unknown due to source unknown; and nutrient/eutrophication biological indicators due to agriculture and rural areas. Non-irrigated crop production, and grazing in riparian or shoreline zones and also for nutrient/eutrophication biological indicator due to loss of riparian habitat, non-irrigated crop production, agriculture. Table 3-2 provides a listing of local streams with their state (KDOW 2013) designated uses. Streams are also designated as High Quality Waters of the State when they are not listed on the 303d list as impaired or when they are not designated as Outstanding National Resource Waters or Exceptional Waters.

Table 3-2. Designations for Streams in the Vicinity of the Proposed Eagle Creek Transmission Line in Kentucky

Stream	Use Classification ¹					
	WAH	CAH	PCR	SCR	DWS	OSRW
<u>Blood River Drainage Ditch</u>	X		X	X		X
Bryant Branch	X		X	X		X
Ferguson and Tributaries	X		X		X	
Rabbit Creek	X		X		X	
Eagle Creek and Tributaries	X		X		X	

¹ Codes: DWS = Domestic Water Supply; WAH= Warm Water Aquatic Habitat; CAH = Cold Water Aquatic Habitat; PCR = Primary Contact Recreation; SCR = Secondary Contact Recreation; DWS = Domestic Water Supply, OSRW = Outstanding State Resource Water

3.2.2 Environmental Consequences

3.2.2.1 Alternative A – The No Action Alternative

Under the No Action Alternative, the proposed transmission line and switch house would not be constructed, operated, or maintained. Consequently, no impacts to surface water systems would occur in the project area as a result of TVA actions associated with the proposed project.

3.2.2.2 Alternative B – TVA Provides a Power Supply to the Paris Board of Public Utilities Eagle Creek 161-kV Substation

3.2.2.2.1 Surface Runoff

Construction activities have the potential to temporarily affect surface water via storm water runoff. Soil erosion and sedimentation can clog small streams and threaten aquatic life. TVA would comply with all appropriate state and federal permit requirements. Appropriate BMPs would be followed, and all proposed project activities would be conducted in a manner to ensure that waste materials are contained, and the introduction of pollution materials to the receiving waters would be minimized.

In Tennessee, a storm water construction permit would be required if the project disturbs more than one acre. This permit would require a Storm Water Pollution Prevention Plan (SWPPP) that would detail sediment and erosion control features and practices. Additionally all stream crossings may require an Aquatic Resource Alteration Permit (ARAP)/401 Water quality Certification and a 404 USACE permit. These extra measures are detailed in the 2016 TDEC construction storm water general permit and may be included in any ARAP permit/USACE permit acquired. The SWPPP would identify specific BMPs to address construction-related activities that would be adopted to minimize storm water impacts.

In Kentucky, a storm water construction permit would be required if the project disturbs more than one acre. This permit would require a Best Management Practices Plan (BMP) that would detail sediment and erosion control features and practices. Additionally, all stream crossings may require a 401 Water quality Certification and a 404 USACE nationwide or individual permit. No commitments beyond standard TVA requirements—i.e., compliance with all applicable environmental laws and regulations, proper implementation of BMPs and best engineering practices, and proper containment/treatment/disposal of wastewaters, storm water runoff, wastes, and potential pollutants. The BMP plan would identify specific BMPs to address construction-related activities that would be adopted to minimize storm water impacts.

Additionally, BMPs, as described in the Tennessee Erosion and Sediment Control Handbook (TDEC 2012), Stormwater Best Management Practices for Controlling Erosion, Sediment and Pollution Runoff from Construction sites (KDEP 2009) and *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority* (TVA 2017) would be used to avoid contamination of surface water in the project area. Proper implementation of these controls would be expected to result in only minor, temporary impacts to surface waters. See the Section 3.3 for buffer zone sizes and additional stream crossing details.

Additionally, impervious buildings and infrastructure prevent rain from percolating through the soil and result in additional runoff of water and pollutants into storm drains, ditches, and streams. This project would increase impervious flows in the area. All flows would be properly treated with either implementation of the proper 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

Portable toilets would be provided for the construction workforce as needed. These toilets 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 managed using 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 as described in TVA 2017a. 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.

3.2.2.2.4 Transmission Line Maintenance

ROW maintenance would take place periodically to ensure that vegetation does not become a fire hazard, nor does it have the potential to interrupt electrical service. This maintenance could incorporate various manual, mechanical or chemical means of controlling vegetative growth. Primarily this work is done on the surface, where vegetation is cut and stumps are left in place. As this work does not include earthwork the impacts to surface waters would be expected to be minor and temporary.

Improper use of herbicides to control vegetation 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 impacts surface waters. No cumulative impacts are anticipated.

3.3 Aquatic Ecology

3.3.1 Affected Environment

As previously discussed in Section 3.2, a total of 81 watercourse intersections, including 11 perennial, 17 intermittent, four ponds and 49 ephemeral/WWCs streams, occur along the proposed 16-mile transmission line route within the ROW. The proposed ROW is located within portions of the Interior Plateau and Mississippi Valley Loess Plains ecoregion. Streams encountered along the ROW were typical of streams within the Upper Clarks River, Blood River, and Tennessee River watersheds.

Because transmission line construction and maintenance activities primarily affect riparian conditions and instream habitat, TVA evaluated the condition of these resources at each stream crossing along the proposed transmission line route (Table 3-3). Riparian condition along the transmission line route was evaluated in field surveys conducted in October 2019 using the TDEC Hydrologic Determination Field Data form. A listing of stream crossings in the project area, excluding ephemeral/WWCs, is provided in Appendix D. Additional information regarding watercourses in the vicinity of the project area can be found in Section 3.2.

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

- **Forested** – Riparian area is fully 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 or 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 Located Along the Proposed Transmission Line Route

Riparian Condition	# Perennial Streams	# Intermittent Streams	Total
Forested	2	6	8
Partially forested	2	7	9
Non-forested	7	4	11
Total	11	17	28

TVA then assigns appropriate SMZs and BMPs based on these evaluations and other considerations (such as State 303(d) listing and presence of endangered or threatened aquatic species) (TVA 2017a). Appropriate application of the BMPs minimizes the potential for impacts to water quality and instream habitat for aquatic organisms.

3.3.2 Environmental Consequences

3.3.2.1 Alternative A – The No Action Alternative

Under the No Action Alternative, construction, operation, and maintenance of the proposed project components would not occur. Changes to aquatic ecology would likely occur within the watershed over the long term due to factors such as the continuation of agricultural activities and population growth. However, no impacts to aquatic ecology would occur as a result of TVA's proposed project.

3.3.2.2 Alternative B – TVA Provides a Power Supply to the Paris Board of Public Utilities Eagle Creek 161-kV Substation

Aquatic ecology could be affected by the proposed action. 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 along the transmission line corridor. 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 fish and mussel species (Brim Box and Mossa 1999; Sutherland et al. 2002).

Watercourses that convey only surface water during storm events such as ephemeral streams/WWCs and could be affected by the proposed transmission line route would be protected by standard BMPs outlined in TVA (2017b). These BMPs are designed in part to minimize disturbance of riparian areas, and subsequent erosion and sedimentation that can be carried to streams. TVA also provides additional categories of protection to watercourses 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 D). The width of the SMZs is determined by the type of watercourse, primary use of the water resource, topography, or other physical barriers (TVA 2017b).

Applicable ARAP and USACE 404 Permits would be obtained for any stream alterations located within the project area and the terms and conditions of these permits would also be followed.

A total of 25 Standard Stream Protection (Category A), as defined in TVA (2017) SMZs, were assigned for perennial and intermittent streams and an additional four Category A SMZs for ponds (Appendix D). This standard (basic) level of protection for streams and the habitats around them is to minimize the amount and length of disturbance to the water bodies without causing adverse impacts on the construction work. With the implementation of BMPs, adhering to specifications as defined in the categories of protection, and following terms and conditions in applicable permits, effects to aquatic life in local surface waters are expected to be minor and insignificant.

3.4 Vegetation

3.4.1 Affected Environment

All of the proposed new transmission line and about one fourth of the ROW proposed for widening occurs in the Loess Plains Level IV ecoregion. The remaining three fourths of the rebuild would occur in the Western Highland Rim Level IV ecoregion. The Loess Plains ecoregion is comprised of gently undulating uplands, broad bottomlands, and terraces. It is covered by thick loess and alluvium and is underlain by weak, unconsolidated coastal plain sediments. Potential natural vegetation is a mixture of oak-hickory forest, bluestem prairie, and forested wetlands. Most of the original vegetation has been converted to agricultural use. The Western Highland Rim ecoregion is hillier than the Loess Plains ecoregion. Ridges and hills are often capped by cherty gravels and veneered by thin loess. Karst valleys underlain by limestone can also occur. Like the Loess Plains, potential natural vegetation is oak-hickory forest, but the ecoregion lacks bluestem prairies. Current land cover is a mixture of cropland, deciduous forest, pasture, and some pine plantations (Woods et al. 2002).

October and December 2019 field surveys of the project area were focused on documenting plant communities, infestations of invasive plants, and to search for possible threatened and endangered plant species. All areas along the proposed new ROW and within the ROW proposed for widening 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, evergreen, mixed evergreen-deciduous forest, and herbaceous vegetation. No forested areas in the proposed project area had structural characteristics indicative of old growth forest stands (Leverett 1996). The plant communities observed on-site are common and well represented throughout the region. Vegetation in the proposed new transmission line and existing ROW are characterized by two main types: forest (30 percent) and herbaceous (70 percent). The

entire habitat in the existing ROW is mowed fields, grazed pastures, and row crops. The majority of the transmission line ROW to be widened is situated adjacent to forest with mature, large overstory trees averaging 24 inches diameter at breast height (dbh). These stands have well-developed canopy, understory, and herbaceous layer and very little non-native invasive plant species. Other portions of the proposed transmission line cross herbaceous fields, row crops, and pastures with small fragmented forested islands of smaller overstory trees averaging 18 inches dbh.

Deciduous forest, where deciduous trees account for more than 75 percent of total canopy cover, is the most common forest type and constitutes about 97 percent of the total forest cover in the proposed project area. Deciduous forests are dominated by a variety of tree species including American beech, American elm, American sycamore, black cherry, black gum, black walnut, boxelder, hickories (bitternut, mockernut, pignut, and shagbark), northern hackberry, oaks (black, blackjack, cherrybark, chestnut, northern red, post, scarlet, shingle, southern red, and white), osage orange, red maple, river birch, sassafras, slippery elm, southern hackberry, sugar maple, sweetgum, tulip poplar, and white ash. Intermixed with the deciduous trees are some evergreen trees which include eastern red cedar, loblolly pine and white pine. The understory consists of American hazelnut, American holly, Chinese privet, eastern redbud, farkleberry, flowering dogwood, hophornbeam, ironwood, pawpaw, persimmon, red mulberry, and winged elm, as well as saplings of some of the trees previously listed. Herbaceous plants, short woody plants, and woody vines observed included beefsteak plant, broad beech fern, broadleaf woodoats, bunchy knotweed, cat greenbrier, Christmas fern, common dittany, coralberry, crossvine, Japanese honeysuckle, Japanese stiltgrass, jumpseed, longleaf woodoats, poison ivy, roundleaf greenbrier, spotted wintergreen, tall rattlesnake root, white snakeroot, and winter creeper. Two occurrences of the Kentucky threatened Nuttall's oak are found in forested sections in both the new line and proposed existing ROW widening. Forested wetlands were found in several locations in the proposed ROW and are described in more detail in Section 3.8.

Evergreen forest, which accounts for about 3 percent of total forest cover for the entire proposed project, has low species diversity and is dominated by plantation-grown loblolly pine in the overstory. Many of these stands were planted and canopy trees are approximately the same size, are regularly harvested to produce wood products, and bear little resemblance to native plant communities found in the region.

Herbaceous vegetation is characterized as sites with greater than 75 percent cover of forbs and grasses and less than 25 percent cover of other types of vegetation. The majority of this habitat type occurs along the existing transmission line ROW, but cropland, hayfields, and heavily grazed 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 anisescented goldenrod, beaked panic grass, broomsedge, field thistle, giant ironweed, gray goldenrod, hairy lespedeza, hairy small-leaf tick trefoil, hairy sunflower, hyssopleaf thoroughwort, Japanese honeysuckle, Japanese stiltgrass, Johnson grass, late purple aster, maypops, narrowleaf mountain mint, purpletop tridens, rabbit tobacco, red fescue, rice button aster, sawtooth blackberry, sericea lespedeza, silver beard grass, silver plume grass, swamp sunflower, tall goldenrod, trumpetweed, velvet panicum, whorled mountain mint, and yellow bristle grass. Areas of emergent wetlands were present throughout the project area. See Section 3.8 for species indicative of those areas.

EO 13112 directs 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 federally listed noxious weeds were observed, but many non-native invasive plant species were observed throughout the project area (Table 3-4). Additionally, populations of eleven plant species designated by the Kentucky Invasive Plant Council as severe and significant threat were observed sporadically throughout the project area (KY-IPC 2013). During field surveys, invasive plants were prevalent in small, disturbed forested sections, especially near sloughs and creeks.

Table 3-4. Severe and Significant Threat Invasive Plant Species Observed within the Eagle Creek Project Area

Common Name	Scientific Name
Five-leaf akebia	<i>Akebia quinata</i>
Winter creeper	<i>Euonymus hederaceus</i>
Ground ivy	<i>Glechoma hederacea</i>
Sericea lespedeza	<i>Lespedeza cuneata</i>
Chinese Privet	<i>Ligustrum sinense</i>
Japanese Honeysuckle	<i>Lonicera japonica</i>
Japanese Stiltgrass	<i>Microstegium vimineum</i>
Princess tree	<i>Paulownia tomentosa</i>
Beefsteak plant	<i>Perilla frutescens</i>
Bunchy knotweed	<i>Persicaria longiseta</i>
Johnson grass	<i>Sorghum halepense</i>

One population of the non-native, invasive plant species five-leaf akebia was observed along a creek that meandered through an herbaceous transmission line ROW into an adjacent forested tract. No plants were observed outside of the existing and proposed TVA ROW. Total acreage of the five-leaf akebia infestation is about 0.5 acres. Five-leaf akebia is known only from Cherokee and Iroquois Parks in Jefferson County, Kentucky and in the Daniel Boone National Forest in Rockcastle County (SERNEC 2019). There are no other documented occurrences of this plant in Kentucky.

3.4.2 Environmental Consequences

3.4.2.1 Alternative A – The No Action Alternative

Under the No Action Alternative, construction, operation, and maintenance of the proposed project transmission line would not occur. As such, no additional impacts to vegetation would occur as a result of the proposed transmission line. The routine periodic vegetation maintenance would continue to be conducted along the existing transmission line ROW. Potential impacts to vegetation include periodic cutting and herbicide application to maintain a safe and reliable transmission system as described in the final programmatic ROW EIS (TVA 2019b). Therefore, because such maintenance activities are routine and are a component of on-going vegetation management programs, overall impacts to vegetation under this alternative are considered minor.

3.4.2.2 Alternative B – TVA Provides a Power Supply to the Paris Board of Public Utilities Eagle Creek 161-kV Substation

Adoption of Alternative B would not significantly affect forest cover in the region. Conversion of forested land to herbaceous vegetation for construction of the proposed transmission line would be long-term in duration, but insignificant. Over half of the forest is mature with well-developed canopy, understory, and herbaceous layer, while the rest has been recently disturbed. The plant communities found in the proposed project area are common and well represented throughout the region. As of 2016, there were well over 1,200,000 acres of forest land in Calloway County, Kentucky and Henry County, Tennessee, and the surrounding Kentucky and Tennessee counties (U.S. Forest Service [USFS] 2019). Cumulatively, project-related effects to forest resources would be negligible when compared to the total amount of forest land occurring in the region.

Most herbaceous plant communities found throughout the project area are heavily disturbed, early successional habitats. Project-related work would temporarily affect other herbaceous plant communities, but these areas would likely recover to their pre-project condition in less than one year.

Parts of the project area currently have a substantial component of invasive terrestrial plants and 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 standard operating procedure of vegetating with noninvasive species (TVA 2017) would serve to minimize the potential introduction and spread of invasive species in the project area.

Parts of the project area currently have a substantial component of invasive terrestrial plants and 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 standard operating procedure of revegetating with noninvasive species (TVA 2017a) would serve to minimize the potential introduction and spread of invasive species in the project area.

According to the Kentucky Invasive Plant council, the invasive plant five-leaf akebia is a significant threat, to natural communities because of its ability to readily invade undisturbed sites. Since the species only occurs in a handful of places in Kentucky and only within the project footprint in western Kentucky, leaving the infestation untreated along the TVA could result in substantial ecological impacts because the species would continue to spread along the ROW into the future.

To comply with EO 13751 and prevent the potential for significant impacts, TVA would remove five-leaf akebia from the ROW. To prevent the spread of five-leaf akebia, TVA's ROW Forester or Environmental Technician would contact the TVA botanist before and after construction to coordinate application of aquatic approved herbicides to five-leaf akebia vines in the proposed project area during the growing season. With implementation of this commitment, the proposed project would not significantly affect the terrestrial plant ecology of the region.

3.5 Wildlife

3.5.1 Affected Environment

The proposed project footprint would impact a total of about 188 acres. Approximately 128 acres of this is comprised of agricultural fields, hay fields, and early successional habitat. The remaining area, approximately 60 acres, is comprised of deciduous or evergreen forests.

Deciduous forests provide habitat for an array of terrestrial animal species. Avian species found in this habitat are chuck-will's-widow, downy woodpecker, eastern screech-owl, red-tailed hawk, white-breasted nuthatch, wood thrush, and yellow-billed cuckoo (National Geographic 2002). This area also provides foraging and roosting habitat for several species of bat, particularly in areas where the forest understory is more open. Some examples of bat species likely found within this habitat are big and little brown, eastern red, evening, hoary, Rafinesque's big-eared, silver-haired, and tricolored bat. Coyote, eastern chipmunk, eastern woodrat, North American deer mouse, and woodland vole are also likely mammalian species present within this habitat (Kays and Wilson 2002). Grey ratsnake and midland brownsnake as well as scarlet kingsnake are all common reptilian residents of this habitat (Powell et al. 2016). In forest sections with aquatic features, amphibians likely found in the area include dusky, marbled, mole, and spotted salamanders as well as barking and Cope's gray treefrogs (Powell et al. 2016; Niemiller et al. 2011).

Wetland habitat provides resources for such avian species as hooded warbler, northern harrier, red-winged blackbird, song sparrow, swamp sparrow and white-throated sparrow (National Geographic 2002). Mammalian species that may utilize this habitat are American beaver, eastern harvest mouse, marsh rice rat, muskrat, nutria, and swamp rabbit (Kays and Wilson 2002). Eastern black kingsnake, eastern ribbonsnake, common gartersnake, midland watersnake, and gray ratsnake are all wetland reptilian species (Powell et al. 2016). Eastern red-spotted newt and three-lined salamanders as well as American bullfrog, bird-voiced tree-frog, green frog, northern cricket frog, pickerel frog, and southern cricket frog are examples of some amphibian species that are likely present (Niemiller et al. 2011).

Pasture and agricultural fields offer habitat to a multitude of species such as blue grosbeak, brown-headed cowbird, brown thrasher, common grackle, common yellowthroat, Bewick's wren, dickcissel, eastern bluebird, eastern kingbird, eastern meadowlark, eastern towhee, field sparrow, grasshopper sparrow, house finch, northern mockingbird, and prairie warbler among others (National Geographic 2002). Mammalian species likely present in this habitat include eastern cottontail, eastern harvest mouse, eastern woodrat, hispid cotton rat, red fox and striped skunk (Kays and Wilson 2002). Reptilian species with the potential to occur in the project area are eastern milk, gray ratsnake, smooth earthsnake and southern black racer snakes, as well as eastern slender glass lizard (Powell et al. 2016).

Review of the USFWS Information for Planning and Conservation (IPaC) identified 22 migratory birds of conservation concern (American kestrel, bald eagle, blue-winged warbler, cerulean warbler, dunlin, eastern whip-poor-will, golden eagle, Kentucky warbler, Le Conte's sparrow, lesser yellowlegs, Nelson's sparrow, prairie warbler, prothonotary warbler, red-headed woodpecker, red-throated loon, ruddy turnstone, rusty blackbird, semipalmated sandpiper, short-billed dowitcher, swallow-tailed kite, willet, and wood thrush) that have the potential to occur in the action area. Bald eagles are addressed in detail in a later part of this report. Suitable habitat for these species exists within and adjacent to the project footprint. One record of a colonial wading bird colony and six records of osprey exist within 3 miles of the project footprint. The closest record of a colonial wading bird colony is approximately 2.4 miles from the project footprint and would not be impacted by the proposed actions. The closest record of osprey is a record of a nest within the project footprint. However, as discussed below, this nest was not found during the field review. No migratory birds of conservation concern were documented within the project footprint during the field review in October 2019.

3.5.2 Environmental Consequences

3.5.2.1 Alternative A – The No Action Alternative

Under the No Action Alternative, the proposed project would not occur. As such, no additional impacts to wildlife would occur as a result of the proposed development of the new transmission line. However, routine periodic vegetation maintenance would be conducted along the existing transmission line ROW. Potential impacts to wildlife include localized habitat alteration resulting from periodic cutting and herbicide application to maintain a safe and reliable transmission system as described in the final programmatic EIS (TVA 2019b). Therefore, because such maintenance activities are routine and are a component of on-going vegetation management programs, overall impacts to wildlife under this alternative are considered minor.

3.5.2.2 Alternative B – TVA Provides a Power Supply to the Paris Board of Public Utilities Eagle Creek 161-kV Substation

Under Alternative B, TVA would expand approximately 14.5 miles of current transmission line ROW, build 1.5 miles of new 100 foot ROW, and build associated access roads. Both forested and herbaceous vegetation that may provide habitat for common wildlife species would be removed in association with the proposed actions.

Vegetation removal may occur in the 188 acres of project footprint. Any wildlife (primarily common, habituated species) currently using this disturbed area may be displaced by increased levels of disturbance during construction actions, but it is expected that they would return to the project area upon completion of actions. Direct effects to some individuals that are immobile during the time of construction may occur, particularly if construction activities occur during breeding/nesting seasons.

Construction-associated disturbances and habitat removal would likely disperse wildlife into surrounding areas in an attempt to find new food and shelter sources and to reestablish territories, potentially resulting in added stress or energy use to these individuals. Much of the forested area within the project region has been impacted by human activity (i.e. forestry practices). These adjacent areas would be relatively receptive to terrestrial animal species dispersing from the action area. In the event that surrounding areas are already overpopulated, further stress to wildlife populations could occur to those individuals

presently utilizing these areas, as well as those attempting to relocate. It is expected that over time those species utilizing early successional habitat would return to the project area upon completion of the proposed actions.

Routine vegetation management of transmission line ROWs would have periodic effects on habitats within the ROW over the long-term. Methods may vary but are likely to include use of herbicides and various mechanical measures to control vegetation. As such maintenance measures would result in cutting, damage and mortality to treated plant communities and the associated habitats. Wildlife is expected to be displaced intermittently in conjunction with the presence of maintenance crews and the alteration of habitats. However, as discussed in TVA's final programmatic EIS regarding transmission line vegetation management, it is expected that such practices would result in localized impacts but generally minor impacts to established transmission line ROWs (TVA 2019b). Such potential impacts would be minimized by the integration of TVA's O-SAR process and appropriate BMPs as described in this programmatic EIS (TVA 2019b). Further, with the implementation of TVA's preferred alternative, vegetation management would be undertaken on a condition-based manner (i.e., as needed) and would result in relatively increased long-term habitat quality associated with ROW floor end-state and the potential for increased habitat and support for pollinator species.

Cumulative effects of the project on common wildlife species are expected to be negligible. Proposed actions across the transmission line would permanently remove existing forested habitat for common wildlife. Following completion of the project, the ROW would be maintained as early successional habitat, herbaceous fields, or agricultural fields which would provide habitat for several common wildlife species that utilize early successional fields and agricultural/developed areas.

3.6 Endangered and Threatened Species

3.6.1 Affected Environment

Endangered species are those determined to be in danger of extinction throughout all or a significant portion of their range. Threatened species are those likely to become endangered within the foreseeable future throughout all or a significant portion of their range. Section 7 of the ESA requires federal agencies to consult with the USFWS when their proposed actions may affect endangered or threatened species or their designated critical habitats (DCH).

The ESA provides broad protection for species of fishes, wildlife, and plants that are listed as threatened or endangered in the United States or elsewhere. The ESA outlines procedures for federal agencies to follow when taking actions that may jeopardize federally listed species or DCH. 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.

Species of concern within the project area and vicinity based on a review of literature and the TVA Regional Natural Heritage database are shown in Table 3-5.

Table 3-5. Federally and State-Listed species within the Project Area and Vicinity of Calloway County, Kentucky or Henry County, Tennessee

Common Name	Scientific Name	Status ¹		
		Federal	KY State (Rank) ²	TN State (Rank) ²
Aquatic Animals ³				
Fish				
Central Mudminnow	<i>Umbra limi</i>		T (S2S3)	
Chain Pickerel	<i>Esox niger</i>		SPCO (S3)	
Cypress Darter	<i>Etheostoma proeliare</i>		T (S2)	
Dollar Sunfish	<i>Lepomis marginatus</i>		E (S1)	
Goldstripe Darter	<i>Etheostoma parvipinne</i>		E (S1)	
Crayfish				
Blood River Crayfish	<i>Orconectes burri</i>		T (S2)	
Mussels				
Pale Lilliput	<i>Toxolasma cylindrellus</i>	LE		E (S1)
Pink Mucket ⁴	<i>Lampsilis abrupta</i>	LE		
Plants				
Price's Potato-bean	<i>Apios priceana</i>	LT	E	E
Cream Wild Indigo	<i>Baptisia bracteata</i> var. <i>leucophaea</i>		SPCO	SPCO
Screwstem	<i>Bartonia virginica</i>		T	
Howe Sedge	<i>Carex atlantica</i> ssp. <i>capillacea</i>		E	
Dark Green Sedge	<i>Carex venusta</i>		E	
Button Snakeroot	<i>Eryngium integrifolium</i>		E	T
Common Silverbell	<i>Halesia tetraptera</i> var. <i>tetraptera</i>		E	
Hairy Hawkweed ⁵	<i>Hiercium longipilum</i>		SPCO	SPCO
Hydrolea	<i>Hydrolea ovata</i>		E	
Southern Bog Clubmoss	<i>Lycopodiella appressa</i>		E	
Bunchflower	<i>Melanthium virginicum</i>		E	E
Sundrops	<i>Oenothera linifolia</i>		E	
Small Sundrops	<i>Oenothera perennis</i>		E	
Oldenlandia	<i>Oldenlandia uniflora</i>		E	
Hair-like Mock Bishop-weed	<i>Ptilimnium capillaceum</i>		T	
Eastern Mock Bishop's-weed	<i>Ptilimnium costatum</i>		E	
Nuttall's Mock Bishop's-weed	<i>Ptilimnium nuttallii</i>		E	
Mountain-mint	<i>Pycnanthemum albescens</i>		H	
Nuttall's Oak ⁶	<i>Quercus texana</i>		T	
Hoary Azalea	<i>Rhododendron canescens</i>		E	
Compass-plant	<i>Silphium laciniatum</i>		T	T
Swamp Wedgescale	<i>Sphenopholis pensylvanica</i>		SPCO	

Common Name	Scientific Name	Status ¹		
		Federal	KY State (Rank) ²	TN State (Rank) ²
Possum-haw <i>Viburnum</i>	<i>Viburnum nudum</i>		E	
Terrestrial Wildlife⁷				
Amphibians				
Coal skink	<i>Plestiodon anthracinus</i>		E (S1)	D (S1)
Northern crawfish frog	<i>Rana areolata circulosa</i>		SPCO (S3)	
Three-lined salamander	<i>Eurycea guttolineata</i>		T (S2)	-- (S5)
Birds				
Bachman's sparrow	<i>Peucaea aestivalis</i>			
Bald eagle ⁸	<i>Haliaeetus leucocephalus</i>	DM	SPCO (S3B,S3S4N)	D (S3)
Bewick's wren	<i>Thryomanes bewickii</i>		H (SHB)	
Lark sparrow	<i>Chondestes grammacus</i>		SPCO (S2S3B)	-- (S1B)
Osprey	<i>Pandion haliaetus</i>		SPCO (S3S4B)	
Yellow-crowned night-heron	<i>Nyctanassa violacea</i>		T (S2B)	-- (S3)
Invertebrates				
Osmunda borer moth	<i>Papaipema speciosissima</i>		T (S2)	
Rare cane borer moth	<i>Papaipema sp. 5</i>		T (S1S2)	
Mammals				
Gray bat	<i>Myotis grisescens</i>	LE	T (S2)	E (S2)
Little brown bat	<i>Myotis lucifugus</i>		T (S2)	T (S3)
Evening bat	<i>Nycticeius humeralis</i>		SPCO (S3)	-- (S5)
Indiana bat	<i>Myotis sodalis</i>	LE	E (S1S2)	E (S1)
Northern long-eared bat ⁹	<i>Myotis septentrionalis</i>	LT	E (S1)	T (S1S2)
Reptiles				
Northern pine snake	<i>Pituophis melanoleucus melanoleucus</i>		E(S1)	T (S3)
Western mudsnake	<i>Farancia abacura reinwardtii</i>		S(S3)	

Source: TVA Regional Natural Heritage database, queried November 2018, and January, October and December 2019;

¹ Status Codes: E or LE = Listed Endangered; H = Historically known from the area; SPCO = Listed as Special Concern; LT or T = Listed Threatened.

² State Ranks: S1 = Critically Imperiled; S2 = Imperiled; S3 = Vulnerable; S4 = Apparently Secure; S5 = Secure; SH = Possibly Extirpated (Historical); S#S# = Denotes a range of ranks because the exact rarity of the element is uncertain (e.g., S1S2).

³ Aquatic species include those from within the Upper Clarks River (0604000601), Blood River (0604000508), and Tennessee River (0604000509) ten digit HUC watersheds, and/or, USFWS Information for Planning and Conservation (IPaC).

⁴ Source: USFWS IPaC database (<https://ecos.fws.gov/ipac/>), queried on 04/01/2020.

⁵ Tennessee state-listed plant species in Tennessee.

⁶ State-listed plant species documented from the proposed project area.

⁷ Source: USFWS IPaC accessed 11/26/2018 and 1/7/2019.

⁸ Federally threatened species known from Calloway County, Kentucky or Henry County, Tennessee, but not within three miles of the project footprint.

⁹ Federally listed species whose known range include Calloway County, Kentucky or Henry County, Tennessee, but for which no known records exist.

The State of Tennessee provides protection for species considered threatened, endangered, or deemed in need of management within the state in addition to those federally listed under the ESA. The State listing is handled by the TDEC; however, the Tennessee Natural Heritage Program and TVA both maintain databases of aquatic animal species that are considered threatened, endangered, special concern, or tracked in Tennessee.

The State of Kentucky provides protection for species considered threatened, endangered, or deemed in need of management within the state in addition to those federally listed under the ESA. The State listing is handled by the Kentucky Department of Fish and Wildlife Services; however, the Kentucky Natural Heritage Program and TVA both maintain databases of aquatic animal species that are considered threatened, endangered, special concern, or tracked in Kentucky.

3.6.1.1 Aquatic Animals

The TVA Regional Natural Heritage database and the USFWS IPaC database indicated one federally listed mussel species (pale lilliput) has been documented to occur within the Upper Clarks River, Blood River, and Tennessee River encompassing the proposed project area (Table 3-5). IPaC indicated that one additional federally protected mussel (pink mucket) may occur within the project area. Six additional state-listed species (five fish, one crayfish) have also been documented (Table 3-5).

General ecological descriptions were retrieved from Etnier and Starnes (1993), fish; NatureServe Explorer (2020), crayfish; and Parmalee and Bogan (1998), mussels.

3.6.1.1.1 Fish

The central mudminnow usually occur in moderately to densely vegetated streams, sloughs, or swamps; sometimes in bog lakes. This species avoids areas with current and water more than 0.5 meter deep (but occurs in deep pools in winter). It is also tolerant of low oxygen and high temperatures.

The chain pickerel prefer vegetated lakes, swamps, and backwaters and quiet pools of creeks and small to medium rivers; ranges from clean shallow heavily vegetated shoal water to deeper parts of lakes and larger mountain streams. Spawning occurs on flooded benches of streams, lakes, and ponds.

The cypress darter can occur in standing or slow-flowing water, especially in vegetation over mud. This darter is especially common in lowland lakes, streams, bayous, swamps, and backwaters where the bottom is soft and detritus and aquatic vegetation abound. It prefers quiet, often murky water.

The dollar sunfish prefers unaltered sluggish streams, vegetated swamps, and/or natural lakes. Spawning occurs from late May into August over constructed nest of hard sand substrates.

The goldstripe darter prefers habitat in small sandy coastal plain streams. In Tennessee, it is associated with shallow streams with shifting sand substrates and typically associated with clumps of detritus and undercut banks.

3.6.1.1.2 Crayfish

The blood river crayfish is endemic to the Blood River drainage, a Tennessee River tributary in western Kentucky and northwest Tennessee. The Blood River is a relatively small tributary of the Tennessee River, with its headwaters originating in Henry County.

3.6.1.1.3 Mussels

The pale lilliput normally occurs in the tributaries of the Tennessee River. However, records have been reported from the Mobile River system. Adults can reach lengths of 35 millimeters. It only occurs in small tributary rivers and streams. The pale lilliput prefers gravel and sand substrate in slow to moderate current at depths less than 3 feet.

The pink mucket is typically a big river species, but occasionally individuals become established in small to medium sized tributaries of large rivers. It inhabits rocky bottoms with swift current usually in less than three feet of water

3.6.1.2 Plants

Twenty-one Kentucky state-listed, one Tennessee state-listed, and one federally listed plant species have been previously reported from within a five-mile vicinity of the project area. No federally listed plants have been previously reported from Calloway County, Kentucky or Henry County, Tennessee. (Table 3-5). No DCH for plant species occurs within the project area. Field surveys of the proposed project occurred in late October 2019. No potential habitat for the federally listed Price's Potato-bean was observed in the project area. During field reviews, two occurrences of the Kentucky threatened plant species Nuttall's oak were observed in fragmented forested patches. One population of five small trees was observed in the proposed new transmission line several hundred feet east of the existing Murray substation. A second population of five small trees was in ROW proposed for widening southeast of Murray, Kentucky, between Highway 121 and Fox Road.

3.6.1.3 Terrestrial Animals

A review of the TVA Regional Natural Heritage database on November 26, 2018, resulted in records of 12 state-listed species and records of two federally listed species (gray bat and Indiana bat) within 3.0 miles of the project footprint. Records of one federally protected species (bald eagle) are known from Calloway County, Kentucky and Henry County, Tennessee. Though no known records exist in either of these counties, the USFWS has determined that the federally listed northern long-eared bat has the potential to occur in the project footprint (Table 3-5).

Osmunda borer moths occur frequently in forests and moist pinelands (Natureserve 2019). The species uses the flowers of ferns in the Osmunda genus. The closest record of Osmunda borer moth is approximately 1.9 miles from the study area. During the field survey in October 2019, no suitable habitat for Osmunda borer moth was found within the project footprint. Additionally, no suitable foraging plants were documented within the project footprint.

Rare cane borer moth is a moth that is found in forested wetlands and riparian cane breaks (Natureserve 2019). The species appears to be restricted to riparian cane brakes which are usually in a wooded, wet area. This species is known to be a borer in cane species. The closest record of rare cane borer moth is within the study area. During the field survey in October 2019, suitable habitat for rare cane borer moth was found along the edges of rivers, streams, and wetlands.

Northern crawfish frogs are often found in prairies, pasturelands, floodplains, and pine scrub (Powell et al. 2016). The species is nocturnal and often uses the underground burrows made by crayfish or other animals. Breeding occurs from late winter to early spring. Eggs are laid in shallow water and are attached to stems of vegetation. The closest record of northern crawfish frog is approximately 0.8 miles from the project footprint. During a field review in October 2019, suitable habitat for northern crawfish frog was found within the project footprint in and around pastures and flooded areas.

Three-lined salamanders inhabit forested floodplains, ditches, damp stream sides, and seepage springs (Powell et al. 2016). Three-lined salamander primarily feed on invertebrates found under debris on the forest floor. The closest record of three-lined salamander is a historical record that is approximately 1.4 miles from the project footprint. Suitable habitat for three-lined salamanders exists within the project footprint along streams and rivers as well as flooded forests in the Blood River drainage.

Coal skinks inhabit moist wooded hillsides, areas near springs, and around rocky bluffs (Powell et al. 2016). Coal skinks mate in the spring and lay eggs in June. The closest record of coal skink is a collection record that is approximately 2.1 miles from the project footprint. During a field review in October 2019, suitable habitat for coal skink was found within the project footprint in bottomland forests and along the edges of rivers, streams, and wetlands.

Western mud snake inhabit swamps and wet lowlands (Powell et al. 2016). The species can also be found along the edges of rivers, lakes, ponds, and streams. Western mud snake often burrow in soft, wet soil and wet debris mats near the edge of aquatic habitats. The closest record of western mud snake is approximately 2.6 miles from the project footprint. During the field review in October 2019, suitable habitat for western mud snake was found within the project footprint along rivers, streams, and wetlands.

Northern pine snakes are found in dry, sandy Pine Barrens, sand hills, and dry mountain ridges, most often in or near pine woods (Powell et al. 2016). They can also use scrub habitat and agricultural fields. Northern pine snakes are considered secretive because of the amount of time they spend in underground burrows. The closest record of a pine snake is a historical record approximately 2.2 miles from the project footprint. During a field review in October 2019, suitable habitat for northern pine snake was found within the project footprint in pine forests and dry, forested, ridges. However, northern pine snake was not documented within the project footprint.

Bachman's sparrow inhabit dry, open woods, especially pines (National Geographic 2002). The species has also adapted to use brushy, open fields. The closest record of a Bachman's sparrow is approximately 2.6 miles from the project footprint. During field surveys in October 2019, habitat for Bachman's sparrow was found within the project footprint around the edges of agricultural fields and along brushy transmission line ROWs. Bachman's sparrow was not documented within the project footprint. Project actions have the potential to temporarily displace or directly impact individuals if they are present during the proposed project actions. However, the amount of early successional habitat would likely increase due to the natural regrowth of vegetation after the proposed project actions. This additional early successional habitat can increase the amount of suitable habitat for Bachman's sparrow within the project footprint.

Lark sparrows are often found in heavily grazed pastures, cultivated fields, and fallow fields with brushy edges. Additionally, lark sparrow can be found in clearcuts that have been replanted with pine trees. Breeding habitat includes various open situations with scattered bushes and trees (Natureserve 2019). The closest record of lark sparrow is approximately 2.7 miles from the study area. Habitat for lark sparrow exists in fallow fields and brushy power line ROWs within the project footprint. Project actions have the potential to temporarily displace or directly impact individuals if they are present during the proposed project actions. However, the amount of early successional habitat would likely increase due to the natural regrowth of vegetation after the proposed project actions. This increase in early successional habitat can increase the amount of suitable habitat for lark sparrow within the project footprint.

Bewick's wren utilize brushland, hedgerows, stream edges, open woods, and clear-cuts (National Geographic 2002). The species has disappeared from much of its historical range east of the Mississippi River. The closest record of Bewick's wren is a historical record approximately 2.4 mile from the project footprint. During a field review in October 2019, suitable habitat for Bewick's wren was found within the project footprint along brushy transmission line ROWs, stream edges, and open woods. Bewick's wren was not documented within the project footprint. Vegetation removal is proposed for the project. Project actions have the potential to displace or directly impact individuals if they are present during the proposed project actions. However, the amount of early successional habitat would likely increase due to the natural regrowth of vegetation after the proposed project actions. This additional early successional habitat can increase the amount of suitable habitat for Bewick's wren within the project footprint.

Yellow-crowned night-heron roost in trees in wet woods and swamps (National Geographic 2002). The species winters along the coast but can be encountered in Tennessee and Kentucky from March to October. Yellow-crowned night-heron often nest alone or in small groups in these wetland areas. The closest record of yellow-crowned night-heron is a historical record that is approximately 2.6 miles from the project footprint. During the field survey in October 2019, yellow-crowned night-heron were not documented within the project footprint. Additionally, no heronries were seen within 660 feet of the project footprint. Foraging habitat exists along the edges of rivers and streams and throughout wetlands within the project footprint.

Osprey can be found near lakes, rivers and on seacoasts. Ospreys establish nests near water. Nests are built in trees, on sheds, poles, docks, and special platforms (National Geographic 2002). The closest record of osprey is a nest record that occurs within the project footprint. During the field survey in October 2019, this nest was not found. Additionally, no osprey and no osprey nest were documented within 660 feet of the project footprint. Suitable foraging habitat exists within the project footprint in rivers and streams.

Bald eagle are protected under the Bald and Golden Eagle Protection Act (USFWS 2013). This species is associated with larger mature trees capable of supporting its massive nests. These are usually found near larger waterways where the eagles forage (Turcotte and Watts 1999). The closest record of bald eagle is from a nest that is approximately 4.6 miles from the project footprint. During the field review in October 2019, no bald eagles and no bald eagle nests were documented within 660 feet of the project footprint. Bald eagle foraging habitat exists in rivers and streams adjacent to and within the project footprint.

Little brown bats primarily hibernate in caves and mines. During summer this species can be found in hot buildings, where females form nursing colonies. Colonies are usually close to water bodies where these bats prefer to forage. Foraging also occurs among trees in open areas. The nearest known little brown bat record is a mist net capture approximately 2.5 miles from the project footprint. No caves are known within 3 miles of the project footprint. One possible cave opening was observed in the existing ROW during field surveys; however, the opening appeared too narrow for use by bats.

Evening bat inhabit deciduous and mixed forest interspersed with cultivated areas. Males tend to roost solitarily and females form nursery colonies in summer, usually in trees or buildings (Natureserve 2019). Evening bat utilize the areas around caves for swarming (mating) in the fall but do not hibernate, rather, it is thought that they migrate to more mild southern climates in winter where increased populations have been observed roosting in Spanish moss and beneath palm fronds. The closest record of evening bat is a capture record that is approximately 2.4 miles from the project footprint. No caves are known within 3.0 miles of the project footprint. During the field review in October 2019, no caves were documented within the project footprint. Approximately 34.7 acres of suitable summer roosting habitat for evening bat was documented within the project footprint. This habitat will be removed during the proposed project actions. Additionally, several dilapidated buildings exist within the project footprint. These structures provide marginal summer roosting habitat for evening bat and may be removed during the proposed project actions. However, these buildings showed no evidence of prior bat use. Foraging habitat for evening bat exists within the project footprint in and above rivers, streams, and wetlands.

Gray bats roost in caves year-round and migrate between summer and winter roosts during spring and fall (Brady et al. 1982; Tuttle 1976). Gray bats disperse over bodies of water at dusk where they forage for insects emerging from the surface of the water (Harvey 1992). The closest gray bat record is a mist net capture record that is approximately 2.4 miles from the project footprint. There are no known cave records within 3 miles of the project footprint and no caves were documented during field review in October 2019. Several dilapidated buildings exist within the project footprint. These structures provide marginal summer roosting habitat for gray bat and may be removed during the proposed project actions. However, these buildings showed no evidence of prior bat use. Foraging habitat for gray bat exists in and above multiple rivers, streams, and wetlands within the project footprint.

Indiana bats hibernate in caves in winter and use areas around them for swarming in fall and for staging in spring, prior to migration back to summer habitat. During the summer, Indiana bats roost under the exfoliating bark of dead and living trees in mature forests with an open understory, often near sources 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. This species forages over forest canopies, along forest edges and tree lines, and occasionally over bodies of water (Pruitt and TeWinkel 2007; Kurta et al. 2002; USFWS 2019). The closest record of an Indiana bat is 1.6 miles from the project footprint. There are no known cave records within 3 miles of the project footprint and no caves were documented within the project footprint during field review in October 2019. During the field review, approximately 34.7 acres of suitable summer roosting habitat for Indiana bat was documented within the project footprint. This suitable summer roosting habitat would be removed during the project actions. Foraging habitat for Indiana bat exists throughout the project footprint above forest canopies and along forested edges. Additional foraging habitat exists in and above rivers, streams, and wetlands that exist within the project footprint.

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 that of the Indiana bat; however northern long-eared bats are thought to be 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). There are no known northern long-eared bat records from Calloway County, Kentucky or Henry County, Tennessee. There are no known cave records within 3 miles of the project footprint and no caves were documented within the project footprint during field review in October 2019. During the field review, approximately 34.7 acres of suitable summer roosting habitat for Indiana bat was documented within the project footprint. This suitable summer roosting habitat would be removed during the project actions. Additionally, several dilapidated buildings exist within the project footprint. These structures provide marginal summer roosting habitat for Indiana bat and may be removed during the proposed project actions. However, these buildings showed no evidence of prior bat use. Foraging habitat for northern long-eared bat exists throughout the project footprint below forest canopies and along forested edges. Additional foraging habitat exists above rivers, streams, and wetlands that exist within the project footprint.

3.6.2 Environmental Consequences

3.6.2.1 Alternative A – The No Action Alternative

Under the No Action Alternative, construction, operation, and maintenance of the proposed transmission line and switching station would not occur. As such, no impacts to endangered or threatened species would occur as a result of the proposed transmission line. However, routine periodic vegetation maintenance would be conducted along the existing transmission line ROWs. Potential impacts to threatened or endangered species include localized roost tree alteration (i.e., potential “immediate hazard” trees) resulting from periodic cutting to maintain a safe and reliable transmission system as described in the final programmatic ROW Vegetation Management EIS (TVA 2019b). However, such maintenance activities are routine and have been included in extensive consultations with USFWS in conjunction with maintenance activities across TVA’s transmission line system. As such, overall impacts to threatened and endangered species under this alternative would be avoided.

3.6.2.2 Alternative B – TVA Provides a Power Supply to the Paris Board of Public Utilities Eagle Creek 161-kV Substation

3.6.2.2.1 Aquatic Animals

Based on field surveys and habitat requirements of the federally protected pale lilliput and pink mucket, these species would not occur within any of the streams intersecting the proposed transmission line ROW. Therefore, the proposed project would not result in impacts to federally listed aquatic animals.

Suitable habitat for state-listed aquatic species known to occur within the project watersheds may occur in streams intersected by the proposed ROW and associated access roads. However, ground disturbance would be minimized and all work done in accordance to BMPs, as outlined in TVA 2017a. These BMPs are designed to prevent/reduce surface water runoff from carrying suspended solids to adjacent waterbodies. With the proper implementation of BMPs, any potential impacts to state-listed aquatic species occurring within the project area would be minor and insignificant.

3.6.2.2.2 Plants

Adoption of the Action alternative would not affect federally listed plant species or DCH because neither occurs in the proposed project area. However, adoption of the Action Alternative would negatively impact the Kentucky state-listed Nuttall's oak.

Nuttall's oak has only been previously observed in three counties in the state of Kentucky (SERNEC 2019). Two of the herbarium specimens were reported from Calloway County where the project would occur. Another record occurs in the Blood River TVA Habitat Protection Area, along the nearby Blood River (SERNEC 2019). The two specimens from Calloway County note that the trees are "common" on the sites where they occur, with one found along the Blood River (Nestor 2019).

There are more than 100 acres of forested wetland located adjacent to the proposed transmission line ROW near a population of Nuttall's oak found east of the Murray Substation. Additionally, immediately adjacent to the Nuttall's oak in the ROW proposed for widening there are about 40 acres of forest with a creek. A subsequent field review within this 40 acres identified three more Nuttall's oak trees. Substantial swaths of forests set aside for conservation also exist around the Blood River, including the Kentucky Lake Wildlife Management Area and the Nature Conservancy's Blood River Seeps Easement.

Because there are over 100 acres of suitable forested habitat for this species immediately adjacent to the proposed transmission line, and suitable habitat is present throughout the Blood River area, it is likely that other undiscovered records of Nuttall's oak exist in this part of Kentucky. Implementation of the Action Alternative would require the removal of all Nuttall's oak trees in the project footprint to avoid impacting the safety and operation of the transmission line. Although this effect would be permanent, it would be insignificant because of the relatively small size of the populations compared to other extant sites in Calloway County, the large, contiguous area of protected suitable habitat along the Blood River, and the three newly identified Nuttall's oaks found within the 40 acres of forest adjacent to the project area.

3.6.2.2.3 Terrestrial Animals

Under Action Alternative B, TVA would expand approximately 14.5 miles of current transmission line ROW, build 1.5 miles of new 100-foot-wide ROW, and build associated access roads. Both forested and herbaceous vegetation that may provide habitat for common wildlife species would be removed in association with the proposed actions.

One federally threatened, two federally endangered, and one federally protected species have been assessed based on known or potential presence within Calloway County, Kentucky and Henry County, Tennessee. Fourteen state-listed species have been recorded within three miles of the project footprint. All of these have the potential to use the project area. BMPs must be implemented to minimize impacts to habitat for each of these species.

Proposed project actions would not impact *Osmunda* borer moth. No suitable habitat was present in the project footprint at the time of field survey.

The proposed project has the potential to directly impact individual rare cane borer moths. However, the abundance of similar suitable habitat and implementation of BMPs suggest that proposed project actions would not impact populations of rare cane borer moth.

Direct impacts (i.e. crushing) to individual northern crawfish frog, western mud snake, and northern pine snake are possible if any occupied burrows are disturbed during project actions. However, the abundance of suitable habitat and the implementation of BMPs suggest that there would be no cumulative impacts to populations of northern crawfish frog, western mud snake, and northern pine snake.

Proposed project actions have the potential to directly impact individual three-lined salamanders and coal skinks if they are in the project footprint during the timing of the project actions. However, the historical nature of the record, implementation of BMPs, and abundance of similar suitable habitat in the project vicinity suggest proposed project actions would not have a cumulative impact on populations of three-lined salamander and coal skink.

Proposed project actions have the potential to directly impact or temporarily displace individual Bachman's sparrow, lark sparrow, Bewick's wren, and yellow crowned night heron. However, suitable habitat for these avian species is abundant in the project vicinity. Therefore, proposed project actions would not have a cumulative impact on populations of these birds.

No ospreys, bald eagles or nests of either species were documented within 660 feet of the project footprint. BMPs would be implemented to minimize impacts to foraging habitats in rivers and streams adjacent to the project footprint. Project actions are in compliance with the National Bald Eagle Management Guidelines. With the implementation of BMPs, proposed project actions would not impact ospreys or bald eagles.

BMPs must be implemented in order to minimize impacts to these foraging habitat for little brown bat and evening bat. Project actions have the potential to directly impact individuals should they be in the project footprint during the timing of the project actions. However, similar suitable habitat is abundant on the landscape in the project vicinity. With the implementation of BMPs, the proposed project actions would not impact populations of little brown bat or evening bat.

No caves or other winter hibernacula for gray bat, Indiana bat, or northern long-eared bat exist in the project footprint or would be impacted by the proposed actions. Foraging habitat for Indiana and northern long-eared bats exists within forests and along forested edges. Forested foraging habitat would be removed in association with the proposed actions, however, similarly suitable foraging habitat is plentiful in the surrounding landscape. Summer roosting habitat surveys for Indiana bat and northern long-eared bat recorded approximately 34.7 acres of suitable summer roosting habitat within the project footprint. This suitable summer roosting habitat would be removed during the proposed project actions. Additionally, several dilapidated buildings exist within the project footprint. These structures provide marginal summer roosting habitat for gray bat and northern long-eared bat. These buildings may be removed during the proposed project actions. However, these buildings showed no evidence of prior bat use.

A number of activities associated with the proposed project were addressed in TVA's programmatic consultation with the U.S. Fish and Wildlife Service on routine actions and federally listed bats in accordance with ESA Section 7(a)(2) and completed in April, 2018. For those activities with potential to affect bats, TVA committed to implementing specific conservation measures. These activities and associated conservation measures are listed in the TVA Bat Strategy Project Screening Form (Appendix E) and will be implemented as part of the proposed project. With the use of BMPs and identified conservation measures, proposed actions would not significantly impact gray bat, Indiana bat, or northern long-eared bat.

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. It is necessary to evaluate development in the 100-year floodplain to ensure that the project is consistent with the requirements of EO 11988. The proposed transmission line route would cross several floodplain areas associated with rivers and streams listed in Section 3.2 in Calloway County, Kentucky, and Henry County, Tennessee.

3.7.2 Environmental Consequences

3.7.2.1 Alternative A – The No Action Alternative

Because the construction, operation, and maintenance of the proposed project components would not occur under the No Action Alternative, no impacts to floodplains in the project area would occur as a result of TVA actions associated with the proposed project.

3.7.2.2 Alternative B – Alternative B – TVA Provides a Power Supply to the Paris Board of Public Utilities Eagle Creek 161-kV Substation

TVA proposes to construct a new 16-mile 161-kV transmission line from the Murray 161-kV Substation to the LPC's proposed new Eagle Creek 161-kV Substation. Additionally, TVA proposes to install a new switch house at the Murray Substation. The existing switch house is owned by the LPC and does not have adequate space to accommodate TVA's new equipment. The fencing in the switchyard would be extended to accommodate the new switch house.

The proposed Eagle Creek 161-kV Transmission Line route, shown in Figures 3-1 through 3-4, would cross several floodplain areas in Calloway County, Kentucky, and Henry County, Tennessee. Consistent with EO 11988, the construction of an overhead transmission line and related support structures is considered to be a repetitive action in the 100-year floodplain (TVA 1981). The construction of the support structures for the transmission line would not be expected to result in any increase in flood hazard from either changes in flood elevations or flow-carrying capacity of the streams being crossed. However, to minimize adverse impacts on natural and beneficial floodplain values, the ROW would be revegetated where natural vegetation is removed as described in TVA's Environmental Quality Protection Specifications for Transmission Line Construction (TVA 2020).

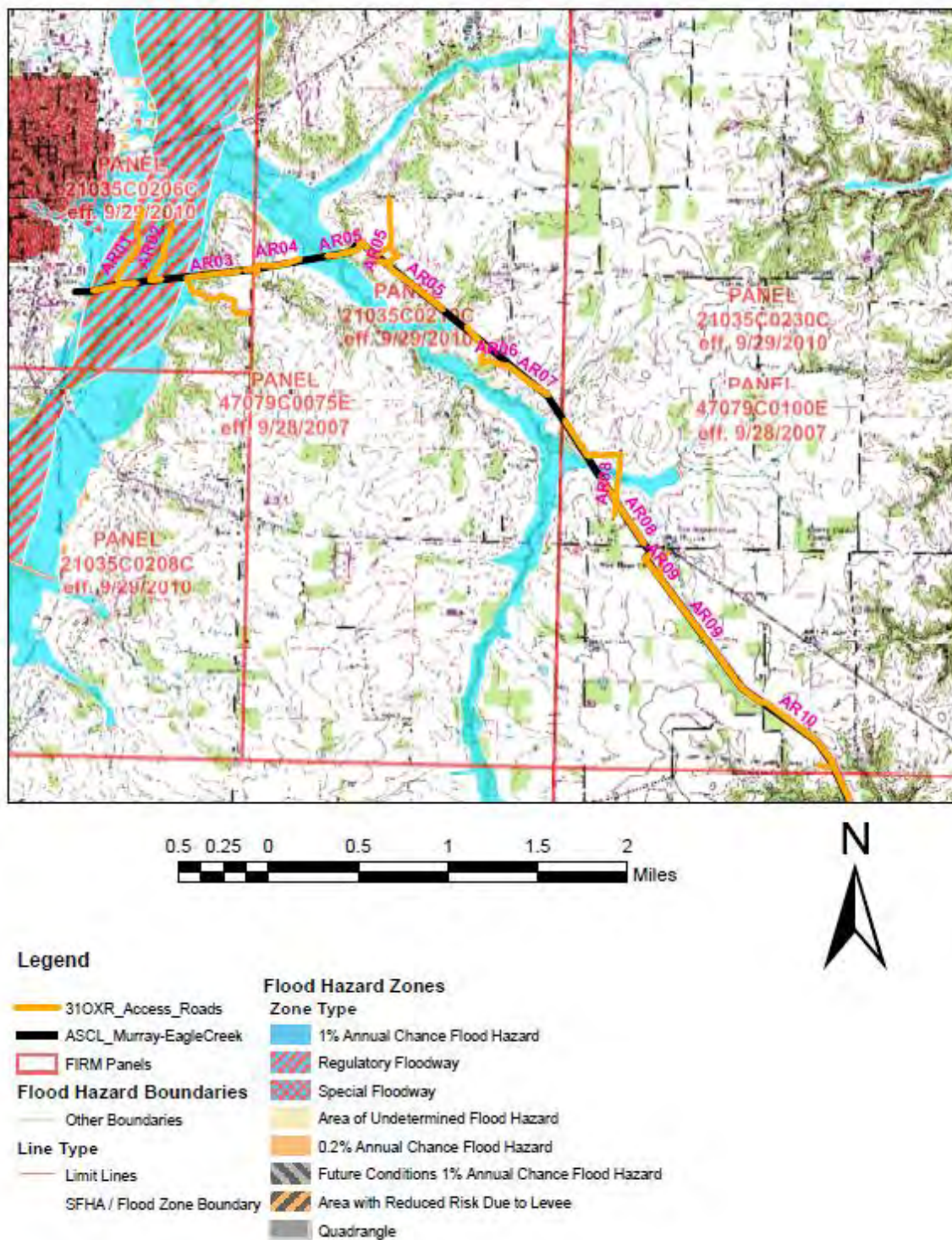


Figure 3-1. Proposed Eagle Creek Transmission Line in Relation to the 100-Year Floodplain (Map 1 of 4)

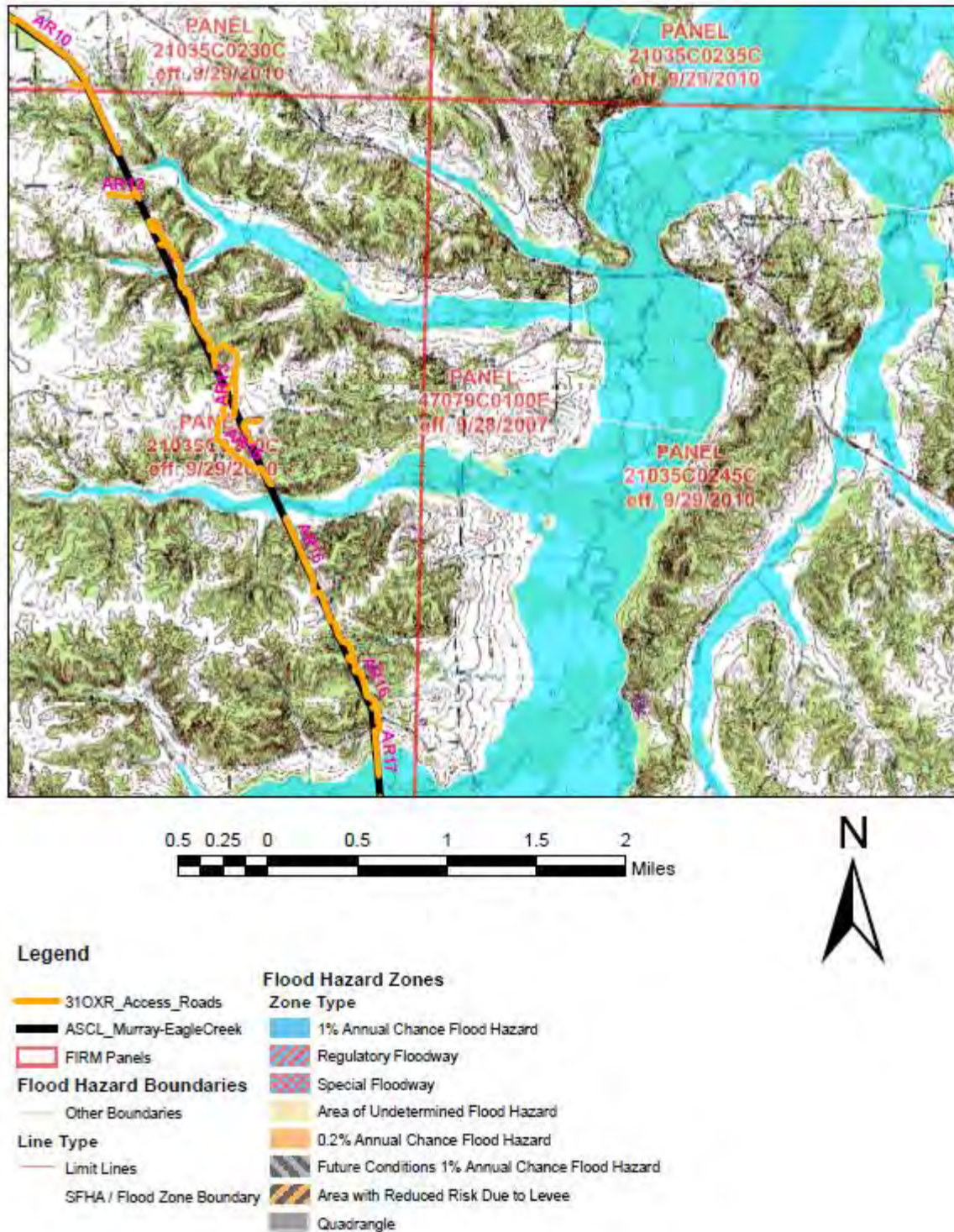


Figure 3-2. Proposed Eagle Creek Transmission Line in Relation to the 100-Year Floodplain (Map 2 of 4)

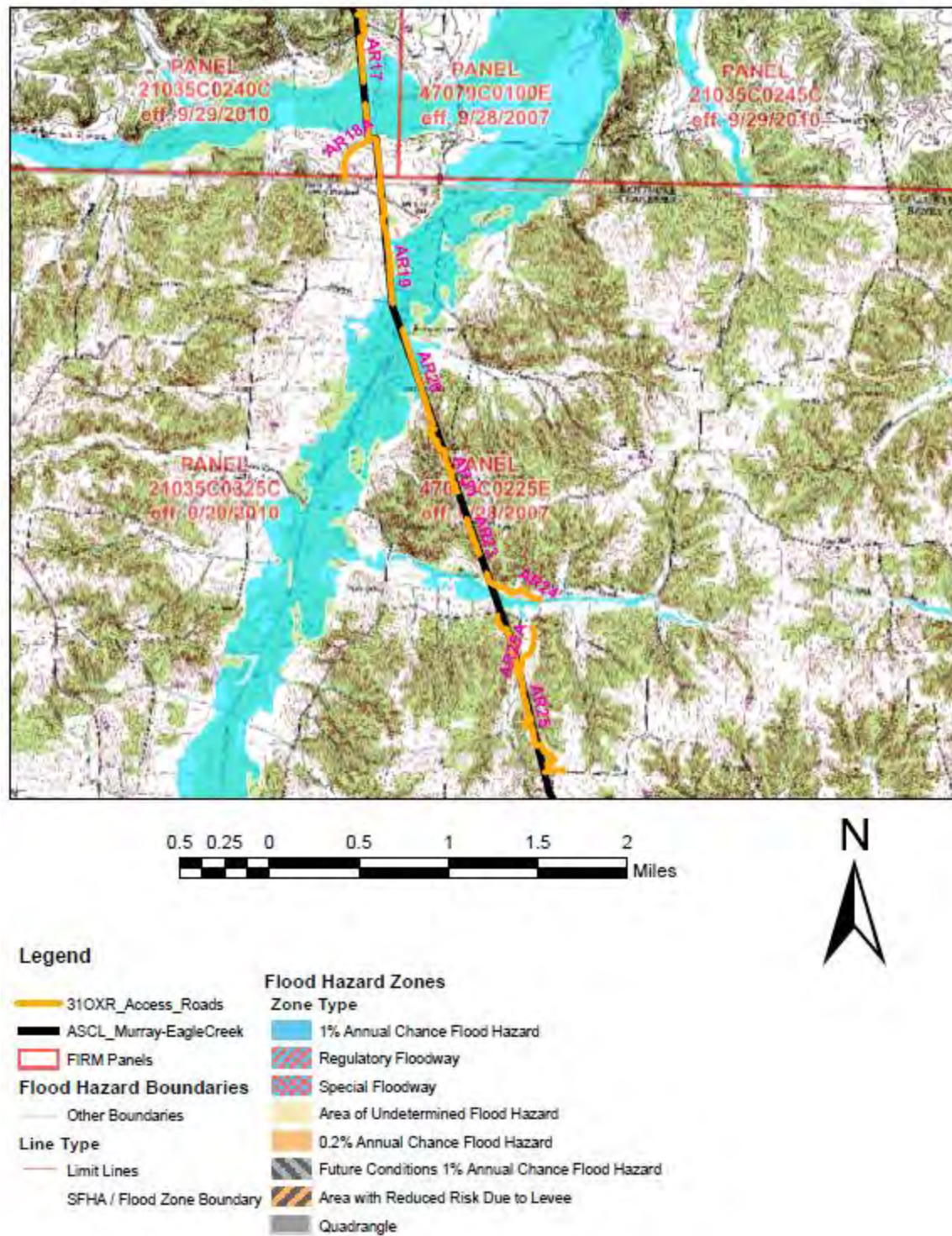


Figure 3-3. Proposed Eagle Creek Transmission Line in Relation to the 100-Year Floodplain (Map 3 of 4)

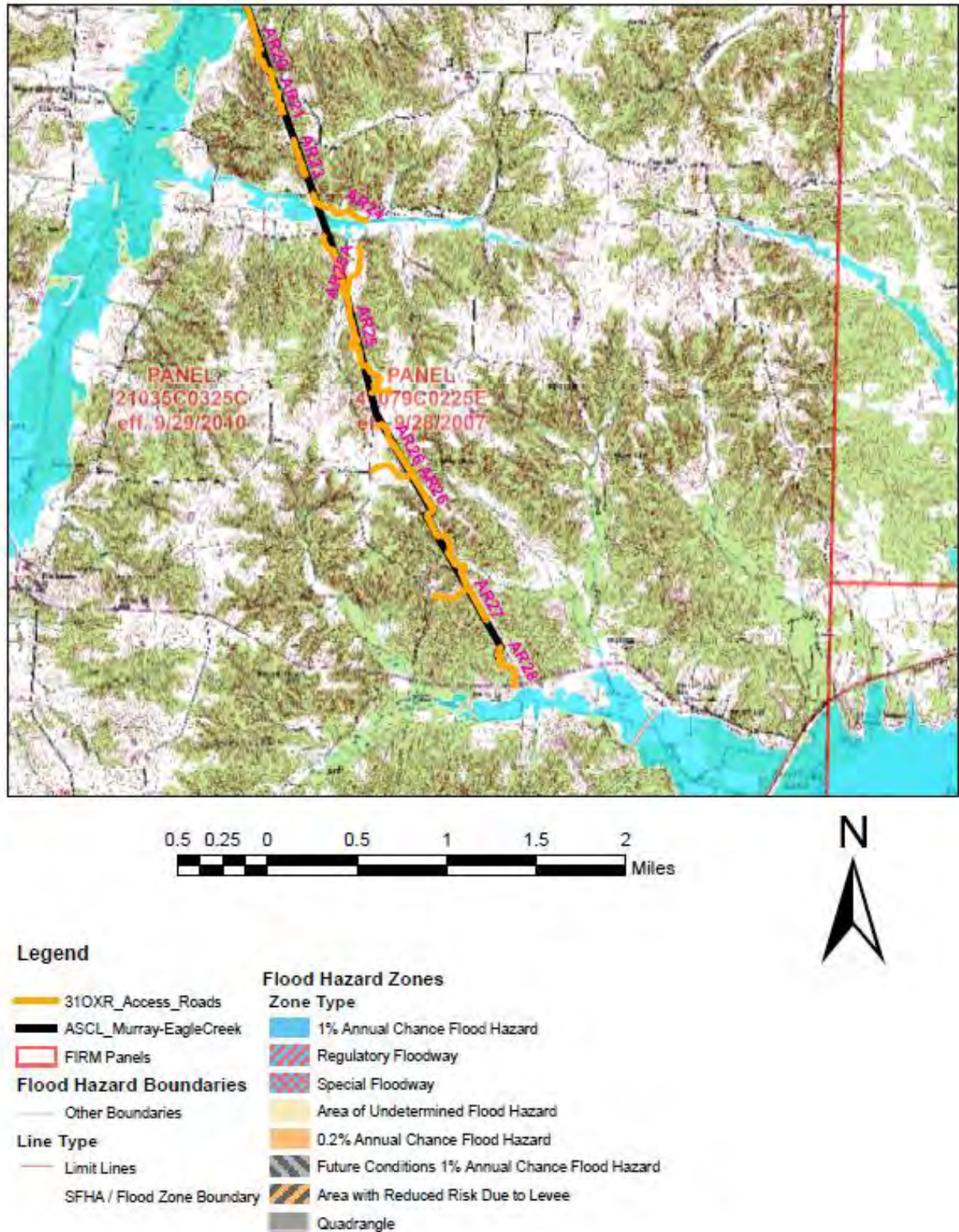


Figure 3-4. Proposed Eagle Creek Transmission Line in Relation to the 100-Year Floodplain (Map 4 of 4)

Due to the existing railroad, site topography, and span distance requirements for transmission structures (poles), five poles (Structures PI-2 through PI-6) of about 3-foot diameter each, would be located within the Clarks River floodway, as shown in Figure 3-1. Calloway County, Kentucky, participates in the National Flood Insurance Program, and any development must be consistent with its floodplain ordinance. TVA believes these five poles would not create an obstruction within the floodway, and therefore would not result in any increase in base flood levels. This is because the space occupied by five 3-foot diameter poles (roughly 15 feet) would be far less than both the width of the floodway, which is about 2,600 feet, and the 100-year floodplain, which is about 4,400 feet where the ROW would be. Additionally, upon construction of the transmission line, the ROW would be kept clear of tall vegetation, increasing the ability of the Clarks River to convey floodwater.

As shown in figures 3-1 through 3-4, access roads AR01, AR02, AR04, AR05, AR08, AR13, AR17, AR18, AR19, and AR20 would be located in 100-year floodplains. The access roads would be temporary, which would be consistent with EO 11988.

Portions of access roads AR01 and AR02 would also be located within the 100-year floodway of the Clarks River (Figure 3-5). To prevent an obstruction in the floodway, TVA would follow the mitigation measures identified below. Therefore, AR01 and AR02 would comply with the National Flood Insurance Program, and thus be consistent with EO 11988.

TVA proposes to install a new switch house, two new breakers, and associated relays at the Murray Substation. Figure 3-5 identifies the approximate area proposed for this equipment in the southeast corner of the property, outside the Clarks River 100- and 500-year floodplain, which would be consistent with EO 11988.

A cumulative impact of constructing the transmission line would include the construction of the Eagle Creek 161-kV Substation to be financed, built, operated, and maintained by Paris BPU. However, as shown in Figure 3-6, the substation would be located outside of the 100- and 500-year floodplain, which would be consistent with EO 11988, including for critical actions. Therefore, TVA would not be promoting unwise development in the floodplain by constructing the transmission line.

Based on implementation of the following standard mitigation measures, the proposed Eagle Creek Transmission Line, temporary access roads, and switch house with relays and breakers would have no significant impact on floodplains and their natural and beneficial values.

- BMPs would be used during construction activities (TVA 2017a).
- Construction would adhere to the TVA subclass review criteria for transmission line location in floodplains.
- Road construction and/or improvements outside the Clarks River floodway would be done in such a manner that upstream flood elevations would not be increased by more than one foot.
- Any fill, gravel or other modifications in the Clarks River floodway that extend above the pre-construction road grade would be removed after completion of the project, would have excess material spoiled outside of the published floodway, and the area would be return to its pre-construction condition.

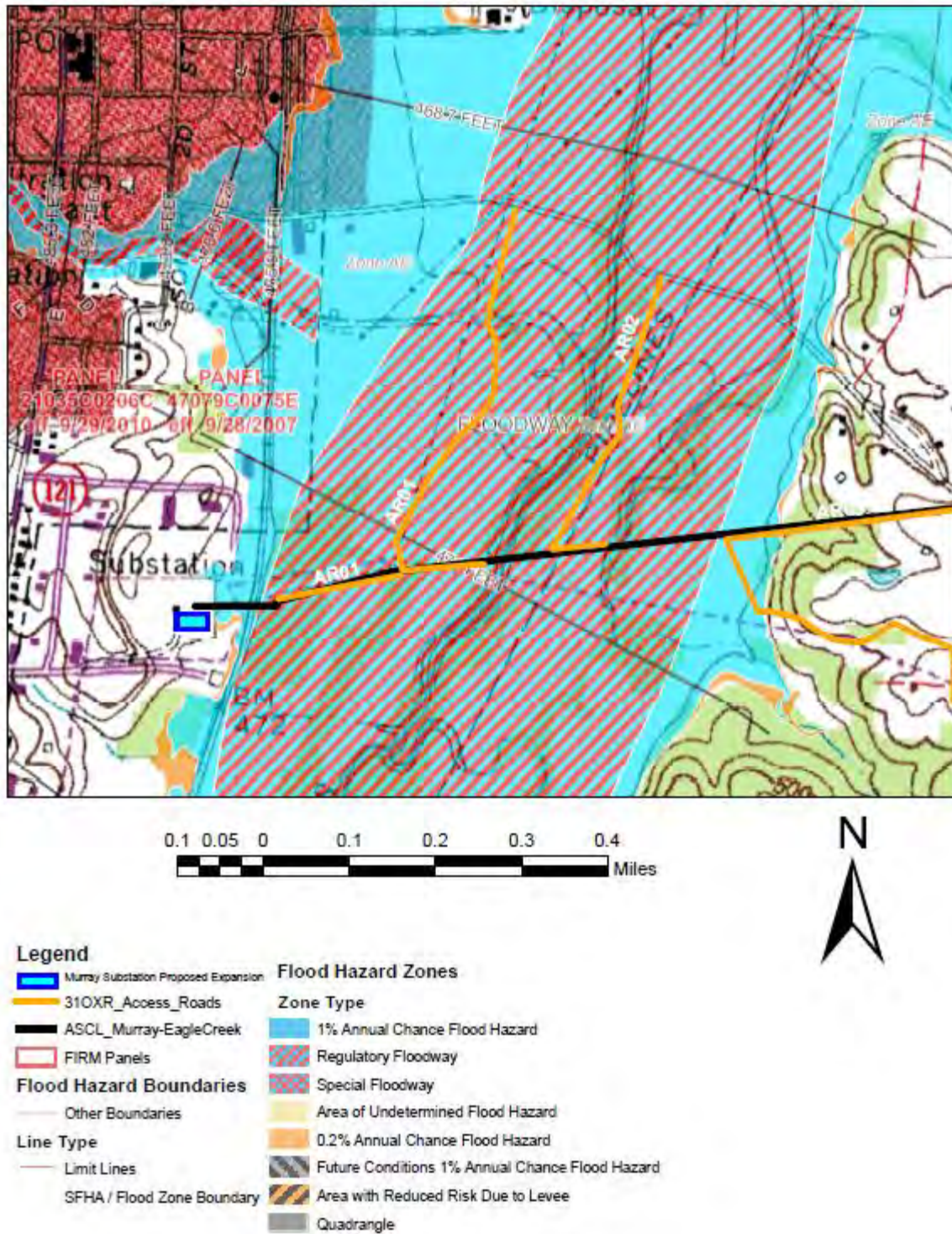


Figure 3-5. Expansion for TVA Switch House and Access Roads in Floodway

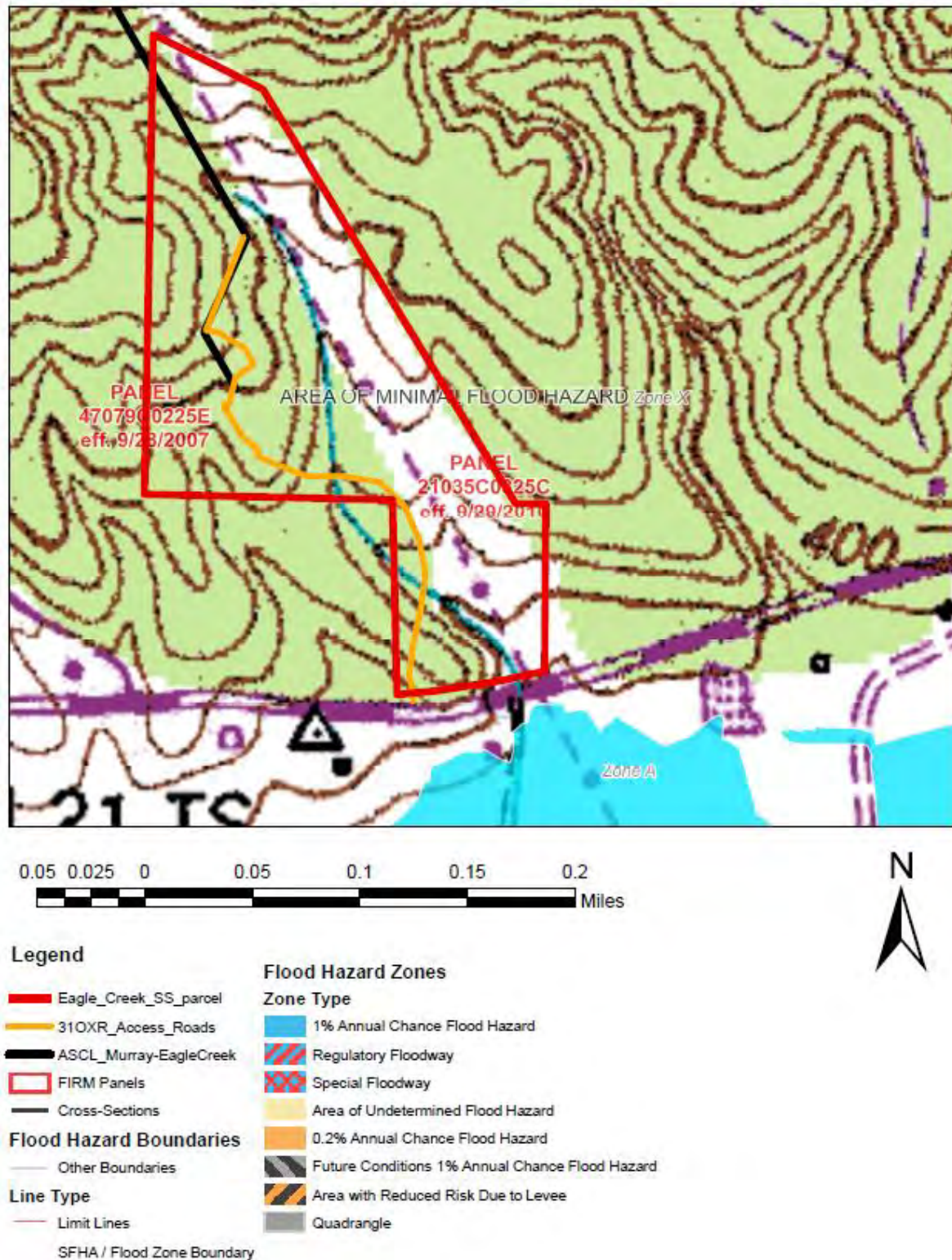


Figure 3-6. Proposed Eagle Creek Substation Parcel and the 100-Year Floodplain

3.8 Wetlands

3.8.1 Affected Environment

The USACE regulates the discharge of fill material into waters of the United States, including wetlands pursuant to Section 404 of the CWA (33 USC 1344). Additionally, EO 11990 (Protection of Wetlands) requires federal agencies to avoid to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative. Section 401 of the CWA requires water quality certification by the state for projects permitted by the federal government (Strand 1997). Section 404 implementation requires activities resulting in the discharge of dredge or fill into waters of the U.S. to be authorized through a nationwide general permit or individual permit issued by the USACE.

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, shallow embayments, and shoreline fringe wetland along the edges of watercourses and impoundments, or lake systems. Wetlands provide many societal benefits including 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. Therefore, a wetland assessment was performed to ascertain wetland presence, condition, and extent to which wetland functions may be provided within the proposed project area. Field assessments took place in October 2019 to delineate wetland areas potentially affected by the proposed Action Alternative. The project footprint included 1.5 miles of new 100-foot-wide transmission line ROW and 14.5 miles of new ROW parallel to an existing TVA transmission line corridor. This 14.5-mile section would require the expansion of the ROW width by an additional 60 feet to accommodate the new transmission line.

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 2012). Using the Tennessee Rapid Assessment Method (TRAM) wetlands were evaluated by their functions and classified into three categories: low quality, moderate quality, or exceptional resource value (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 due to a lesser degree of 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. Wetlands with exceptional resource value provide high functions and values within a watershed or are of regional/statewide concern. Those wetlands would exhibit little, if any, recent disturbance, provide essential and/or large scale storm water storage, sediment retention, and toxin absorption, contain mature vegetation communities, and/or offer habitat to rare species. TRAM was used to assess all wetlands across the entire project footprint due to the similar wetland habitats and landscape settings, regardless of state boundaries.

The proposed Eagle Creek Transmission Line route traverses a rural landscape, dominated by pastureland, agricultural fields, hunting lands, and forested uplands and bottomlands across Calloway County, Kentucky, and Henry County, Tennessee. This project crosses the Lower Tennessee River and Kentucky Lake sub-basins (8-HUC), and Upper Clarks River, Blood River, and Tennessee River watersheds (10-HUC). The project footprint for the Action Alternative was field surveyed to identify actual wetland extent and quality. The majority of the proposed ROW parallels and overlaps an existing ROW, resulting in a large coverage of herbaceous vegetation either due to current ROW vegetation management actions or as a result of current land use crossed by the existing transmission line. A total of 12 wetland areas were identified within the Action Alternative for the selected ROW corridor (Appendix F). The combination of land-use practices and landscape position dictates the wetland habitat type, wetland functional capacity, and wetland value. These wetlands consisted of emergent, scrub-shrub (sapling dominated), and forested wetland habitat of varying levels of condition, thus providing a range of wetland function and value to the surrounding landscape (Tables 3-6 and 3-7, and Appendix F). The delineated wetlands were generally identified in association with smaller to medium sized drainage features and larger floodplain bottoms. Tables 3-6 and 3-7 identify the wetland acreage and wetland types by watershed within the project footprint.

Table 3-6. Acreage of Low, Moderate, and High Quality Wetlands by Watershed Within the Action Alternative Footprint in Kentucky for the Proposed Eagle Creek Transmission Line Corridor

Watershed (10-HUC)	NWI Estimated Total Wetland Area in Watershed*	Delineated Wetland Acreage in Project Area			
		Low	Moderate	High	TOTAL
Upper Clarks River (0604000601)	4% (4,020 acres)	0	9.77	0	9.77
Blood River (0604000508)	6% (4,766 acres)	0.93	13.25	0	14.18
Tennessee River (0604000509)	2% (2,239 acres)	0.03	0	0	0.03
TOTAL		0.96	23.02	0	23.98

*National Wetland Inventory (USFWS 1982)

Table 3-7. Acreage of Wetland Habitat Type by Watershed Within the Proposed Eagle Creek KY Transmission Line Corridor

Watershed (10-HUC)	NWI Estimated Total Wetland Area in Watershed*	Delineated Total Wetland Acreage in Proposed Project			TOTAL
		Emergent	Scrub- Shrub	Forested	
Upper Clarks River (0604000601)	4% (4,020 acres)	7.12	0.41	2.24	9.77
Blood River (0604000508)	6% (4,766 acres)	7.48	0	6.70	14.18
Tennessee River (0604000509)	2% (2,239 acres)	0.03	0	0	0.03
TOTAL		14.63	0.41	8.94	23.98

*National Wetland Inventory (USFWS 1982)

Emergent wetlands are generally devoid of woody vegetation with predominant cover by non-woody species across periodically saturated and/or inundated areas. The emergent wetland habitat encountered within the project footprints were either maintained as emergent habitat by current land use practices, such as farmland or pasture, or through ROW vegetation management with the objective to maintain a meadow-like habitat and deter woody growth that has the potential to interfere with overhead conductor clearance. This was evident within all existing ROW portions of the proposed project footprint wherever vegetation management would be required by TVA to ensure adequate conductor clearance. All other emergent wetlands were identified in agricultural fields or pastureland. 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. Typical emergent wetland vegetation dominated these habitats. This included wetland grasses, sedges, pathrushes, bulrushes, and forbs. Condition and functional capacity of these wetlands ranged from low to moderate in quality, largely due to or dependent on size, landscape position, hydrologic influence, and degree of impacts evident (e.g. grazing, farming, woody vegetation control, soil compaction, mowing, etc.) (Table 3-7).

Scrub-shrub wetlands are dominated by woody vegetation generally less than 15 feet tall and three inches diameter (Cowardin et al. 1979). This habitat type totaled 0.41 acre within one wetland area on the new line portion of the proposed ROW. This wetland area comprises a portion of a larger wetland area containing forested and emergent habitat within the Clarks River floodplain (Appendix F). This habitat type within the project footprint is comprised of young saplings in early successional forest (scrubby). Due to the landscape position, size, disturbance regime, and hydrologic influence, coupled with the extended wetland habitat, this wetland area was assessed as providing moderate wetland value to the surrounding landscape. The scrub-shrub wetland habitat exhibited wetland hydrology indicators and hydric soil coloration within the soil profile. Hydrophytic saplings, such as sugarberry and box elder, and elderberry, a hydrophytic shrub, were dominant within this wetland area.

Forested wetlands encountered within the proposed Eagle Creek Transmission Line corridor consisted of bottomland floodplain areas associated with rivers or smaller tributary streams. 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). 8.94 acres of forested wetland were delineated across nine wetland areas within the proposed Eagle Creek Transmission Line ROW (Appendix F, Table 3-7). Due to landscape position, buffer composition, hydrologic influence, disturbance history, and habitat features, these forested wetlands varied in condition and associated value provided to the surrounding watershed from low to moderate. Moderate quality forested wetland totaled 7.56 acres, providing adequate and healthy function and value. The remaining 1.38 acre was assessed as having low value, offering less than desirable wetland function (Appendix F and Table 3-8).

Table 3-8. Acreage of Low, Moderate, and High Quality Wetlands by Watershed Within the Action Alternative Footprint in Kentucky for the Proposed Eagle Creek Transmission Line Corridor

Watershed (10-HUC)	NWI Estimated Forested Wetland Area in Watershed*	Delineated Forested Wetland Acreage in Proposed Project Area			
		Low	Moderate	High	TOTAL
Upper Clarks River (0604000601)	3.5% (3,790 acres)	0	2.24	0	2.24
Blood River (0604000508)	5% (4,415 acres)	0.15	6.55	0	6.70
Tennessee River (0604000509)	1% (1,931 acres)	0	0	0	0
TOTAL		1.38	7.56	0	8.94

*National Wetland Inventory (USFWS 1982)

The Upper Clarks River watershed in Kentucky contains forested wetlands W001c, W001e, W001f, W002a, and W002c, which total 2.24 acre of forested wetland within the proposed ROW, or less than 0.1 percent of the estimated total 3,790 forested wetland acres within this watershed (Table 3-8). These forested wetlands are located within the floodplain wetland crossing of the Clarks River, a watercourse listed on Kentucky's impaired reaches under 303(d) of the CWA (KDOW 2018). W001c, W001e, W001f, W002a, and W002c scored as having moderate value due to their large size, beneficial landscape position, and sufficient hydrologic influence, coupled with recently recovering disturbances due to farming and existing ROW vegetation management within the wetland area. Wetland hydrology indicators, such as saturated soils, drainage patterns, crayfish burrows, and geomorphic position were exhibited within these forested wetlands. These hydrology parameters influenced the soil profile, and hydric soil coloration was evident. Hydrophytic forested vegetation was dominated by sycamore, river birch, or sugarberry.

The Blood River watershed contains forested wetlands W005, W006, W007a, W008a, W008c, W009a and W011a. These forested wetlands total 6.70 acre within the proposed ROW, or less than 0.1 percent of the estimated total 4,415 forested wetland acres within this watershed (Table 3-8). W005 and W006 consist forested wetlands within the floodplains of small unnamed stream reaches, and W007a, W008a, and W008c comprise forested portions of the floodplain wetland complex associated with McCullough Fork, all of which are located in Kentucky and tributary to the Blood River. W009a and W011a comprise the forested portions of the Blood River floodplain wetland complex crossed by the proposed ROW via overlapping and paralleling an existing ROW in Tennessee. This section of the Blood River is listed on Tennessee's impaired reaches under 303(d) of the CWA (TDEC 2018). W005 and W006 offer low value to the surrounding landscape primarily due to their small size and lack of significant hydrologic influence on downstream waters. W007a, W008a, W008c, W009a, and W011a scored as having moderate value due to their large size, beneficial landscape position, and sufficient hydrologic influence, coupled with recently recovering disturbances due to and existing ROW vegetation management within the delineated wetland area. Wetland hydrology indicators, such as saturated soils, drainage patterns, crayfish burrows, and geomorphic position were exhibited within these forested wetlands. These hydrology parameters influenced the soil profile, and hydric soil coloration was evident. Hydrophytic forested vegetation was dominated by sycamore, sweetgum, red maple, green ash, or wetland oaks.

3.8.2 Environmental Consequences

3.8.2.1 Alternative A – The No Action Alternative

Under the No Action Alternative, construction, operation, and maintenance of the proposed project components would not occur. As such, no project related disturbance to wetlands within the proposed project footprint would occur.

3.8.2.2 Alternative B – TVA Provides a Power Supply to the Paris Board of Public Utilities Eagle Creek 161-kV Substation

Activities in wetlands are regulated by state and federal agencies to ensure no net loss of wetland resources. Under the CWA §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 located in the Nashville District USACE. The CWA §401 mandates state water quality certification for projects requiring USACE approval. In Kentucky, the KDOW is responsible for certifying CWA Section 404 permits are compliant with state water quality regulations. Kentucky's jurisdiction would apply to regulated activities affecting W001 through W008. This includes impacts to W001a-f and W002a-d, both of which comprise the ROW portion of the floodplain wetland complex associated with Clarks River, which is on KDOW's 303(d) list of impaired waters (KDOW 2018). In Tennessee, an ARAP authorized by the Tennessee Department of Conservation and Environment provides water quality certification under CWA §401. An ARAP 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). Tennessee's jurisdiction would apply to regulated activities affecting W009 through W0012. This includes impacts to W009, W010, and W011, all of which comprise the ROW portion of the floodplain wetland complex associated with the Blood River, which is on TDEC's 303(d) list of impaired waters (TDEC 2018). Lastly, EO 11990 requires federal agencies to minimize wetland destruction, loss, or degradation, avoid new construction in wetlands wherever there is a practicable alternative.

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 avoiding mapped wetland resources is described in Section 3.8.1. In compliance with the CWA and EO 11990, TVA has considered all options to avoid and minimize wetland impacts, resulting in the least wetland disturbance practicable. TVA has deemed the proposed action to most practicable minimization to wetland impacts in order to facilitate transmission line construction and long-term maintenance in this vicinity.

Under the Action Alternative, the proposed new Eagle Creek Transmission Line would be constructed. Of the total of 23.98 acres of wetland within the project footprint, 9.35 acre would be altered by the proposed activities for the life of the project (Appendix F). Establishing a transmission line corridor requires vegetation clearing within the full extent of the ROW. Subsequently, long-term maintenance of low stature vegetation is necessary to accommodate clearance and abate interference with overhead wires. Wetlands within the existing TVA transmission line ROW are maintained as emergent/low-growing habitat through TVA's ROW management program or current land use practices. This emergent

wetland area would experience cyclical treatment to maintain a meadow-like wetland habitat within the existing ROW proposed for use to accommodate the new line. However, the remaining 9.35 acre of woody wetland, comprised of 0.41 acre scrub-shrub and 8.94 acre forest, located in the proposed expanded ROW area adjacent to the existing line or within the 1.5 mile portion of entirely new TVA ROW area would be cleared and converted to emergent wetland habitat and maintained at that stature for the perpetuity of the transmission line asset.

Wooded 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.

Wooded wetland conversion to accommodate structure locations and spans is considered a secondary impact resulting from typically nominal wetland fill necessary for structure placement and transmission line construction. Section 404b of the CWA directs agencies to consider secondary impacts, such as loss of wetland functions from forested and scrub-shrub wetland clearing and habitat loss due to conversion. The proposed project requires wetland fill associated with structure placement, with the secondary impact of loss of wetland function from wooded wetland clearing to accommodate conductor spans. 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 states exert this oversight through an established permit process that ensures maintenance of the physical, biological, and chemical integrity of the nation's waters, including wetlands, and the objectives of the CWA are upheld. This includes consideration of anti-degradation to waterways identified as impaired on Tennessee and Kentucky's list of 303(d) (KDOW 2018; TDEC 2018), which would include the Clarks River and Blood River wetland impacts at the proposed ROW crossing locations. The permitting process involves a demonstration of wetland avoidance, minimization of disturbance, and compensation for loss of wetland functions and values within the larger watershed basin. TVA would obtain the necessary Section 404/401 CWA permits and purchase compensatory mitigation, if required by USACE, to ensure the proposed wetland impacts are compensated to the extent deemed appropriate such that wetland functions and values remain at the current capacity and no further degradation to water resources occurs within larger affected basins. Any necessary compensatory mitigation would be purchased through an approved wetland mitigation to ensure no more than minimal impacts to the aquatic environment result and the objectives of the CWA are upheld.

Wetland habitat located in areas proposed for heavy equipment travel could experience minor and temporary impacts during transmission line construction. TVA would minimize wetland disturbance through adherence to wetland best management practices for any and all work necessary within the delineated wetland boundaries (TVA 2017). 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 as needed to accommodate structure installation, conductor stringing, and long term maintenance.

Cumulative impact analysis of wetland effects takes into account wetland loss and habitat conversion at a watershed scale currently and within the reasonable and foreseeable future. Loss of wetland habitat due to wetland fill and loss of wetland functions and values due to forested wetland conversion would be compensated, if required by USACE, through wetland mitigation banking, resulting in no cumulative wetland impacts. Similarly, general trends in wetland impacts resulting from development within the watershed would be subject to CWA, EPA, USACE, TDEC, and KDOW mandates. The wetland mandates enforced by agency permit requirements are in place to ensure wetland impacts do not result in cumulative loss. Therefore, the proposed wetland impacts would be minimal on a cumulative scale due to the avoidance, minimization, and compliance measures in place. In compliance and accordance with the CWA and the directives of EPS's no net loss of wetland function policy, TVA's federal obligation under EO 11990, and USACE, TDEC, and KDOW regulations ensuring no more than minimal adverse effects on the aquatic environment, the Action Alternative's impacts to wetlands would be insignificant.

3.9 Visual Resources

3.9.1 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 3.10.

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 is 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 as a result 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.

The project area encompasses portions of Calloway and Henry counties in southwestern Kentucky and northwestern Tennessee and is comprised of flat to strongly rolling terrain. The landscape is characterized by forested areas and developed suburban and rural features including agricultural fields, fencerows, roadways, existing utility corridors, and scattered residences. Beginning at the existing substation located just outside the city of Murray, Kentucky, the first 1.5 miles of the proposed 161-kV transmission line would extend east-northeast through undeveloped forested areas and agricultural fields and would cross the Clarks River near its western end. This portion of the affected environment is primarily a naturally appearing landscape that shows minimal evidence of human development, with the exception of an existing distribution line crossing at the Clarks River. The remaining 14.5 miles of the proposed transmission line would extend generally southeast, paralleling the existing Marshall-Cumberland 500-kV Transmission Line utilizing a portion of the existing ROW. Thus, the project area combines natural elements (including rolling hills of forested areas) with industrial elements (including the overhead electrical transmission towers, wires and cleared ROW), creating a disjointed visual landscape.

The composition and patterns of vegetation are the prominent features of the landscape within the project area. Vegetation within the project area consists of a variety of deciduous and evergreen trees and agricultural fields. The forms, colors, and textures in the project area are normally seen throughout the characteristic landscape and it is 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 3-9). The scenic integrity in the foreground of the 1.5-mile segment in which the entire 100-foot ROW would be newly acquired is considered moderate due to slight human alteration, including agricultural and residential uses. Along the remainder of the proposed transmission line, the scenic integrity in the foreground is considered low, as the visual alterations associated with the existing 500-kV transmission line (large transmission structures, lines, and clear-cut ROW corridors that disrupt the tree canopy) dominate the landscape. However, in the middleground and background, these alterations are not substantive enough to dominate the view. 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 fair (in the foreground of the existing transmission line) to good (in the foreground of the undeveloped segment and at middle and background viewing distances).

Table 3-9. Visual Assessment Ratings for the Project Area

View Distance	Exiting Landscape	
	Scenic Attractiveness	Scenic Integrity
Foreground	Common	Moderate to Low
Middleground	Common	Moderate
Background	Common	Moderate

The undeveloped portion of the project area is visible to passing motorists near the intersection of Old Salem Road and Applewood Road as well as recreationists on the Clarks River and rural residences. The existing overhead 500-kV transmission line is visible from two state highways and various local roads along the route. Sensitive visual receptors within the foreground include several scattered residential and commercial properties that currently have views of the existing transmission line. In addition, as shown in Figure 3-7, there are a number of churches, cemeteries, schools, parks, and recreational areas within a 4-mile radius of the proposed line. The majority of these facilities occur within the middleground of the proposed project, at distances between 0.5 and 4 miles. One church, one day care center, and seven cemeteries occur within the foreground of the project area. The church and day care center are both located in Murray, Kentucky, southwest of the existing substation and the northern terminus of the proposed transmission line. The seven cemeteries in the foreground, all of which are small private or family cemeteries, are scattered along the length of the 14.5-mile segment that parallels the existing transmission line. The closest is located approximately 650 feet from the existing ROW.

3.9.2 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.

3.9.2.1 Alternative A – The No Action Alternative

Under the No Action Alternative, construction, operation, and maintenance of the proposed project components would not occur. As such, no impacts to visual resources would occur as a result of TVA actions associated with the proposed project.

3.9.2.2 Alternative B –TVA Provides a Power Supply to the Paris Board of Public Utilities Eagle Creek 161-kV Substation

Under the Action Alternative, short-term and long-term impacts to visual resources would occur. During the approximate 6-month construction period, there would be some visual discord from existing conditions from 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 through the use of TVA's standard BMPs (TVA 2017). Because of their temporary nature, construction-related impacts to local visual resources are expected to be minor.

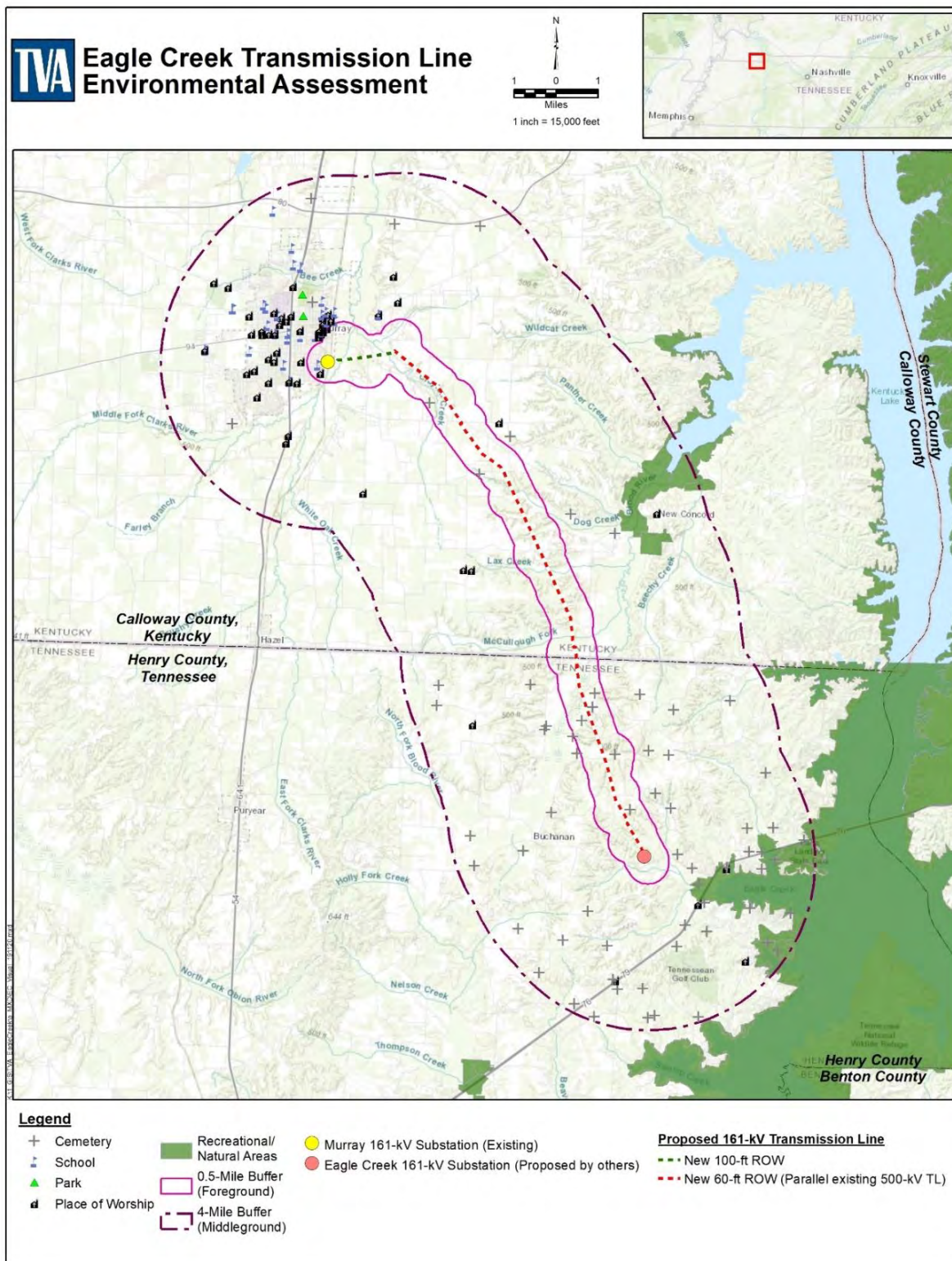


Figure 3-7. Sensitive Visual Receptors within Foreground and Middleground of the Project Area

Permanent impacts consist of the visible alterations associated with new transmission structures, overhead wires, and access road development. Typically, the most visible element of the electric transmission system are the transmission structures and the permanent removal of woody vegetation within the new transmission line ROW which creates a visible corridor. The addition of lines on or near existing structures or ROW increases compatibility with the landscape and minimizes visual impacts. Therefore, where the proposed project would parallel the existing Marshall-Cumberland 500-kV Transmission Line and widen the existing ROW by approximately 60 feet, changes in the viewshed would be minimal and overall aesthetics would remain similar to current conditions. The new transmission structures would have a similar or lower profile than the existing 500-kV transmission line and the project would slightly expand the existing corridor feature rather than create a new visible corridor. In addition, much like the existing transmission line it parallels, the majority of this proposed transmission line segment would not be visible to the public due to the rolling terrain, distance from developed areas, and presence of forested buffers. For residents and passing motorists that do have views of the existing transmission line, the presence of an additional 161-kV transmission line would add another element that is discordant with the natural environment, but that is consistent with the existing 500-kV transmission line, resulting in minor changes to perceptions of the landscapes aesthetic.

The construction of the 1.5-mile segment of proposed 161-kV transmission line that does not parallel the existing 500-kV transmission line would create a new visible corridor and would be visible in the foreground to a small number of residences, recreationists on the Clark River at the proposed crossing, and motorists near the intersection of Old Salem Road and Applewood Road where the transmission line would cross. However, both of these roads support relatively low traffic volumes and views from the residences would be from a distance of 200 feet or more, over expanses of crop land and/or obscured by vegetated buffers. While this segment of the proposed transmission line would add a small number of discordantly contrasting elements and colors to the existing landscape, the view of the corridor would be limited by the minimal number of visual receptors in the foreground and the natural density of the tree growth near much of the transmission line ROW.

In addition to nearby residents and motorists, sensitive visual receptors, including one church, one day care center, and seven cemeteries, were identified in the foreground of the proposed 161-kV transmission line (Figure 3-7). The church and day care center are located near the northwestern project terminus in the city of Murray and are separated from the proposed transmission line by commercial properties, wooded areas, and the Murray Substation. In the unlikely event the proposed transmission line is visible through the intervening vegetation and structures, it would be nearly indistinguishable from the existing substation and would have negligible impacts on the viewshed from these facilities. All seven of the cemeteries located in the foreground of the proposed transmission line have areas of dense forest separating them from the proposed ROW, and most are in wooded areas themselves. It is expected that views of the transmission line would typically be completely obstructed from these cemeteries. Even if the proposed transmission line is partly visible from any of these locations, it would be visually similar to views of the existing 500-kV transmission line. For facilities located at further distances, in the middleground and background, the proposed transmission line would be less visible and obtrusive as it would largely fall into an observer's view where objects are less distinguishable.

The existing Murray Substation and Marshall-Cumberland 500-kV Transmission Line 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 line, it would still remain common or ordinary (Table 3-10). Impacts to scenic integrity are anticipated to be greatest in the foreground along the newly acquired 1.5-mile ROW segment. In this area, scenic integrity would be reduced from moderate to low, as visually disruptive elements and human alterations would begin to dominate the landscape. Along the remainder of the proposed transmission line, the scenic integrity would remain low, as the construction adjacent to an existing transmission line would contribute to further alteration of the landscape character, but only slightly. There would be no change in the ratings for the middleground and background as the addition of the proposed transmission line would not be substantive enough to dominate the view from these distances (Table 3-10). 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 entire length of the proposed transmission line but 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 3-10. Visual Assessment Ratings for the Affected Environment Resulting from the Action Alternative

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

3.10 Archaeological and Historic Resources

3.10.1 Affected Environment

Federal agencies are required by Section 106 of the NHPA and by NEPA to consider the possible effects of their undertakings on historic properties. An *historic property* is 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 Secretary of the Interior (36 Code of Federal Regulations (CFR) §800.16). *Undertaking* means any project, activity, or program, and any of its elements that has the potential to effect historic properties 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 are:

- 1) Initiation (defining the undertaking and the APE, and identifying consulting parties);
- 2) Identification of historic properties in the APE;
- 3) Assessment of effects to historic properties; and
- 4) Resolution of adverse effects by avoidance, minimization, or mitigation.

Throughout the Section 106 process, the agency must consult with the appropriate SHPO (in this case the Tennessee and Kentucky SHPOs), federally recognized Indian tribes that have an interest in the region, and any other party with a vested interest in the undertaking. TVA is coordinating its Section 106 compliance with NEPA's requirement to assess adverse impacts on cultural or historical resources.

A project may have effects on a particular historic property that are not adverse, if those effects do not diminish the characteristics of the property that qualify it for inclusion on the National Register. However, if the agency determines (in consultation) that the undertaking's effect on a historic property would diminish any of the qualities that make the property eligible for the NRHP (based on the criteria for evaluation at 36 CFR Part 60.4), the effect is said to be *adverse*. Examples of adverse effects would be ground disturbing activity in an archaeological site, or erecting structures within the viewshed of a historic building in such a way as to diminish the structure's integrity of feeling or setting.

Ground disturbance associated with the undertaking could occur within the 100-foot of new ROW along the first 1.5-mile section of the transmission line and within the 60-foot of new ROW along the remaining 14.5 miles of transmission line paralleling TVA's existing transmission line. Additionally, ground disturbance could occur within the 20-foot wide access routes totaling approximately 25 miles in length. In areas where access routes follow existing improved roads the APE narrows to the width of the existing road. Ground disturbance could also occur at TVA's 0.25 acre expansion of the Murray Substation. Visual effects could extend within a one-half mile radius surrounding new 100-foot ROW within the state of Kentucky. Visual effects for the new 60-foot ROW were not assessed as this portion of the transmission line would parallel TVA's existing Marshall-Cumberland 500-kV transmission line and would not present additional visual effects beyond the existing transmission line. TVA determined the APE to include the total area mentioned above. The areas within the APE were surveyed for archaeological and/or architectural resources. After consultation with the Tennessee SHPO, the area of visual effects within a one-half mile radius of Paris BPU's new substation, while not within the APE, was also surveyed voluntarily by TVA.

TVA performed a Phase I cultural resources survey of the APE, which included an archaeological survey and an historic architectural survey. The archaeological investigation resulted in the documentation of one archaeological site (40Hy238) in the state of Tennessee. Site 40Hy238 is a prehistoric open habitation site of an indeterminate time period. The site was represented by a low density of undiagnostic lithic material which was recovered from disturbed contexts in three shovel test pits. The recovered materials lacked depositional integrity and no evidence of intact buried deposits or features were observed in any of the shovel test pits. Given the paucity of the materials and the lack of integrity, TVA recommends that the portion of Site 40Hy238 within the APE lacks characteristics that would make it eligible for inclusion in the NRHP. However, as the site may extend beyond the project boundaries to the east and west, TVA cannot propose any determination of the site's overall NRHP eligibility.

A total of six archaeological sites (15Cw320-15Cw323, 15Cw324, and 15Cw325), and three isolated finds (IF2-IF4), were documented in the state of Kentucky. Two of the recorded archaeological sites (15Cw322 and 15Cw324) are prehistoric open habitation sites of indeterminate temporal affiliation, three sites (15Cw320, 15Cw321, and 15Cw323) are historic farm/residence sites dating to the twentieth century, and one site (15Cw325,

Macedonia Cemetery) is a historic cemetery dating to the late nineteenth through twentieth centuries. The three isolated finds are all of indeterminate prehistoric temporal affiliation.

The investigated portions of the recorded sites within the APE all lack archaeological integrity and/or research value and would not contribute to the sites' eligibility for inclusion in the NRHP. However, the sites were not fully delineated during the survey, as shovel testing was limited to the archaeological survey area. As such, TVA recommends that while the NRHP eligibility of the sites is undetermined, the portions of the sites within the APE lack characteristics that would contribute to their eligibility for the NRHP. The three isolated finds are recommended as not eligible for inclusion in the NRHP. TVA finds that the project would have no adverse effects on archaeological resources included in, or eligible for inclusion in, the NRHP.

The architectural assessment investigated 40 previously-recorded architectural resources, CWM-109 to CWM-122, CWM-126, CWM-127, CWM-135 to CWM-157, and CW-99, which fell within their 0.5 mile survey radius. Based on the results of the survey, it is the opinion of TVA that properties CWM-139 to CWM-147 are not eligible for listing on NRHP due to their lack of architectural and historical significance. TVA's survey observed that architectural resources CWM-109–CWM-111, CWM-113, CWM-114, CWM-116, CWM-117, CWM-121, CWM-122, CWM-127, CWM-135–CWM-138, CWM-148, CWM-151–CWM-154, CWM-156, and CWM-157 are extant, but are located outside the viewshed to the project area and, therefore, not in the APE. In addition, previously recorded architectural resources CW-99, CWM-112, CWM-115, CWM-118–CWM-120, CWM-126, CWM-149, CWM-150, and CWM-155 have been destroyed since their initial recordation.

The architectural survey also resulted in the documentation of 28 newly recorded architectural resources (CW-587 to CW-614). Following its assessment of these properties, it is the opinion of TVA that newly recorded architectural resources CW-587 to CW-589 and CW-591 to CW-614 are not eligible for listing on the NRHP due to their lack of architectural significance and loss of integrity caused by modern alterations. TVA recommends newly documented architectural resource CW-590 eligible for the NRHP under Criterion A and C for its historical and architectural significance in connection with early twentieth century tobacco production in Calloway County. TVA's assessment of potential effects to the tobacco barn finds that the proposed undertaking would not destroy, damage, or physically alter any part of the resource and no construction activity associated with the project would occur on the associated parcel. Furthermore, the proposed project would not compromise the architectural significance of the resource for which it is recommended eligible for the NRHP. Based on current project plans, it is the opinion of TVA that the proposed undertaking would have no adverse effect to historic architectural resources located within the project APE. TVA recommends no additional investigation of above-ground resources in connection with the proposed project.

Based on these investigations, there are no NRHP-listed or eligible for listing archaeological sites, and one NRHP-eligible architectural property (CW-590) within the APE. Additionally, there is one historic cemetery (15Cw325, Macedonia Cemetery) located in the APE. TVA has determined this cemetery to be ineligible for inclusion in the NRHP.

3.10.2 Environmental Consequences

3.10.2.1 Alternative A – The No Action Alternative

Because construction, operation, and maintenance of the proposed project components would not occur under the No Action Alternative, no impacts to archeological and historic resources in the project area would occur as a result of TVA actions associated with the proposed project.

3.10.2.2 Alternative B –TVA Provides a Power Supply to the Paris Board of Public Utilities Eagle Creek 161-kV Substation

As there are no NHRP-listed or eligible archaeological sites located in the APE, the proposed actions would have no potential to result in adverse impacts on archaeological sites. The single NRHP-eligible historic structure (CW-590) would not be impacted by any construction activities and the proposed project would not compromise the architectural significance of the resource for which it is recommended eligible for the NRHP. Based on this investigation, TVA finds that the undertaking as currently proposed would have no adverse effect to historic properties.

Though the Macedonia Cemetery (15Cw325) is recommended ineligible, TVA understands the sensitivity of a cemetery's contents. Therefore, TVA would establish a 100-foot protective buffer around the Macedonia Cemetery (15Cw325) for future transmission line maintenance activities. TVA would implement the following restrictions within the buffer area:

- No new construction or ground disturbance.
- Although the owner and operator of the cemetery has authorized TVA to remove trees to provide ground clearance for the overhead transmission line wires, certain restrictions to vegetation management would be implemented. All vegetation clearing and removal would be carried out by hand and conducted in a manner as to insure no damage to any grave markers or monuments.

TVA consulted with the Kentucky SHPO, Tennessee SHPO, and federally recognized tribes with regards to its findings and NRHP eligibility recommendations of archaeological sites and historic architectural resources in the APE. TVA has received concurrence from the Kentucky and Tennessee SHPOs' offices and from all of the federally recognized tribes that chose to take part in the consultation (Appendix B).

3.11 Recreation, Parks, and Natural Areas

3.11.1 Affected Environment

Natural areas include ecologically significant sites; federal, state, or local park lands; national or state forests; wilderness areas; scenic areas; conservation easements; wildlife management areas; recreational areas; greenways; trails; Nationwide Rivers Inventory (NRI) streams; and Wild and Scenic Rivers. This section addresses natural areas that are on, immediately adjacent to (within 0.5 miles), or within the region of the proposed Eagle Creek Transmission Line project (5 mile radius).

The TVA Regional Natural Heritage database indicated that no natural areas are located within the footprint of the proposed project. Fifteen natural areas occur within 5 miles of the proposed project (Table 3-11).

Table 3-11. Natural Areas Located within 5 Miles of the Proposed Eagle Creek 161-kV Transmission Line

Managed Area Name	Managed Area Type	Distance from Project Area
Murray State University Arboretum	Arboretum	0.08
Agricultural Conservation Easement	Conservation Easement	0.48
Wetlands Reserve Program	Conservation Easement	0.85
Blood River Seeps Easement - The Nature Conservancy Conservation Easement	Conservation Easement	0.89
Kentucky Lake Wildlife Management Area	Wildlife Management Area	1.98
Blood River TVA Habitat Protection Area	Habitat Protection Area	1.98
Blook River Seeps Kentucky State Nature Preserve	Nature Preserve	2.17
Calloway County Seep Swamp Potential National Natural Landmark	Potential National Natural Landmark	2.76
McCuiston Woods TVA Habitat Protection Area	Habitat Protection Area	2.94
Panther Creek Swamp TVA Habitat Protection Area	Habitat Protection Area	3.07
Dalton Road Seeps	Rare Habitat Type	3.07
Panther Creek Swamp Registered Natural Area	State Park	3.07
Paris Landing State Park	State Park	3.09
Tennessee National Migratory Wildlife Refuge - Big Sandy Unit	National Wildlife Refuge	3.28
Beechy Creek Wildlife Management Area	Wildlife Management Area	3.75

Two of these areas are located within 0.5 mile:

- Murray State University Arboretum – 12-acre site educational site comprised of open woodlands, savanna, open prairie, oak/hickory forest and wetlands.
- Agricultural Conservation Easement (ACE) – 64-acre agricultural site with a conservation easement placed on it to protect resources such as productive agricultural land, ground and surface water, wildlife habitat, historic sites or scenic views.

Other natural areas within 5-miles of the proposed alternative development sites are listed in Table 3-11.

There are no developed outdoor recreation areas in the vicinity of this project. However, some dispersed recreational activity such as hunting, target practice and nature observation occurs on some of the properties within the pathway of the proposed transmission line.

3.11.2 Environmental Consequences

3.11.2.1 Alternative A – The No Action Alternative

Because construction, operation, and maintenance of the proposed project components would not occur under the No Action Alternative, no impacts to recreation, parks, and natural areas in the project area would occur as a result of TVA actions associated with the proposed project.

3.11.2.2 Alternative B –TVA Provides a Power Supply to the Paris Board of Public Utilities Eagle Creek 161-kV Substation

There would be no direct impacts to natural areas associated with the preferred alternative, as there are no natural areas within the proposed project footprint. All of the natural areas listed in Table 3-11, are located a sufficient distance away such that direct, indirect, and cumulative impacts to natural areas are not expected.

Under the Action Alternative, ROW clearing and transmission line development could cause some shifts in dispersed outdoor recreation activity in or immediately adjacent to the project footprint, but any such shifts should be minor and insignificant.

3.12 Socioeconomics and Environmental Justice

3.12.1 Affected Environment

The proposed 16-mile 161-kV transmission line would extend from an existing substation just outside the city of Murray, in central Calloway County, Kentucky, to the proposed Eagle Creek 161-kV Substation in northeastern Henry County, Tennessee. Given the nature of the proposed actions, the study area for socioeconomic analysis is defined as the five census block groups encompassing the proposed project actions. As the study area spans Calloway and Henry counties in Kentucky and Tennessee, both of these counties and states 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 2013 to 2017 American Community Survey 5-year estimates provided by the U.S. Census Bureau (USCB) (USCB 2019a).

3.12.1.1 Demographics and Socioeconomic Conditions

Demographic characteristics of the study area and of the secondary reference geographies are summarized in Table 3-12. The study area has a resident population of 5,807 and is predominantly characterized by low-density rural residential development. It includes a portion of the city of Murray, Kentucky as well as the unincorporated communities of New Concord, Kentucky and Buchanan, Tennessee. Calloway and Henry Counties have resident populations of 38,616 and 32,263, respectively, both of which make up less than one percent of the total population of the state in which they are located. Since 2010, the population within the block groups that make up the study area has increased by 17.6 percent, notably higher than the minor increases experienced by Calloway County (3.8 percent) and the states of Kentucky and Tennessee (2 and 4 percent, respectively). During this same period, the population of Henry County essentially remained the same, experiencing a population decrease of 0.2 percent.

Approximately 94 percent of the study area population is white. The largest minority group in the study area is Hispanic or Latino, representing 3.2 percent of the population, followed by Black or African American with 1.4 percent, persons who identified as two or more races with 1.3 percent, and small numbers who are American Indian and Alaska Native (less than 1 percent). Minority population percentages in the study area are generally lower than those of the secondary reference geographies, which have total minority populations ranging from 10.3 to 25.7 percent (Table 3-12).

The average median household income in the block groups that make up the study area is \$42,539, which is slightly higher the median household income reported for Calloway County (\$39,269) and Henry County (\$40,415) but lower than that of either state (\$46,535 in Kentucky and \$48,708 in Tennessee) (Table 3-12). The percentage of the study area population below the poverty level is 16.9 percent, similar to the state of Tennessee (16.7 percent) and slightly lower than the state of Kentucky and the referenced counties, where percentages range from 18.3 to 22.4 percent of the total population.

Table 3-12. Demographic and Socioeconomic Characteristics of Study Area and Secondary Reference Geographies

	Study Area (5 Census Block Groups Containing Proposed Project Activities)	Calloway County, KY	Henry County, TN	State of Kentucky	State of Tennessee
Population ^{1,2}					
Population, 2017 estimate	5,807	38,616	32,263	4,424,376	6,597,381
Population, 2010	4,938	37,191	32,330	4,339,367	6,346,105
Percent Change 2010-2017	17.6%	3.8%	-0.2%	2.0%	4.0%
Persons under 18 years, 2017 estimate	24.3%	18.1%	21.0%	22.9%	22.7%
Persons 65 years and over, 2017 estimate	17.4%	16.4%	22.1%	15.2%	15.4%
Racial Characteristics ¹					
Not Hispanic or Latino					
White alone, 2017 (a)	93.9%	89.7%	87.5%	85.1%	74.3%
Black or African American, 2017 (a)	1.4%	3.7%	9.0%	7.9%	16.7%
American Indian and Alaska Native, 2017 (a)	0.3%	0.3%	0.2%	0.2%	0.2%
Asian, 2017 (a)	0.0%	1.8%	0.1%	1.3%	1.7%
Native Hawaiian and Other Pacific Islander, 2017 (a)	0.0%	0.1%	0.0%	0.0%	0.1%
Some Other Race alone, 2017 (a)	0.0%	0.0%	0.0%	0.1%	0.1%
Two or More Races, 2017	1.3%	1.8%	0.9%	1.9%	1.9%

	Study Area (5 Census Block Groups Containing Proposed Project Activities)	Calloway County, KY	Henry County, TN	State of Kentucky	State of Tennessee
Hispanic or Latino, 2017	3.2%	2.6%	2.3%	3.4%	5.2%
Housing and Income ¹					
Housing units, 2017	2,616	18,585	17,157	1,965,202	2,903,199
Median household income, 2013-2017	\$ 42,539	\$ 39,269	\$ 40,415	\$ 46,535	\$ 48,708
Persons below poverty level, 2013- 2017	16.9%	22.4%	19.7%	18.3%	16.7%
Persons below low- income threshold, 2013-2017 (b)	43.2%	40.1%	43.7%	38.1%	37.3%

(a) Includes persons reporting only one race.

(b) Low-income threshold is defined as two times the poverty level

Sources: ¹U.S. Census Bureau 2019a; ² U.S. Census Bureau 2011

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, day-care centers, churches, and community centers. When applicable, the study area for the evaluation of impacts to community services is the service area of various providers; otherwise, a secondary study area identified for the purposes of a socioeconomic analysis may be defined. In this case, a 5-mile radius was utilized along the entirety of the project area to identify facilities and emergency services that could be potentially impacted by proposed project activities or emergency incidents along the length of the transmission line.

Community facilities and services available within a 5-mile radius of the proposed project area include schools and universities, churches, libraries, health care facilities, and police and emergency services. The majority of these facilities are concentrated in and around Murray, Kentucky, in the northeastern portion of the study area where the population density is greatest. Additionally, few of these community facilities are located in close proximity (within 0.5 mile) of the proposed transmission line. Near the northern terminus at the Murray Substation, there are several municipal government buildings, a day-care center, and the Greater Hope Missionary Baptist Church located within a 0.5-mile radius. The only other community facilities located within 0.5 mile of the proposed transmission line are seven small cemeteries which are dispersed along the corridor.

3.12.1.3 Environmental Justice

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. Environmental justice has been defined as the fair treatment and meaningful

involvement of all people regardless of race, color, national origin, or income (EPA 2018) and ensures that minority and low-income populations do not bear disproportionately high and adverse human health or environmental effects from federal programs, policies, and activities. Although TVA is not one of the agencies subject to this order, TVA routinely considers environmental justice impacts as part of the project decision-making process.

Guidance for addressing environmental justice is provided by the Council on Environmental Quality's (CEQ) Environmental Justice Guidance under the National Environmental Policy Act (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 2018 USCB Poverty Threshold for an individual is an annual income of \$13,064, and for a family of four it is an annual household income of \$25,900 (USCB 2019b). 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 the 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 2017). 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 2011). 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., greater than or equal to 20 percent) the appropriate geographic areas of analysis.

Based on a preliminary review of the EPA's EJSCREEN tool, no communities meeting the criteria for consideration as minority populations were identified within the study area. However, EJSCREEN did identify some communities within the study area as low-income populations. Consequently, a more detailed evaluation was completed using the 2013 to 2017 American Community Survey data to identify specific block groups within the study area that exceed environmental justice thresholds.

Total minority populations (i.e., all non-white and Hispanic or Latino racial groups combined) comprise approximately 15 percent of the population of Kentucky and 26 percent of the population of Tennessee. In Calloway and Henry counties, where project activities are proposed, total minority populations account for 10.3 and 12.5 percent of the population, respectively. Just 6.1 percent of people living within the study area are minorities, with percentages for individual block groups ranging from 3.5 to 9.8 percent of the population. Thus, none of the selected block groups 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 within the study area meet the criterion for consideration as minority population groups subject to environmental justice considerations.

Population percentages in Kentucky and Tennessee living below the low-income threshold are 38.1 percent and 37.3 percent, respectively. Calloway County and Henry County have slightly higher percentages of low-income individuals (40.1 percent and 43.7 percent, respectively) than do their respective states. About 43.2 percent of people living within the study area are considered low-income, with percentages for individual block groups ranging from 29.5 to 52.1 percent of the population. Two of the selected 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 3-8 identifies these block groups determined to meet the criterion for consideration as low-income population groups subject to environmental justice considerations.

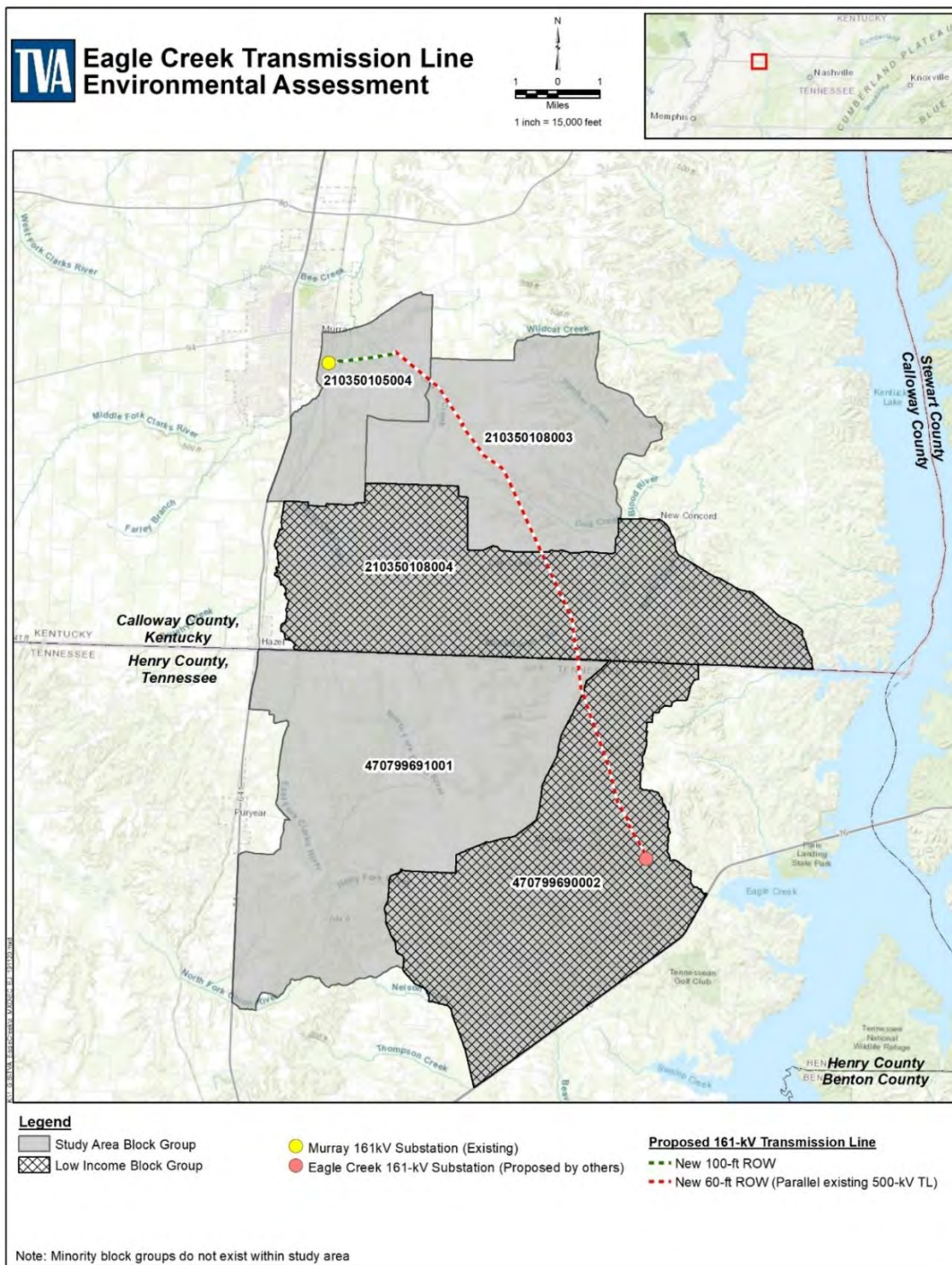


Figure 3-8. Environmental Justice Populations Within the Study Area

3.12.2 Environmental Consequences

3.12.2.1 Alternative A – The No Action Alternative

Under the No Action Alternative, construction, operation, and maintenance of the proposed project components would not occur. Demographic conditions would continue to follow current trends. However, no additional changes to demographics in the project area would occur as a result of TVA actions associated with the proposed project.

3.12.2.2 Alternative B –TVA Provides a Power Supply to the Paris Board of Public Utilities Eagle Creek 161-kV Substation

3.12.2.2.1 Demographic and Socioeconomic Impacts

Under the Action Alternative, proposed construction activities would occur over approximately six months and would entail the use of mobile crews comprised of both contractors and full-time TVA staff. Due to the linear nature of the project, the construction workforce, totaling between 20 and 50 workers at a given time, would be transient as work progresses along the transmission lines. Similarly, in the long-term, there would be work crews present in the study area for occasional ROW maintenance and vegetation management. In both cases, there would be no notable effects on local demographics due to the short-term presence of work crews in any given location.

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 purchase approximately 124 acres of ROW easements, across 76 parcels, from private landowners. Those easements would give TVA the right to construct, operate, and maintain the transmission line across the property owner's land. New temporary or permanent access roads on privately-owned land may also be required to access the ROW. Additionally, in certain cases, it may be necessary for TVA to acquire ownership of a property. In each case, current landowners would be compensated for the value of such rights or properties. While beneficial, the direct local economic effect from the purchase of additional property or ROW easements would be minor relative to the total regional economy. 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.

In addition, the implementation of the proposed Action Alternative would provide a continuous, reliable source of power for the Calloway County, Kentucky and Henry County, Tennessee areas. Currently, increasing power loads caused by commercial and residential growth, as well as aging infrastructure and the reliance of the Paris BPU on a single substation, puts the service area at high risk of overloading facilities and resulting power outages. Therefore, the increased capacity and reliable power supply that would be provided under the Action Alternative would support future development opportunities and could result in long-term indirect economic benefits to the area.

There is also the potential for indirect effects to property values for those parcels intersected by or adjacent to the new transmission line ROW. However, 14.5 miles of the proposed 16-mile transmission line would parallel an existing 500-kV transmission line, where additional indirect impacts to the properties that already accommodate the existing transmission line would be minimal. Along the remaining 1.5 miles of proposed

transmission line, the vast majority of the new construction would take place in forested or agricultural areas; residential properties have been avoided to the greatest extent possible. As most homes are located a significant distance from the proposed ROW and/or would be separated from the transmission line by a vegetated buffer, any effects to local property values would be minor.

3.12.2.2 Community Facilities and Services

Direct impacts to community facilities occur when a community facility is displaced or access to the facility is altered. Construction of the proposed 16-mile transmission line segment would not result in the displacement of any community facilities nor impede access to the 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 related project actions would not result in notable impacts to local demographics, increased demands for services such as schools, churches, and healthcare facilities are not anticipated. However, in the event of an emergency along the transmission line corridor, local law enforcement, fire, and/or Emergency Management System response would likely be required. Due to the rural nature of much of the study area, emergency services in the immediate vicinity are limited. While there are some volunteer fire departments that serve the project area, most emergency services would likely come from the city of Murray. However, as the need for emergency services along the transmission line is anticipated to be a rare occurrence, implementation of the Action Alternative would not have a notable impact on the demand for emergency services in the area.

3.12.2.3 Environmental Justice

Two block groups encompassing portions of the proposed 161-kV transmission line study area were determined to meet the criteria for consideration as low-income population groups subject to environmental justice considerations (Figure 3-8). Impacts to environmental justice populations along the proposed transmission line segment could include short-term increases in noise and fugitive dust during ROW clearing, construction, and access road use, and long-term impacts related to ROW maintenance, potential impacts to property values, and limitations on future land use in the immediate vicinity of the ROW easement. However, construction activities would be temporary and would typically have minimal impact on area residents due to the distance between the majority of residences and the proposed ROW. Long-term impacts such as decreased property value and land use limitations would be minimized as all portions of the proposed transmission line located within low-income block groups would parallel an existing 500-kV transmission line; the 1.5-mile segment of new construction through undeveloped land is not located in a community subject to environmental justice considerations. Additionally, following construction, impacts to environmental justice populations associated with the operation and maintenance of the transmission line would be similar to those experienced under current conditions with the existing transmission line. Therefore, impacts to environmental justice populations associated with the proposed transmission line would be minor, and would not be disproportionate as impacts would be consistent across all communities (i.e., environmental justice and non-environmental justice) along the transmission line corridor.

3.13 Transmission Line Post-Construction Effects

3.13.1 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 transmission line, and the distance from the transmission 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 very low amount of residual energy 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 line has 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 line to develop a charge (typically these would be objects located within the ROW) would be grounded by TVA to prevent them from being sources of shocks.

Under certain weather conditions, high-voltage transmission lines, such as the proposed 161-kV transmission line, may produce an audible low-volume hissing or crackling noise (Appendix G). 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-generated noise is not associated with any adverse health effects in humans or livestock.

Other public interests and concerns related to EMFs include potential interference with A.M.-band 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 preventable and correctable.

Older 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, these older devices and designs (i.e., those beyond five to ten 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, such as the proposed transmission line, no longer 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 such adverse effects 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 power 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 laboratory 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 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 (International Association for Research on Cancer 2002).

TVA follows medical and health research related to EMFs, and thus far, 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).

TVA also follows media reports which suggest such associations, but these reports do not undergo the same scientific or medical peer review that medical research does. 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 position of the scientific and medical communities 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 United States, 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 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 limited to 150 milligauss at the edge of the ROW for transmission 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 EMFs.

Under this alternative, 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 transmission line and with the terrain. Nevertheless, EMF strength attenuates rapidly with distance from the transmission 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.

3.13.2 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 tops of structures and along the transmission line, for at least the width of the ROW. NESC standards are strictly followed when installing, repairing, or upgrading TVA transmission 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.

3.13.3 Transmission Structure Stability

The structures that would be used on the proposed transmission line are similar to those shown in Section 2.5.1.3 and are the result of detailed engineering design. They have been used by TVA, with minor technological upgrades over time, for over 70 years with an exceptional 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 Cumulative Impacts

The CEQ regulations (40 CFR 1500-1508) implementing the procedural provisions of the NEPA of 1969, as amended (42 USC 4321 et seq.) define cumulative impact as:

...the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions (40 CFR § 1508.7).

Baseline conditions reflect the impacts of past and present actions. The impact analyses summarized in preceding sections are based on baseline conditions and either explicitly or implicitly consider cumulative impacts.

3.14.1 Environmental Resources Considered for Cumulative Effects Analysis

For this project, the full range of environmental resource issues was considered for inclusion in the cumulative effects analysis. However, this analysis is appropriately limited to only those resource issues potentially adversely affected by project activities. Accordingly, such resources as air quality, groundwater and geology, soils and prime farmland, floodplains, wildlife, cultural and historic resources, natural areas, parks, and recreation, noise, and socioeconomic and environmental justice are not included in this analysis as these resources are either not adversely affected or the effects are considered to be minimal. As a result, primary resource categories considered in this cumulative effects assessment include surface water, aquatic ecology, vegetation, threatened and endangered species, wetlands, visual resources, and transportation.

3.14.2 Unavoidable Adverse Environmental Impacts

Unavoidable adverse impacts are the effects of the proposed action on natural and human resources that would remain after mitigation measures or BMPs have been applied. Mitigation measures and BMPs are typically implemented in accordance with various environmental laws and regulations aimed at minimizing and compensating for unavoidable adverse environmental impacts.

Construction and operation of the proposed new build section of the transmission line would occur on land currently undeveloped that supports forested and herbaceous vegetation. Clearing and grading of the new build section of the transmission line would result in an unavoidable alteration of habitats. These habitat alterations would result in related long-term impacts to localized species composition and wildlife habitat for the lands immediately affected. However, due to the abundant habitat of similar quality within the vicinity of the project site, the overall impact to vegetation and wildlife is considered minor.

Temporary impacts to water quality from runoff during construction, as well as vegetation maintenance along the transmission line, could impact nearby receiving water bodies but would be reduced with application of appropriate BMPs.

In the context of the availability of regional resources that are similar to those unavoidably adversely affected by the project, coupled with the application of appropriate BMPs and adherence to permit requirements, unavoidable adverse effects would be minor.

3.14.3 Relationship of Local Short-Term Uses and Long-Term Productivity

This EA focuses on the analyses of environmental impact and resulting conclusions associated with the environmental impacts of construction, operation, and maintenance of a new transmission line, switching station and access roads. These activities are considered short-term uses of the environment for purposes of this section. In contrast, the long-term productivity is considered to be that which occur beyond the conclusion of decommissioning the associated facilities. In conjunction with this analysis it is assumed that all site facilities, infrastructure, and associated roadways would be removed and restored as part of decommissioning. This section includes an evaluation of the extent that the short-term uses preclude any options for future long-term use of the associated project areas.

Most environmental impacts during construction activities would be relatively short-term and would be addressed by BMPs and mitigation measures. Site preparation coupled with noise from construction activities, may displace some wildlife and alter existing vegetation. Construction and operational phase activities would have a limited, yet favorable short-term impact to the local economy through the creation of construction jobs and associated revenue.

The project area consists of a variety of fragmented and contiguous forested habitat, wetlands, stream crossings, ponds, early successional habitat (i.e., pasture and agricultural), and residential or otherwise disturbed areas. The principal change in short-term use of the project area would be the loss of vegetation within the areas impacted for construction and operation of the transmission line. Because the vicinity of the project area includes similar vegetation and habitat types and land uses (including prime farmland), the short-term disturbance to support operations is not expected to significantly alter long-term productivity of wildlife, agriculture or other natural resources.

3.14.4 Irreversible and Irretrievable Commitments of Resources

This section describes the expected irreversible and irretrievable environmental resource commitments used to support construction and operation of the new facility. A resource commitment is considered irreversible when impacts from its use would limit future use options and the change cannot be reversed, reclaimed, or repaired. Irreversible commitments generally occur to nonrenewable resources such as minerals or cultural resources and to those resources that are renewable only over long timespans, such as soil productivity. A resource commitment is considered irretrievable when the use or consumption of the resource is neither renewable nor recoverable for use by future generations until reclamation is successfully applied. Irretrievable commitments generally apply to the loss of production, harvest, or natural resources and are not necessarily irreversible.

The ROW used for the new transmission line 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 line could continue.

Resources required by construction activities, including labor, fossil fuels and construction materials, would be irretrievably lost. Nonrenewable fossil fuels would be irretrievably lost through the use of gasoline and diesel-powered equipment during construction. The materials used for the construction of the proposed site would be committed for the life of the facility. However, they are not in short supply and their use would not have an adverse effect upon continued availability of these resources. Some building materials may be irrevocably committed; however, some metal components and structures could be recycled.

The materials used for construction of the proposed transmission line would be committed for the life of the transmission 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.

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Name: **Anita E. Masters (TVA)**
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3.16 TVA Staff Contributors

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CHAPTER 5 – ENVIRONMENTAL ASSESSMENT RECIPIENTS

Following is a list of who has received copies of this NEPA document or notices of its availability with instructions on how to access the EA on the project web page.

4.1 Federal Agencies

U.S. Army Corps of Engineers

4.2 Federally Recognized Indian Tribes

Absentee Shawnee Tribe of Indians of Oklahoma

Cherokee Nation

Chickasaw Nation

Delaware Nation

Eastern Band of Cherokee Indians

Eastern Shawnee Tribe of Oklahoma

Jena Band of Choctaw Indians

Kialegee Tribal Town

Shawnee Tribe

The Muscogee (Creek) Nation

Thlopthlocco Tribal Town

United Keetoowah Band of Cherokee Indians in Oklahoma

4.3 State Agencies

Kentucky Historic Preservation Office

Tennessee Department of Environment and Conservation

Tennessee State Historic Preservation Office

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Appendix A - *Sherwood v. TVA Litigation* – Injunction Order

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UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF TENNESSEE

DONNA W. SHERWOOD, et al.,

Plaintiffs,

v.

TENNESSEE VALLEY AUTHORITY,

Defendant.

No.: 3:12-CV-156-TAV-HBG

INJUNCTION ORDER

For the reasons discussed in the Memorandum Opinion and Order entered contemporaneously with this Injunction Order, and for good cause being shown, it is hereby ordered, adjudged, and decreed as follows:

IT IS ORDERED that TVA is **ENJOINED** from further implementing the transmission line right-of-way vegetation management practice that has come to be known in this litigation as the “15-foot rule” until TVA has prepared and published an environmental impact statement pursuant to the National Environmental Policy Act (“NEPA”), 42 U.S.C. §§ 4321–4370m12. TVA shall submit a request for dissolution of the injunction after completion of the procedural steps necessary to comply with NEPA. Plaintiffs will then have the opportunity to state their position with respect to the dissolution of the injunction.

IT IS FURTHER ORDERED that the terms of this injunction will remain in effect until the Court grants TVA’s request for dissolution of the injunction.

IT IS FURTHER ORDERED that TVA will maintain buffer zones on the edges of its rights-of-way as described in TVA’s 1997 and 2008 Line Maintenance Manuals:

- a. When re-clearing 500-kV transmission lines on ROWs that are 200 feet wide, TVA will re-clear 150 feet, that is, 75 feet from centerline to outside edges, leaving a 25-foot buffer zone on each side.
- b. On the more recently purchased 500-kV transmission line ROWs where 175 feet is all that is purchased, TVA will re-clear 150 feet, that is, 75 feet from centerline to outside edges, leaving a 12.5-foot buffer zone on each side.
- c. When re-clearing 161-kV transmission lines, the structure type and height will determine the width.
 - i. On multiple-pole structures and single- and double-circuit steel tower lines where TVA has 150 feet of easement, TVA will re-clear 100 feet, that is, 50 feet from centerline to outside edges, leaving a 25-foot buffer zone on each side. Where TVA only has 100 feet of ROW, the entire 100 feet is re-cleared.
 - ii. On lines that utilize single-pole structures where TVA has an easement of 75 feet, the entire 75 feet will be re-cleared.
 - iii. On 69-kV transmission lines, re-clearing will be accomplished.

d. On easements with multiple transmission lines, the “centerline to outside edges” will apply to the transmission line nearest the outside boundary.

TVA will leave the existing trees in the wire zone so long as they do not pose an immediate hazard to the transmission lines.

TVA may remove or trim any trees in the wire zone of the right-of-way, or in the buffer zones of the right-of-way, or any danger tree outside the right-of-way, in accordance with its contract rights, that it deems to present an immediate hazard to its transmission lines.

In using the term “re-clearing” in this Order the Court is simply utilizing the terminology that TVA has used in its Line Maintenance Manuals and is making no determination as to whether TVA either has or has not cleared the right-of-way previously.

IT IS FURTHER ORDERED that where TVA has previously allowed a given landowner to trim his or her own trees, TVA shall continue to do so, except that TVA will have the right to immediately remove or trim any tree that it deems to present an immediate hazard to its transmission lines.

The Court accepts TVA’s representations that it has budgeted \$15 million for its yearly vegetation management and \$14 million for vegetation management during Fiscal Year 2018 through 2020. TVA shall report its quarterly and cumulative annual spending levels to plaintiffs when those figures are reasonably available through its accounting department.

IT IS FURTHER ORDERED that TVA shall post a copy of this Order and any subsequent substantive Order in a prominent location on its website to inform the public and in particular the landowners on the right-of-way that TVA has been enjoined from further implementing the 15-foot rule, and to inform the public and landowners as to the practices that TVA is being ordered to follow pursuant to this Order.

IT IS FURTHER ORDERED that TVA is required to pay plaintiffs' reasonable attorney's fees and costs in this litigation related to the NEPA and mootness issues pursuant to the Equal Access to Justice Act ("EAJA") with reasonableness to be determined by the Court in accordance with the EAJA if the parties cannot agree on the amount.

TVA will inform the Court within thirty (30) days after entry of this Order of the measures taken to inform TVA employees and contractors involved in transmission line right-of-way vegetation management of the terms of this injunction.

If a party seeks to modify any provision of the injunction, the parties must first meet and confer, in order to attempt to reach agreement before applying to the Court.

The Court retains continuing jurisdiction to enforce this Order through contempt or otherwise, to clarify the injunction should the need arise, to determine whether the injunction should be dissolved, and for such other proceedings as may be appropriate.

IT IS SO ORDERED.

s/ Thomas A. Varlan
CHIEF UNITED STATES DISTRICT JUDGE

Appendix B –Agency Correspondence



Tennessee Valley Authority, 400 West Summit Hill Drive, Knoxville, Tennessee 37902

March 9, 2020

Mr. E. Patrick McIntyre, Jr.
Executive Director
and State Historic Preservation Officer
Tennessee Historical Commission
2941 Lebanon Pike
Nashville, Tennessee 37243-0442

Dear Mr. McIntyre:

TENNESSEE VALLEY AUTHORITY (TVA), EAGLE CREEK TRANSMISSION LINE (TL)
PROJECT, CALLOWAY COUNTY, KENTUCKY AND HENRY COUNTY, TENNESSEE

TVA proposes to construct a new 16-mile 161-kiloVolt (kV) TL and approximately 25 miles of associated access routes from the Murray, Kentucky 161-kV Substation to the Paris Board of Public Utilities' (Paris BPU) proposed new Eagle Creek, Tennessee 161-kV Substation. Beginning at the Murray Substation in Calloway County, Kentucky (36.60002, -88.29893), the new TL would head northeast along a new 100 foot wide right-of-way (ROW) for the first 1.5 miles, then turn southeast and parallel TVA's existing Marshall-Cumberland 500-kV TL (L6073) for approximately 14.5 miles to Paris BPU's proposed new substation in Henry County, Tennessee (36.43079, -88.15792). The 14.5-mile section will utilize 40 feet of the existing TL ROW and require an additional 60 feet of new ROW. Approximately five miles of this section is within the state of Tennessee with six miles of access routes. Additionally, TVA proposes to install a new switch house at the Murray, KY Substation, expanding the footprint of the southeast corner of the substation by approximately 0.25 acres.

Ground disturbance associated with the undertaking could occur within the 60-foot of new ROW along the approximately five mile section of TL and 20 foot wide access routes totaling approximately 10 miles in length within the State of Tennessee. In areas where access routes follow existing improved roads the APE narrows to the width of the existing road. TVA has determined the area of potential effects (APE) for direct effects to include the total area mentioned above. Visual effects will not be assessed as the new ROW will parallel TVA's existing Marshall-Cumberland 500-kV TL and will not present additional visual impacts beyond the existing TL. We are consulting separately with the Kentucky State Historic Preservation Officer concerning the undertaking's APE and potential to affect historic properties in that state.

TVA contracted with TRC Environmental, Inc. (TRC) to perform a Cultural Resources survey of the APE. TRC documented the results in the enclosed report titled, *Phase I Archaeological Survey of the TVA Eagle Creek Transmission Line Project in Calloway County, Kentucky and Henry County, Tennessee*.

Mr. E. Patrick McIntyre, Jr.
Page 2
March 9, 2020

TRC's archaeological investigation resulted in the documentation of one archaeological site (40Hy238) in the state of Tennessee. Site 40Hy238 is a prehistoric open habitation site of an indeterminate time period. The site was represented by a low density of undiagnostic lithic material, which was recovered from disturbed contexts in three shovel test pits (STP). The recovered materials lacked depositional integrity and no evidence of intact buried deposits or features were observed in any of the STPs. Given the paucity of the materials and the lack of integrity, TRC recommends that the portion of site 40Hy238 within the APE lacks characteristics that would make it eligible for inclusion in the National Register of Historic Places (NRHP). However, as the site may extend beyond the project boundaries to the east and west, TVA cannot propose any determination of the site's overall NRHP eligibility. Therefore, any work conducted outside of the existing APE would require additional investigations.

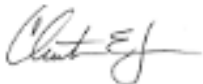
TVA has read TRC's report and agrees with their findings and recommendations. Based on this investigation TVA finds that the undertaking as currently proposed will have no adverse effect to historic properties in the state of Tennessee.

Pursuant to 36 CFR Part 800.5(c) we are notifying you of TVA's finding of no adverse effect; providing the documentation specified in § 800.11(e); and inviting you to review the finding. Also, we are seeking your agreement with TVA's eligibility determinations and finding that the undertaking as currently planned will have no adverse effects on historic properties within Tennessee.

Pursuant to 36 CFR Part 800.3(f)(2), TVA is consulting with federally recognized Indian tribes within the proposed project's APE that may be of religious and cultural significance and eligible for the NRHP.

Please contact Ted Wells by email, ewwells@tva.gov or by phone, (865) 632-3754 with your comments.

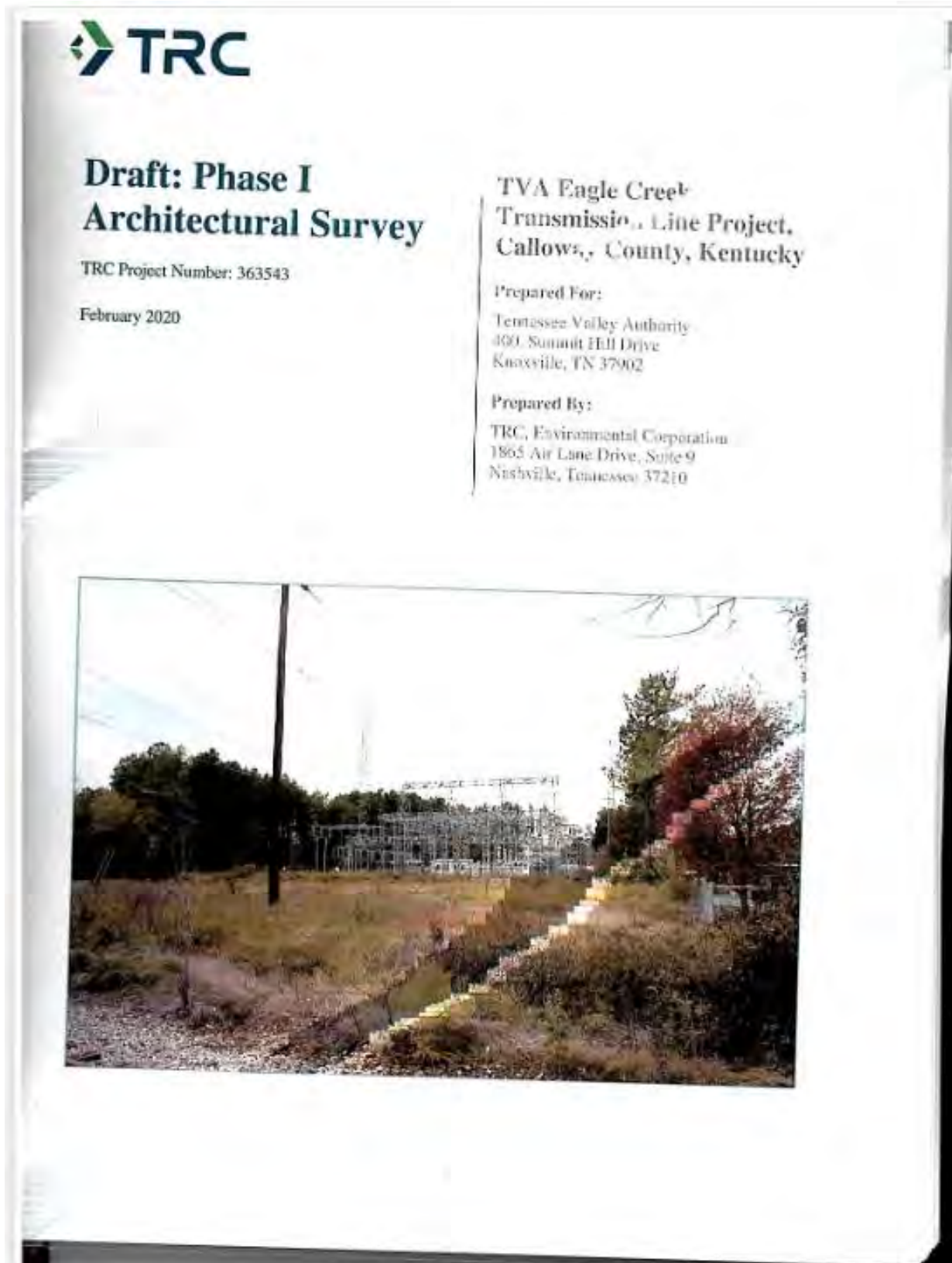
Sincerely,



Clinton E. Jones
Manager
Cultural Compliance

Mr. E. Patrick McIntyre, Jr.
Page 2
March 9, 2020

ZWD:ABM
Enclosures
cc (Enclosures):
 Ms. Jennifer Barnett
 Tennessee Division of Archaeology
 1216 Foster Avenue, Cole Bldg. #3
 Nashville, Tennessee 37210





Draft: Phase I Archaeological Survey

Kentucky OSA Numbers: P230253, P230254
TRC Project Number: 356534

November 2019

**TVA Eagle Creek
Transmission Line Project,
Calloway County, Kentucky
and Henry County, Tennessee**

Prepared For:

Tennessee Valley Authority
400 W. Summit Hill Drive
Knoxville, TN 37902

Prepared By:

TRC
1865 Air Lane Drive
Knoxville, Tennessee 37219





TENNESSEE HISTORICAL COMMISSION
STATE HISTORIC PRESERVATION OFFICE
2941 LEBANON PIKE
NASHVILLE, TENNESSEE 37243-4442
OFFICE: (615) 532-1630
www.tnhistoricalcommission.org

March 12, 2020

Mr. Clinton E. Jones
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, TN 37902

RE: TVA / Tennessee Valley Authority, Eagle Creek Transmission Line Project, Henry County, TN

Dear Mr. Jones:

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. You have submitted documents that are insufficient for us to complete our review. To continue the Tennessee State Historic Preservation Office review of this undertaking, please provide us with the following information:

1. Your cover letter says that visual effects in Tennessee were not assessed because the new transmission line would run parallel to an existing transmission line. You failed to say how far apart the transmission lines would be. The archaeology report suggests most of the new transmission line would be within 40 feet of the existing transmission line, but this information was not included in the cover letter or architectural survey report. How far apart will the transmission lines be?
2. The architectural survey report mentions that a new substation will be built in Henry County. No effects assessment was completed for the construction of the new substation.

We concur that no archaeological resources will be affected by this undertaking. However, in the final report, please include the total area surveyed for archaeological resources as measured in square miles.

Upon receipt of this additional documentation, we will continue our review of this undertaking as quickly as possible. Please be advised that until this office has provided you a final written comment on this undertaking, you have not met your Section 106 obligation under federal law. Questions and comments may be directed to Casey Lee (615 253-3163). We appreciate your cooperation.

Sincerely,

A handwritten signature in dark ink, appearing to read "E. Patrick McIntyre, Jr.", is written over a horizontal line.

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

EPM/cjl



Tennessee Valley Authority, 400 West Summit Hill Drive, Knoxville, Tennessee 37902

May 15, 2020

Mr. E. Patrick McIntyre, Jr.
Executive Director
and State Historic Preservation Officer
Tennessee Historical Commission
2941 Lebanon Pike
Nashville, Tennessee 37243-0442

Dear Mr. McIntyre:

TENNESSEE VALLEY AUTHORITY (TVA), EAGLE CREEK TRANSMISSION LINE (TL)
PROJECT, CALLOWAY COUNTY, KENTUCKY AND HENRY COUNTY, TENNESSEE

This letter is in response to the Tennessee State Historic Preservation Officer's (SHPO) March 12, 2020 letter to TVA regarding TVA's Eagle Creek Transmission Line Project. The SHPO has requested information on two matters regarding TVA's proposed undertaking to construct a new 16-mile 161-kilovolt TL and associated access routes: (1) the distance between the new TL and the existing TL; and (2) the exclusion of the Paris Board of Public Utilities' (Paris BPU) proposed substation from the area of potential effects (APE).

With regard to the distance between the TLs, the distance between the existing TL and the new TL would be 100 feet. TVA will revise the historic architectural report to reflect this detail.

To understand the basis for TVA's delineation of the APE, we have described below the general coordination process for electric power delivery points, and then we have specifically described how the Paris BPU coordinated the connection of its proposed substation with the TVA transmission system. Generally speaking, a delivery point is where electric power is delivered by TVA to a customer. These customers may be either local power companies (LPC or distributor) or directly served customers. TVA's ownership and control ends where the TVA electric system connects to the customer's facilities.

The general process for coordinating a delivery point with TVA starts with the customer submitting a formal request to TVA for a connection between the TVA transmission system and the customer's system. When TVA's customers experience transmission or distribution system problems, such as problems resulting from load growth or a decline in reliability, TVA Board policy requires TVA to work cooperatively with the customer toward the mutual goal of finding the most economical combinations of transmission and distribution facilities. The design and location of any new facilities to be built by the customer, such as a substation, are at the customer's discretion and not part of TVA's review. The customer selects a location for its substation. TVA initially reviews the customer's plan to determine if it is economically justifiable, and then TVA evaluates the feasibility of connecting the customer's substation to the TVA

Mr. E. Patrick McIntyre, Jr.
Page 2
May 15, 2020

system ("connectivity"). If TVA identifies issues relating to connectivity or economics, then TVA would further coordinate with the distributor to resolve those issues. After conducting these reviews and resolving any issues identified, TVA would commence the process of connecting the customer's substation to the TVA transmission system.

For the Eagle Creek project, the Paris BPU submitted a Facilities Connection Request to TVA in 2013. In this request, the Paris BPU presented the location of the proposed Eagle Creek substation that the distributor had the option to buy. An economic review of the distributor's request showed that it provided the most economical solution to solve problems relating to reliability, loss savings, and capacity experienced in the distributor's service area. TVA also determined, based on the assessment of any physical constraints presented by the terrain, that it would be feasible to provide the delivery point to the proposed Eagle Creek substation. The location and design of the Paris BPU substation were chosen by the distributor without TVA involvement. In 2018, Paris BPU purchased the substation property. The substation will be constructed and operated by the distributor on this property using its own funds. There is no funding, permit, or license that TVA needs to provide to the distributor for the construction or operation of the Eagle Creek substation.

TVA has delineated the APE for effects to archaeological resources to include the 80-foot wide new right-of-way (ROW) along the approximately 5-mile route of the TL within the State of Tennessee and the 20-foot wide access routes totaling 10 miles in length to access the TL. The Paris BPU's substation is not within the archaeological APE as TVA has no control over the distributor's selection of the substation site or the construction of the substation itself. As a result, the APE includes only the TL ROW and the access routes.

Pursuant to 36 CFR Part 800.3(f)(2), TVA is consulting with federally recognized Indian tribes regarding properties within the proposed project's APE that may be of religious and cultural significance to them and eligible for the National Register of Historic Places.

Pursuant to 36 CFR Part 800.5(c), we are notifying you of TVA's finding of no adverse effect and providing the documentation specified in § 800.11(e). TVA is seeking your agreement with the described eligibility determinations and finding that the undertaking as currently planned will have no adverse effects on historic properties.

Please contact Ted Wells by telephone (865) 632-2259 or by email, ewwells@tva.gov with your comments.

Sincerely,

Clinton E. Jones
Manager
Cultural Compliance

Mr. E. Patrick McIntyre, Jr.
Page 3
May 15, 2020

EWV:ABM
cc: Ms. Jennifer Barnett
Tennessee Division of Archaeology
1216 Foster Avenue, Cole Bldg. #3
Nashville, Tennessee 37210



TENNESSEE HISTORICAL COMMISSION
STATE HISTORIC PRESERVATION OFFICE
2541 LEBANON PIKE
NASHVILLE, TENNESSEE 37243-0442
OFFICE: (615) 532-1550
www.tnhistoricalcommission.org

May 19, 2020

Mr. Clinton E. Jones
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, TN 37902

RE: TVA / Tennessee Valley Authority, Eagle Creek Transmission Line Project, Henry County, TN

Dear Mr. Jones:

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. Your justification for why the substation should not be included in the Area of Potential Effect (APE) is insufficient. Just because TVA is not funding, permitting, or licensing the substation, does not mean it is not part of the larger undertaking. The substation relies on the transmission lines and the transmission lines rely on the substation. You would not have one without the other. Therefore, the effects of the substation to any historic resources needs to be evaluated. Please provide the following information:

1. A map that shows the location of the substation, its APE, and any historic resources within the APE.
2. Assess effects the substation may have on any historic resources within the APE according to 36 CFR 800.5.

Thank you for specifying how far the new transmission line will be from the old.

Upon receipt of this additional documentation, we will continue our review of this undertaking as quickly as possible. Please be advised that until this office has provided you a final written comment on this undertaking, you have not met your Section 106 obligation under federal law. Questions and comments may be directed to Casey Lee (615 253-3163). We appreciate your cooperation.

Sincerely,

A handwritten signature in black ink that reads "E. Patrick McIntyre, Jr." The signature is written in a cursive style.

cjl

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

EPM/cjl



Tennessee Valley Authority, 400 West Summit Hill Drive, Knoxville, Tennessee 37902

July 1, 2020

Mr. E. Patrick McIntyre, Jr.
Executive Director
and State Historic Preservation Officer
Tennessee Historical Commission
2941 Lebanon Pike
Nashville, Tennessee 37243-0442

Dear Mr. McIntyre:

TENNESSEE VALLEY AUTHORITY (TVA), EAGLE CREEK TRANSMISSION LINE (TL)
PROJECT, CALLOWAY COUNTY, KENTUCKY AND HENRY COUNTY, TENNESSEE

This letter is in response to the Tennessee State Historic Preservation Officer's (SHPO) May 19, 2020 letter to TVA regarding TVA's Eagle Creek TL Project. In that letter the SHPO requested the following information:

- "A map that shows the location of the substation, its area of potential effects (APE), and any historic resources within the APE."
- "Assess effects the substation may have on any historic resources within the APE according to 36 CFR 800.5."

As previously indicated, TVA determined that the degree of federal control over the distributor's substation is insufficient to "federalize" it as part of TVA's undertaking to build the TL and thus include the substation in the APE. The distributor's substation is not owned or controlled by TVA, and is not a TVA undertaking. However, to meet critical project deadlines and be responsive in this consultation process, TVA sought permission from the distributor to enter the substation property, and voluntarily performed a historic architectural resource survey and effects assessment within the substation footprint and in areas within a one-half mile radius surrounding the footprint that have unobstructed views to the substation. A map of the substation's location, the historic architectural resource findings, and an effect assessment are documented in the enclosed report titled *TVA Eagle Creek Substation Project, Henry County, Tennessee*. TRC Inc. (TVA's consultant) identified no historic architectural resources within the survey area defined above and recommends that the substation would have no effect on historic properties.

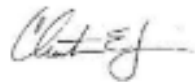
TVA has reviewed the TRC Inc. report and agrees with the findings and recommendations. Pursuant to 36 CFR Part 800.3(f)(2), TVA is consulting with federally recognized Indian tribes regarding properties within the proposed project's APE that may be of religious and cultural significance to them and eligible for the National Register of Historic Places.

Mr. E. Patrick McIntyre, Jr.
Page 2
July 1, 2020

Pursuant to 36 CFR Part 800.5(c) we are notifying you of TVA's finding of no adverse effect and are seeking your agreement with TVA's finding that the Eagle Creek TL project as currently planned will have no adverse effects on historic properties.

Please contact Ted Wells by telephone (865) 632-2259 or by email, ewwells@tva.gov with your comments.

Sincerely,



Clinton E. Jones
Manager
Cultural Compliance

EWV:ABM
Enclosures



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

July 2, 2020

Mr. Clinton E. Jones
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, TN 37902

RE: TVA / Tennessee Valley Authority, Eagle Creek Transmission Line Project, , Henry County, TN

Dear Mr. Jones:

Pursuant to your request, this office has reviewed documentation concerning 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).

Your original report did not survey the APE of the Transmission Line as there is already an existing transmission line 100 feet or less away. We concur that if any historic resources are present, they will not be adversely affected. We further concur that no historic properties will be affected by the proposed substation and that no archaeological resources will be affected by your undertaking. Therefore, we concur that your undertaking will have no adverse effect to historic resources.

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. Questions and comments may be directed to Casey Lee (615 253-3163). We appreciate your cooperation.

Sincerely,

A handwritten signature in black ink that reads "E. Patrick McIntyre, Jr." in a cursive script.

cjl

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

EPM/cjl



Tennessee Valley Authority, 400 West Summit Hill Drive, Knoxville, Tennessee 37902

March 9, 2020

Mr. Craig Potts
State Historic Preservation Officer
and Executive Director
Kentucky Heritage Council
300 Washington Street
Frankfort, Kentucky 40601

Dear Mr. Potts:

TENNESSEE VALLEY AUTHORITY (TVA), EAGLE CREEK TRANSMISSION LINE (TL)
PROJECT, CALLOWAY COUNTY, KENTUCKY AND HENRY COUNTY, TENNESSEE

TVA proposes to construct a new 16-mile 161-kiloVolt (kV) TL and approximately 25 miles of associated access routes from the Murray, Kentucky 161-kV Substation to the Paris Board of Public Utilities' (Paris BPU) proposed new Eagle Creek, Tennessee 161-kV Substation. Beginning at the Murray Substation in Calloway County, Kentucky (36.60002, -88.29893), the new TL would head northeast using a new 100-foot wide right-of-way (ROW) for the first 1.5 miles, then turn southeast and parallel TVA's existing Marshall-Cumberland 500-kV TL (L6073) for approximately 14.5 miles to the local power company's (LPC) proposed new substation in Henry County, Tennessee (36.43079, -88.15792). The 14.5-mile section will utilize 40 feet of the existing TL ROW and require an additional 60 feet of new ROW. Approximately 8.7 miles of this section is within the state of Kentucky, with the remainder running south through Tennessee. Approximately 15 miles of access routes associated with the new ROW are located within Kentucky. Additionally, TVA proposes to install a new switch house at the Murray, Kentucky Substation, expanding the footprint of the southeast corner of the substation by approximately 0.25 acres.

Ground disturbance associated with the undertaking could occur within the 100-foot of new ROW along the first 1.5-mile section of the TL and within the 60-foot of new ROW along the remaining 8.7 miles of TL paralleling TVA's existing TL. Additionally, ground disturbance could occur within the 20-foot wide access routes totaling 15 miles in length within the state of Kentucky. Visual effects could extend within a one-half mile radius surrounding new 100-foot ROW. Visual effects will not be assessed for the new 60-foot ROW as this portion of the TL will parallel TVA's existing Marshall-Cumberland 500-kV TL and will not present additional visual effects beyond the existing TL. TVA has determined the area of potential effects (APE) to include the total area mentioned above. We are consulting separately with the Tennessee Historical Commission concerning the undertaking's APE and potential to affect historic properties in that state.

Mr. Craig Potts
Page 2
March 9, 2020

TVA contracted with TRC Environmental, Inc. (TRC) to perform a Cultural Resources survey of the APE. TRC documented the results in the enclosed reports titled, *Phase I Archaeological Survey of the TVA Eagle Creek Transmission Line Project in Calloway County, Kentucky and Henry County, Tennessee and Phase I Architectural Survey for the Proposed Tennessee Valley Authority Eagle Creek Transmission Line Project, Calloway County, Kentucky.*

Archaeological Resources

A total of six archaeological sites (15Cw320-15Cw323, 15Cw324, and 15Cw325), and three isolated finds (IF2-IF4), were documented in the state of Kentucky. Two of the recorded archaeological sites (15Cw322 and 15Cw324) are prehistoric open habitation sites of indeterminate temporal affiliation, three sites (15Cw320, 15Cw321, and 15Cw323) are historic farm/residence sites dating to the twentieth century, and one site (15Cw325, Macedonia Cemetery) is a historic cemetery dating to the late nineteenth through twentieth centuries. The three isolated finds are all of indeterminate prehistoric temporal affiliation.

The investigated portions of the recorded sites within the APE all lack archaeological integrity and/or research value and would not contribute to the sites' eligibility for inclusion in the NRHP. However, the sites were not fully delineated during TRC's survey, as shovel testing was limited to the archaeological survey area. As such, TVA recommends that while the NRHP eligibility of the sites is undetermined, the portions of the sites within the APE lack characteristics that would contribute to their eligibility for the NRHP. The three isolated finds are recommended as not eligible for inclusion in the NRHP. TRC recommends that the project will have no adverse effects on archaeological resources included in or eligible for inclusion in, the National Register of Historic Places (NRHP). Since the recorded sites may extend beyond the current APE, any work conducted outside of the existing APE would require additional investigations. In addition, TRC recommends that ground disturbance within the Macedonia Cemetery (15Cw325) be avoided to insure impacts to any marked or potentially unmarked graves or grave monuments do not occur.

Though the Macedonia Cemetery (15Cw325) is recommended ineligible and protections under Section 106 would not be required, TVA understands the sensitivity of a cemetery's contents. Therefore, TVA would establish a 100-foot protective buffer around the Macedonia Cemetery (15Cw325). TVA would implement the following restrictions within the buffer area for the proposed project:

- No new construction or ground disturbance.
- Although the owner and operator of the cemetery has authorized TVA to remove trees to provide ground clearance for the overhead transmission line wires, certain restrictions to vegetation management will be implemented. All vegetation clearing and removal will be carried out by hand and conducted in a manner as to insure no damage to any grave markers or monuments.
- TVA Cultural Compliance will review any future maintenance activities beyond the scope of this project under the guidance of the Section 106 Programmatic Agreement.

Mr. Craig Potts
Page 3
March 9, 2020

TVA Transmission's standard operating procedures ensure sensitive resources are documented and protective measures are tracked for all transmission line work. When sensitive resources are identified in transmission line project areas, they are marked on the design sheets that are used by the construction and maintenance groups; specifically they are marked on the "Plan & Profile" sheets. Attached to the Plan & Profile sheets are lists of protective measures that must be put into place for each resource. The drawings are consulted each time TVA is considering any type of physical work on a transmission line. If the section of ROW in question has already been subject to archaeological survey and resources have been identified, those resources are indicated on the Plan & Profile sheets, the associated conditions are listed in the associated documents, and the project managers consult these drawings and documents when planning the project. This process will ensure that the above conditions are followed for any future work involving the cultural resource.

Architectural Resources

TRC's architectural assessment investigated 41 previously recorded architectural resources, CWM-109 to CWM-122, CWM-126, CWM-127, CWM-130, CWM-135 to CWM-157, and CW-99, which fall within the survey radius. Based on the results of the survey, TRC recommends that properties CWM-139 to CWM-147 are not eligible for listing on NRHP due to their lack of architectural and historical significance. TRC's survey observed that architectural resources CWM-109 to CWM-117, CWM-119 to CWM-138, CWM-148, CWM-151 to CWM-154, CWM-156, and CWM-157 are extant, but are located outside the viewshed to the project area and, therefore, not in the APE. In addition, previously recorded architectural resources CWM-118, CWM-149, CWM-150, CWM-155, and CW-99, have been destroyed since their initial recordation.

TRC's architectural survey also resulted in the documentation of 13 newly recorded architectural resources (CW-587–CW-599). Following its assessment of these properties, it is the opinion of TRC that newly recorded architectural resources CW-587–CW-599 are not eligible for listing on NRHP due to their lack of architectural distinction and loss of integrity caused by modern alterations. Based on current Project plans, it is the opinion of TRC that the proposed undertaking will have no effect to historic architectural resources located within the project APE. TRC recommends no additional investigation of aboveground resources in connection with the proposed Project.

TVA has read TRC's reports and agrees with their findings and recommendations. Based on this investigation TVA finds that the undertaking as currently proposed will have no adverse effect to historic properties in the state of Kentucky.

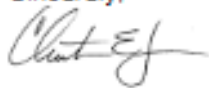
Pursuant to 36 CFR Part 800.5(c) we are notifying you of TVA's finding of no adverse effect; providing the documentation specified in § 800.11(e); and inviting you to review the finding. We are also seeking your agreement with TVA's eligibility determinations and finding that the undertaking as currently planned will have no adverse effects on historic properties within Kentucky.

Mr. Craig Potts
Page 4
March 9, 2020

Pursuant to 36 CFR Part 800.3(f)(2), TVA is consulting with federally recognized Indian tribes within the proposed project's APE that may be of religious and cultural significance and eligible for the NRHP.

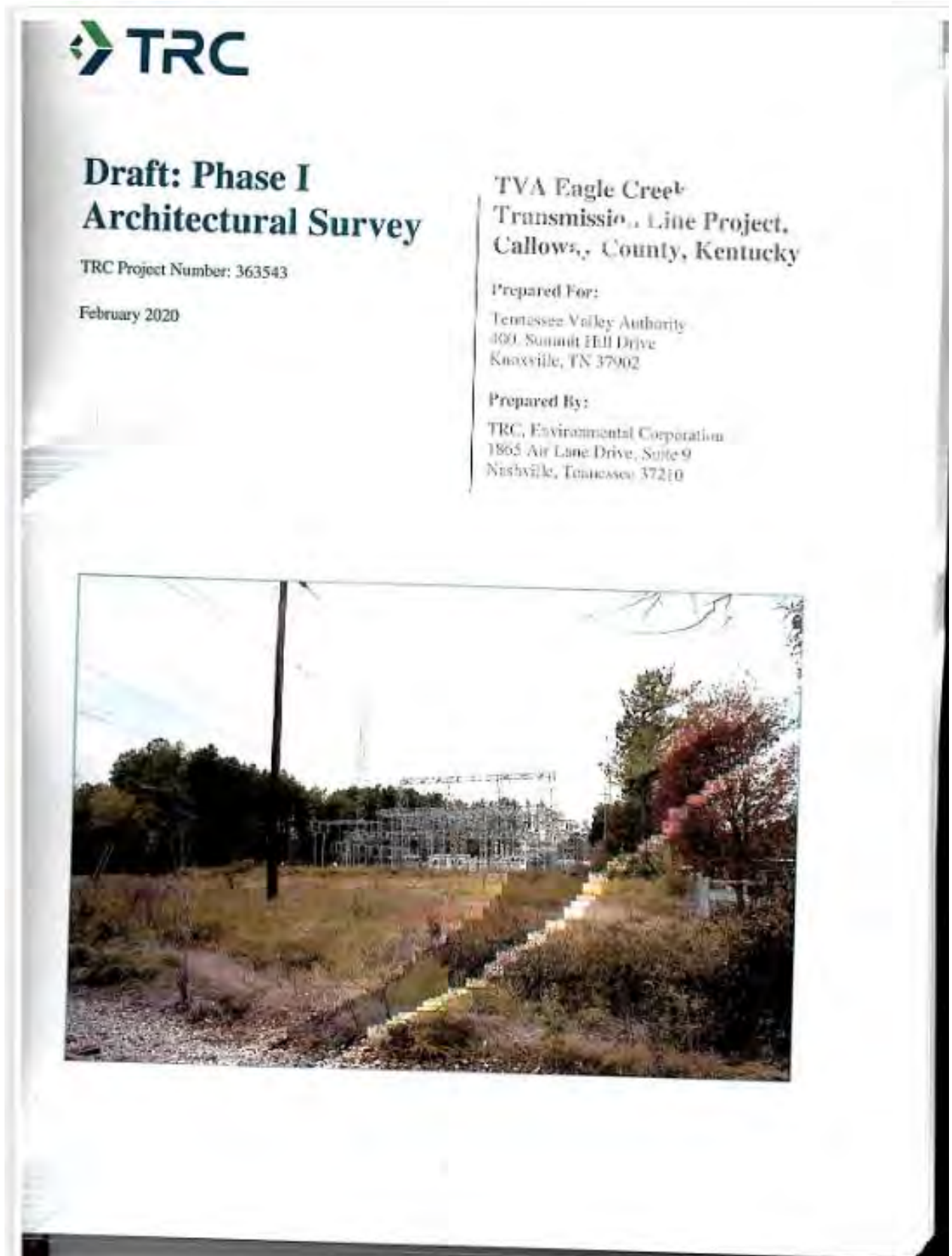
Please contact Ted Wells by email, ewwells@tva.gov or by phone, (865) 632-3754 with your comments.

Sincerely,

A handwritten signature in black ink, appearing to read "Clinton E. Jones".

Clinton E. Jones
Manager
Cultural Compliance

ZWD:ABM
Enclosures





Draft: Phase I Archaeological Survey

Kentucky OSA Numbers: P230253, P230254
TRC Project Number: 355534

November 2019

**TVA Eagle Creek
Transmission Line Project,
Calloway County, Kentucky
and Henry County, Tennessee**

Prepared For:

Tennessee Valley Authority
400 W. Summit Hill Drive
Knoxville, TN 37902

Prepared By:

TRC
1865 Air Lane Drive
Knoxville, Tennessee 37210





ANDY BESHEAR
GOVERNOR

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KENTUCKY HERITAGE COUNCIL**

THE STATE HISTORIC PRESERVATION OFFICE

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MIKE BERRY
SECRETARY

CRAIG A. POTTS
EXECUTIVE DIRECTOR
& STATE HISTORIC
PRESERVATION OFFICER

April 8, 2020

Mr. Clinton E. Jones
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, TN 37902

Re: DRAFT: Phase I Archaeological Survey, TVA Eagle Creek Transmission Line Project, Calloway County, Kentucky, and Henry County, Tennessee prepared by Gavin Davies of TRC. Report dated November 2019.

ARCHAEOLOGY COMMENT ONLY

Dear Mr. Jones:

Thank you for your letter and enclosed archaeological report concerning the above-mentioned project, March 10, 2020. We understand that the Tennessee Valley Authority proposes to construct a new 16-mile 161 kV transmission line between Murray, Kentucky and Eagle Creek, Tennessee. The construction of the line will entail approximately 25 miles of access road. Of the total project area, we understand that two segments, totaling 10.2 miles, and 15 miles of access roads, fall within Calloway County, Kentucky. The Kentucky portion of the project area was assessed for both archaeological resources and architectural resources. In this letter we comment only on the assessment of the project area for archaeological resources.

After review of the archaeological report, we find that it does not meet our reporting specifications, and request that it is revised to address the following deficiencies:

- The mapping in the report should be revised to depict the actual survey area for the project. We understand that the survey area varied in width and ranged from 100 ft. to 20 ft. The width of the survey area must be depicted in the report.
- Figure Set 1 should be removed from the report as it depicts sites well outside the survey area.
- The report does not sufficiently describe why pedestrian survey with only visual inspection was used in any of the places this method was performed. There can be several reasons why visual inspection may be employed, and the report should clearly depict which set of the field conditions warranted this method, differentiating between excessive slope and sufficient surface visibility.
- Related to the previous point, the report should specifically detail why many of the access roads were only visually surveyed. As we have repeatedly reminded TVA, our Specifications do not allow inspection of dirt or gravel roads in lieu of shovel testing.

We look forward to receipt of a revised report. Should you have any questions concerning archaeological resources, feel free to contact Chris Gunn of my staff at (502) 892-3615 or chris.gunn@ky.gov.

Sincerely,

Craig A. Potts,
Executive Director and
State Historic Preservation Officer

CP: cmg KHC # 57250

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CHAG A. POTTS
EXECUTIVE DIRECTOR
& STATE HISTORIC
PRESERVATION OFFICER

April 10, 2020

Mr. Clinton Jones
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, TN 37902

RE: ABOVEGROUND RESPONSE ONLY: TVA Eagle Creek Transmission Line Project – Calloway County, KY and Henry County, TN and
Draft Report: Phase I Architectural Survey for the Proposed Tennessee Valley Authority Eagle Creek Transmission Line Project, Calloway County, Kentucky, prepared by Ted Karpyniec, report dated February 2020.

Dear Mr. Jones:

Thank you for your transmittal letter including TVA's official determinations of National Register eligibility and the effects of this project as well as a copy of the above-cited report for our review and comment. We understand from your letter that TVA proposes to construct a new 16-mile TL and approximately 25 miles of associated access routes from the Murray, KY, 161-kV substation to the Paris BPU proposed new Eagle Creek, Tennessee 161 kV Substation. We understand that beginning at the Murray Substation in Calloway County, the new TL would head northeast using a new 100-foot-wide ROW for the first 1.5 miles, then turn southeast and parallel TVA's existing Marshall-Cumberland 500-KV TL for approximately 14.5 miles to the local power company's proposed new substation in Henry County, TN. We understand that this 14.5-mile section of new TL will utilize 40 feet of existing TL ROW and require an additional 60 feet of new ROW. We understand that approximately 8.7 miles of this section is within Kentucky.

Regarding the justification of the APE, TVA explains that "visual effects could extend within a one-half mile radius surrounding the new 100-foot ROW," but then also explains that "Visual effects will not be assessed for the new 60-foot ROW as this portion of the TL will parallel TVA's existing Marshall-Cumberland 500 kV TL and will not present additional visual effects beyond the existing TL." As such, our office has confusion regarding the justification of the APE for the aboveground portion of this project. If new line will be installed on existing transmission towers, it is possible we would concur with this justification. The need to expand the ROW by 60 feet, however, indicates that new transmission towers might be installed. If the latter is true, our office would be concerned not only about visual impacts to potential historic properties but also about potential direct effects from the acquisition of the additional ROW as well as potential direct effects created by the installation of new transmission towers which might be placed closer (or within a proposed NRHP boundary). As such, unless TVA can persuade our office to understand why no effects to historic properties are possible with acquisition of new ROW and installation of the new, parallel TL, our office would request this 8.7 miles be included within the aboveground APE for the project and that historic properties within the appropriate radius be documented, assessed for NRHP eligibility, and included within the draft report cited above. A comment on the adequacy of the report is impossible until that time. Our response regarding archaeology will be in a separate letter. Should you have any questions concerning above-ground resources please contact Jennifer Ryall of my staff at (502) 892-3619 or jennifer.ryall@ky.gov.

Sincerely,

Craig A. Potts,
Executive Director and State Historic Preservation Officer

CP: jr/KHC # 57250

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Tennessee Valley Authority, 400 West Summit Hill Drive, Knoxville, Tennessee 37902

August 17, 2020

Mr. Craig Potts
State Historic Preservation Officer
and Executive Director
Kentucky Heritage Council
300 Washington Street
Frankfort, Kentucky 40601

Dear Mr. Potts:

TENNESSEE VALLEY AUTHORITY (TVA), EAGLE CREEK TRANSMISSION LINE (TL)
PROJECT, CALLOWAY COUNTY, KENTUCKY AND HENRY COUNTY, TENNESSEE

TVA initially consulted with your office in March of 2020 on the proposed Eagle Creek TL project in Calloway County, Kentucky (KHC# 57250). The proposed project involves the construction of a new 16-mile 161-kiloVolt (kV) TL and approximately 25 miles of associated access routes from the Murray, Kentucky 161-kV Substation to the Paris Board of Public Utilities' (Paris BPU) proposed new Eagle Creek, TN 161-kV Substation.

Archaeological Resources

In a letter dated April 8, 2020, focused on archaeological resources, the Kentucky Heritage Council (KHC) requested additional information regarding the archaeological resources survey completed for the referenced project. The requests and TVA's responses follow.

KHC request: *The mapping in the report should be revised to depict the actual survey area for the project. We understand that the survey area varied in width and ranged from 100 ft. to 20 ft. The width of the survey area must be depicted in the report.*

- **TVA response:** The mapping has been revised in the revised report.

KHC request: *Figure Set 1 should be removed from the report as it depicts sites well outside the survey area.*

- **TVA response:** Figure Set 1 has been removed from the revised report.

KHC request: *The report does not sufficiently describe why pedestrian survey with only visual inspection was used at any of the places this method was performed. There can be several reasons why visual inspection may be employed, and the report should clearly*

Mr. Craig Potts
Page 2
August 17, 2020

depict which set of the field conditions warranted this method, differentiating between excessive slope and sufficient surface visibility.

- **TVA response:** The Archaeological Survey Methods section of the attached report has been revised to better clarify the survey strategy.

KHC request: *Related to the previous point, the report should specifically detail why many of the access roads were only visually surveyed. As we have repeatedly reminded TVA, our Specifications do not allow inspection of dirt or gravel roads in lieu of shovel testing.*

- **TVA response:** TVA proposes to clarify the area of potential effects (APE) for the project in instances where proposed access routes follow established graveled/paved roads. In these instances the width of the APE will narrow to the width of the existing road and no ground disturbance would occur beyond the footprint of the existing roads.

TVA has attached TRC's revised report titled, [Phase I Archaeological Survey of the TVA Eagle Creek Transmission Line Project in Calloway County, Kentucky and Henry County, Tennessee](#), for your review.

Historic Architectural Resources

In a letter dated April 10, 2020, the Kentucky Heritage Council (KHC) requested clarification of the APE for visual effects for the proposed project.

During the initial consultation, TVA defined the APE for the proposed project within the State of Kentucky as follows: *Ground disturbance associated with the undertaking could occur within the 100-foot of new right-of-way (ROW) along the first 1.5-mile section of the TL and within the 60-foot of new ROW along the remaining 8.7 miles of TL paralleling TVA's existing TL. Additionally, ground disturbance could occur within the 20-foot wide access routes totaling 15 miles in length within the state of Kentucky. Visual effects could extend within a one-half mile radius surrounding new 100-foot ROW. Visual effects will not be assessed for the new 60-foot ROW as this portion of the TL will parallel TVA's existing Marshall-Cumberland 500-kV TL and will not present additional visual effects beyond the existing TL. TVA has determined the area of potential effects (APE) to include the total area mentioned above.*

In response, the KHC requested that the 8.7 miles of ROW paralleling TVA's existing TL also be included within the APE and the potential visual effects of that portion of the project also be assessed. As a result, TVA has revised the APE to include areas within a one-half mile radius surrounding the proposed 8.7 miles of TL that would be within the viewshed of the proposed undertaking, where visual effects could occur.

Mr. Craig Potts
Page 3
August 17, 2020

TVA contracted with TRC Environmental, Inc. (TRC) to perform an architectural resources survey of the revised APE. TRC documented the results in the attached report titled, [Phase I Architectural Survey for the Proposed Tennessee Valley Authority Eagle Creek Transmission Line Project, Calloway County, Kentucky.](#)

TRC's architectural assessment investigated 40 previously recorded architectural resources, CWM-109–CWM-122, CWM-126, CWM-127, CWM-135–CWM-157, and CW-99, which fell within their 0.5 mile survey radius. Based on the results of the survey, it is the opinion of TRC that properties CWM-139–147 are not eligible for listing on NRHP due to their lack of architectural and historical significance. TRC's survey observed that architectural resources CWM-109–CWM-111, CWM-113, CWM-114, CWM-116, CWM-117, CWM-121, CWM-122, CWM-127, CWM-135–CWM-138, CWM-148, CWM-151–CWM-154, CWM-156, and CWM-157 are extant, but are located outside the viewshed to the project area and, therefore, not in the APE. In addition, previously recorded architectural resources CW-99, CWM-112, CWM-115, CWM-118–CWM-120, CWM-126, CWM-149, CWM-150, and CWM-155 have been destroyed since their initial recordation.

TRC's architectural survey also resulted in the documentation of 28 newly recorded architectural resources (CW-587–CW-614). Following its assessment of these properties, it is the opinion of TRC that newly recorded architectural resources CW-587–CW-589, CW-591–CW-614 are not eligible for listing on the NRHP due to their lack of architectural significance and loss of integrity caused by modern alterations. TRC recommends newly documented architectural resource CW-590 eligible for the NRHP under Criterion A and C for its historical and architectural significance in connection with early twentieth century tobacco production in Calloway County. TRC's assessment of potential effects to the tobacco barn finds that the proposed undertaking will not destroy, damage, or physically alter any part of the resource and no construction activity associated with the project will occur on the associated parcel. Furthermore, the proposed project will not compromise the architectural significance of the resource for which it is recommended eligible for the NRHP. Based on current project plans, it is the opinion of TRC that the proposed undertaking will have no adverse effect to historic architectural resources located within the project APE. TRC recommends no additional investigation of above-ground resources in connection with the proposed project.

TVA has reviewed TRC's reports and agrees with their findings and recommendations. Based on this investigation TVA finds that the undertaking as currently proposed will have no adverse effect to historic properties in the state of Kentucky.

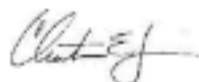
Pursuant to 36 CFR Part 800.5(c) we are notifying you of TVA's finding of no adverse effect; providing the documentation specified in § 800.11(e); and inviting you to review the finding. Also, we are seeking your agreement with TVA's eligibility determinations and finding that the undertaking as currently planned will have no adverse effects on historic properties within Kentucky.

Mr. Craig Potts
Page 4
August 17, 2020

Pursuant to 36 CFR Part 800.3(f)(2), TVA is consulting with federally recognized Indian tribes within the proposed project's APE that may be of religious and cultural significance and eligible for the NRHP.

Please contact Ted Wells at ewwells@tva.gov with your comments.

Sincerely,

A handwritten signature in black ink, appearing to read "Clinton E. Jones".

Clinton E. Jones
Manager
Cultural Compliance

MR:ABM
Enclosures



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GOVERNOR

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LT. GOVERNOR

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CRAIG A. POTTS
EXECUTIVE DIRECTOR &
STATE HISTORIC
PRESERVATION OFFICER

September 17, 2020

Mr. Clinton E. Jones
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, TN 37902

Re: REVISED: DRAFT: Phase I Archaeological Survey, TVA Eagle Creek Transmission Line Project, Calloway County, Kentucky and Henry County, Tennessee prepared by Gavin Davies of TRC. Report dated [November 2019].

And

Draft: Phase I Architectural Survey TVA Eagle Creek Transmission Line Project, Calloway County, Kentucky, prepared by Ted Karpynac of TRC. Report dated July 2020.

Dear Mr. Jones:

Thank you for your email and attached files concerning the above-mentioned project, received August 17, 2020. We understand that the Tennessee Valley Authority proposes to construct a new 16-mile 161 kV transmission line between Murray, Kentucky and Eagle Creek Tennessee. The construction of the line will entail approximately 25 miles of access roads. Of the total project area, we understand that two segments, totaling 10.2 miles, and 15 miles of access roads fall within Calloway County, Kentucky. In this letter, we provide comments on the TVA's determination of effect to archaeological and above-ground historic properties located in Kentucky.

We previously reviewed this project and requested revisions to the archaeological report on April 8, 2020. After review of the revised archaeological report, we find that the requested revisions have been made. The report describes the intensive pedestrian reconnaissance, supplemented by screened shovel tests, of the proposed project area. During the survey, the investigator identified six archaeological sites – 15Cw320-15Cw325 – and three isolated artifact finds in Calloway County. Sites 15Cw320, 15Cw321, 15Cw323 contain historic artifact assemblages. Sites 15Cw322 and 15Cw324 produced pre-contact assemblages of stone tool-making debris. The investigator recommended that all of these sites likely extend beyond the survey corridor and did not make National Register of Historic Places (NRHP) eligibility recommendations for them. They did recommend, however, that no intact cultural features were identified at the portions of these five sites investigated and that no significant deposits would be affected by the proposed project. Site 15Cw325 – the historic era Macedonia Cemetery – is directly adjacent to the project area. The cemetery was also evaluated as above-ground resource CW-599 (see below). The archaeological investigator recommended that the cemetery is not eligible for the NRHP but recommended avoidance of the cemetery. The investigator also recommended that the isolated finds were not eligible for the NRHP. After review of the revised archaeological report, we agree with its findings and recommendations.

We reviewed a digital version of the archaeological report. Please submit three printed bound copies of the report for our archives. When the final reports are printed. Please ensure that the word 'Draft' is removed from the report title and that the revision date is accurately reflected.

(Continued on next page.)



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C. Jones
Tennessee Valley Authority
Eagle Creek Transmission Line
September 17, 2020
page 2 of 2

Based on our review of the Phase I Architectural Survey cited above, we understand that the author of the report located 40 previously recorded architectural resources within a standard buffer of the transmission line corridor. We also understand that, of these 40, the author intensively documented historic resources CWM-139-147 as they were the only previously recorded historic resources within the viewshed (and thus the APE) of the proposed transmission line corridor. We understand that the author of the report recommended that CWM-139-147 are Not Eligible for listing on National Register of Historic Places (NRHP) due to their lack of architectural and historic significance. We understand that the author of the report also documented 28 newly recorded architectural resources (CW-587-CW-614) within the APE for this project and has recommended historic resources CW-587-CW-589, CW-591-CW-614 as Not Eligible for listing on NRHP due to their lack of architectural significance and loss of integrity caused by modern alterations. We understand that the author recommends that newly documented architectural resource CW-590 is Eligible for the NRHP under Criterion A and C for its historical and architectural significance in connection with early twentieth century tobacco production in Calloway County.

Based on our review, we concur with the author, and with TVA's official determination, that CWM-139 through CWM-147; CW-587 through CW-589; CW-591 through CW-596; CW-598 through CW-603; and CW-605 through CW-614 do not appear to retain sufficient historic integrity or significance and, as a result, appear to be Not Eligible for listing on the NRHP. We concur with the author, and with TVA's official determination, that CW-590 appears to retain sufficient integrity and significance as a good example of a Phase II fire-cured tobacco barn under Criterion A and C and, as a result, is Eligible for listing on the NRHP. For CW-597/Paducah & Tennessee Railroad Corridor, replacement of railroad ties is required over time, and these materials are considered renewable to some degree, and as the significance of the corridor itself and the significance of this railroad line to Calloway County under Criterion A has not been fully investigated, we feel further research would be required to help us understand its historic integrity and significance. For CW-604/Forrester Cemetery, since the cemetery includes the grave sites of at least two of the early settlers/pioneers of Calloway County (Samuel Brown Faries and his wife Betsey), we feel further research would be necessary to help us understand the significance of this family and this pioneer cemetery. Although we feel further research would be required for these two sites, since neither CW-597 nor CW-604 will be directly or indirectly impacted by the proposed project, we withhold comment on their NRHP eligibility and are not requesting additional information at this time.

We reviewed a digital version of the aboveground report. Please submit one printed bound copies of the report for our archives and printed copies of the KHC survey forms for resources CW-587 through CW-614 unbound from the report.

We understand that the TVA determined that the proposed project would result in **No Adverse Effect to Historic Properties**. We *conditionally concur* with this determination. Our full concurrence is contingent upon receipt of the printed and bound report copies and KHC survey forms.

In the event of the unanticipated discovery of an archaeological site or object of antiquity, the discovery should be reported to the Kentucky Heritage Council and to the Kentucky Office of State Archaeology in the Anthropology Department at the University of Kentucky in accordance with KRS 164.730. In the event that human remains are encountered during project activities, all work should be immediately stopped in the area and the area cordoned off, and in accordance with KRS 72.020 the county coroner and local law enforcement must be contacted immediately. Upon confirmation that the human remains are not of forensic interest, the unanticipated discovery must be reported to the Kentucky Heritage Council.

Should you have any questions concerning archaeological resources, feel free to contact Chris Gunn of my staff at (502) 892-3615 or chris.gunn@ky.gov. Questions concerning above-ground resources can be directed to Jennifer Ryall at (502) 892-3619 or jennifer.ryall@ky.gov.

Sincerely,



Craig A. Potts,
Executive Director and
State Historic Preservation Officer

CP:cmg, jr KHC # 57250, 59526, 59579
cc: George Crothers (OSA)



Tennessee Valley Authority, 400 West Summit Hill Drive, Knoxville, Tennessee 37902

March 9, 2020

Mr. Brett Barnes
Tribal Historic Preservation Officer
Eastern Shawnee Tribe of Oklahoma
127 West Oneida
Seneca, Missouri 64865

Ms. Karen Brunso
Tribal Historic Preservation Officer
Division of Historic Preservation
Department of Culture & Humanities
The Chickasaw Nation
Post Office Box 1548
Ada, Oklahoma 74821-1548

Ms. RaeLynn Butler
Manager
Historic & Cultural Preservation Department
The Muscogee (Creek) Nation
Post Office Box 580
Okmulgee, Oklahoma 74447

Mr. Galen Cloud
Tribal Historic Preservation Officer
Thlopthlocco Tribal Town
Post Office Box 188
Okemah, Oklahoma 74859

Mr. David Cook
Tribal Administrator
Kialegee Tribal Town
Post Office Box 332
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Ms. Devon Frazier
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Absentee Shawnee Tribe of Indians of
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2025 S. Gordon Cooper Drive
Shawnee, Oklahoma 74801

Ms. Erin Paden
Director of Cultural Resources
Delaware Nation
Post Office Box 825
Anadarko, Oklahoma 73005

Ms. Alina J. Shively
Tribal Historic Preservation Officer
Jena Band of Choctaw Indians
Post Office Box 14
Jena, Louisiana 71342

Ms. Tonya Tipton
Shawnee Tribe
Post Office Box 189
Miami, Oklahoma 74355

Ms. Elizabeth Toombs
Cherokee Nation
Post Office Box 948
Tahlequah, Oklahoma 74465

Ms. Whitney Warrior
Director of Natural Resources
United Keetoowah Band of Cherokee
Indians in Oklahoma
18263 W. Keetoowah Circle
Tahlequah, Oklahoma 74464

Mr. Stephen Yerka (NHPA)
Tribal Historic Preservation Office
Eastern Band of Cherokee Indians
Post Office Box 455
Cherokee, North Carolina 28719

Dear Sir/Madam:

TENNESSEE VALLEY AUTHORITY (TVA), EAGLE CREEK TRANSMISSION LINE (TL)
PROJECT, CALLOWAY COUNTY, KENTUCKY AND HENRY COUNTY, TENNESSEE

TVA proposes to construct a new 16-mile 161-kiloVolt (kV) TL and approximately 25 miles of associated access routes from the Murray, Kentucky 161-kV Substation to the Paris Board of Public Utilities' (Paris BPU) proposed new Eagle Creek, Tennessee 161-kV Substation. Beginning at the Murray Substation in Calloway County, Kentucky (36.60002, -88.29893), the new TL would head northeast along a new 100 foot wide right-of-way (ROW) for the first 1.5 miles, then turn southeast and parallel TVA's existing Marshall-Cumberland 500-kV TL (L6073) for approximately 14.5 miles to Paris BPU's proposed new substation in Henry County, Tennessee (36.43079, -88.15792). The 14.5-mile section will utilize 40 feet of the existing TL ROW and require an additional 60 feet of new ROW. Additionally, TVA proposes to install a new switch house at the Murray, Kentucky Substation, expanding the footprint of the southeast corner of the substation by approximately 0.25 acres.

Ground disturbance associated with the undertaking could occur within the 100-foot of new ROW along the first 1.5-mile section of the TL and within the 60-foot of new ROW along the remaining 14.5 miles of TL paralleling TVA's existing TL. Additionally, ground disturbance could occur within the 20-foot wide access routes totaling approximately 25 miles in length. In areas where access routes follow, existing improved roads the APE narrows to the width of the existing road. Visual effects could extend within a one-half mile radius surrounding new 100-foot ROW. Visual effects will not be assessed for the new 60-foot ROW as this portion of the TL will parallel TVA's existing Marshall-Cumberland 500-kV TL and will not present additional visual effects beyond the existing TL. TVA has determined the area of potential effects (APE) to include the total area mentioned above.

TVA contracted with TRC Environmental, Inc. (TRC) to perform a Cultural Resources survey of the APE. TRC documented the results in the enclosed reports titled, [*Phase I Archaeological Survey of the TVA Eagle Creek Transmission Line Project in Calloway County, Kentucky and Henry County, Tennessee*](#) and [*Phase I Architectural Survey for the Proposed Tennessee Valley Authority Eagle Creek Transmission Line Project, Calloway County, Kentucky*](#).

TRC's archaeological investigation resulted in the documentation of one archaeological site (40Hy238) in the state of Tennessee. Site 40Hy238 is a prehistoric open habitation site of an indeterminate time period. The site was represented by a low density of undiagnostic lithic material which was recovered from disturbed contexts in three shovel test pits (STP). The recovered materials lacked depositional integrity and no evidence of intact buried deposits or features were observed in any of the STPs. Given the paucity of the materials and the lack of integrity, TRC recommends that the portion of site 40Hy238 within the APE lacks characteristics that would make it eligible for inclusion in the National Register of Historic Places (NRHP). However, as the site may extend beyond the project boundaries to the east and west, TVA cannot propose any determination of the site's overall NRHP eligibility. Therefore, any work conducted outside of the existing APE would require additional investigations.

A total of six archaeological sites (15Cw320-15Cw323, 15Cw324, and 15Cw325), and three isolated finds (IF2-IF4), were documented in the state of Kentucky. Two of the recorded archaeological sites (15Cw322 and 15Cw324) are prehistoric open habitation sites of indeterminate temporal affiliation, three sites (15Cw320, 15Cw321, and 15Cw323) are historic farm/residence sites dating to the twentieth century, and one site (15Cw325, Macedonia

Sir/Madam
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March 9, 2020

Cemetery) is a historic cemetery dating to the late nineteenth through twentieth centuries. The three isolated finds are all of indeterminate prehistoric temporal affiliation.

The investigated portions of the recorded sites within the APE all lack archaeological integrity and/or research value and would not contribute to the sites' eligibility for inclusion in the NRHP. However, the sites were not fully delineated during TRC's survey, as shovel testing was limited to the archaeological survey area. As such, TVA recommends that while the NRHP eligibility of the sites is undetermined, the portions of the sites within the APE lack characteristics that would contribute to their eligibility for the NRHP. The three isolated finds are recommended as not eligible for inclusion in the NRHP. TRC recommends that the project will have no adverse effects on archaeological resources included in or eligible for inclusion in, the NRHP. Since the recorded sites may extend beyond the current APE, any work conducted outside of the existing APE would require additional investigations. In addition, TRC recommends that ground disturbance within the Macedonia Cemetery (15Cw325) be avoided to insure impacts to any marked or potentially unmarked graves or grave monuments do not occur.

Though the Macedonia Cemetery (15Cw325) is recommended ineligible and protections under Section 106 would not be required, TVA understands the sensitivity of a cemetery's contents. Therefore, TVA will establish a 100-foot protective buffer around the Macedonia Cemetery (15Cw325). TVA will implement the following restrictions within the buffer area for the proposed project:

- No new construction or ground disturbance.
- Although the owner and operator of the cemetery has authorized TVA to remove trees to provide ground clearance for the overhead TL wires, certain restrictions to vegetation management will be implemented. All vegetation clearing and removal will be carried out by hand and conducted in a manner as to insure no damage to any grave markers or monuments.
- TVA Cultural Compliance will review any future maintenance activities beyond the scope of this project under the guidance of the Section 106 Programmatic Agreement.

TRC's architectural assessment investigated 41 previously recorded architectural resources, CWM-109 to CWM-122, CWM-126, CWM-127, CWM-130, CWM-135 to CWM-157, and CW-99, which fall within the survey radius. Based on the results of the survey, TRC recommends that properties CWM-139 to CWM-147 are not eligible for listing on NRHP due to their lack of architectural and historical significance. TRC's survey observed that architectural resources CWM-109 to CWM-117, CWM-119 to CWM-138, CWM-148, CWM-151 to CWM-154, CWM-156, and CWM-157 are extant, but are located outside the viewshed to the project area and, therefore, not in the APE. In addition, previously recorded architectural resources CWM-118, CWM-149, CWM-150, CWM-155, and CW-99, have been destroyed since their initial recordation.

TRC's architectural survey also resulted in the documentation of 13 newly recorded architectural resources (CW-587–CW-599). Following its assessment of these properties, it is the opinion of TRC that newly recorded architectural resources CW-587–CW-599 are not eligible for listing on

Sir/Madam
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March 9, 2020

NRHP due to their lack of architectural distinction and loss of integrity caused by modern alterations. Based on current Project plans, it is the opinion of TRC that the proposed undertaking will have no effect to historic architectural resources located within the project APE. TRC recommends no additional investigation of aboveground resources in connection with the proposed Project.

TVA has read TRC's reports and agrees with their findings and recommendations. Based on this investigation, TVA finds that the undertaking as currently proposed will have no adverse effect to historic properties.

Pursuant to 36 C.F.R. Part 800.3(f)(2), TVA is consulting with the following federally recognized Indian tribes regarding historic properties within the proposed project's APE that may be of religious and cultural significance and are eligible for the NRHP: Absentee Shawnee Tribe of Indians of Oklahoma, Cherokee Nation, The Chickasaw Nation, Delaware Nation, Eastern Band of Cherokee Indians, Eastern Shawnee Tribe of Oklahoma, Jena Band of Choctaw Indians, Kialegee Tribal Town, The Muscogee (Creek) Nation, Shawnee Tribe, Thlopthlocco Tribal Town, and United Keetoowah Band of Cherokee Indians in Oklahoma.

By this letter, TVA is providing notification of these findings and is seeking your comments regarding any properties that may be of religious and cultural significance and may be eligible for listing in the NRHP pursuant to 36CFR § 800.2 (c)(2)(ii), 800.3 (f)(2), and 800.4 (a)(4)(b).

Please respond by April 8, 2020 should you have any comments. If you have any questions, please contact me by phone, (865) 632-2464 or by email, mmshuler@tva.gov.

Sincerely,



Marianne Shuler
Senior Specialist, Archaeologist and Tribal Liaison
Cultural Compliance

Sir/Madam
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March 9, 2020

ZWD:ABM

Enclosures

cc (Enclosures):

Mr. Paul Barton
Assistant Director of Cultural Preservation
Eastern Shawnee Tribe of Oklahoma
127 West Oneida
Seneca, Missouri 64885

Ms. Sheila Bird
Cultural Preservation Consultant
Shawnee Tribe
Post Office Box 189
Miami, Oklahoma 74355

Ms. Corain Lowe-Zepeda
Tribal Historic Preservation Officer
Historic & Cultural Preservation Department
The Muscogee (Creek) Nation
Post Office Box 580
Okmulgee, Oklahoma 74447

Mr. Russell Townsend
Tribal Historic Preservation Officer
Eastern Band of Cherokee Indians
Post Office Box 455
Cherokee, North Carolina 28719

Ms. Charlotte Wolfe
Section 106 Compliance Officer/Environmental Scientist
United Keetoowah Band of Cherokee Indians in Oklahoma
18263 W. Keetoowah Circle
Tahlequah, Oklahoma 74464



GWJ/DSP
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Office of the Chief

Chuck Hoshin Jr.
Principal Chief

Bryan Warner
Deputy Principal Chief

April 8, 2020

Marianne Shuler
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, TN 37902

Re: Proposed Eagle Creek Transmission Line Project

Ms. Marianne Shuler:

The Cherokee Nation (Nation) is in receipt of your correspondence about and related report for **Proposed Eagle Creek Transmission Line Project**, and appreciates the opportunity to provide comment upon this project.

The Nation maintains databases and records of cultural, historic, and pre-historic resources in this area. Our Historic Preservation Office reviewed this project, cross referenced the project's legal description against our information, and found no instances where this project intersects or adjoins such resources. Thus, the Nation does not foresee this project imparting impacts to Cherokee cultural resources at this time.

However, the Nation requests that the Tennessee Valley Authority (TVA) halt all project activities immediately and re-contact our Offices for further consultation if items of cultural significance are discovered during the course of this project.

Additionally, the Nation requests that TVA conduct appropriate inquiries with other pertinent Tribal and Historic Preservation Offices regarding historic and prehistoric resources not included in the Nation's databases or records.

If you require additional information or have any questions, please contact me at your convenience. Thank you for your time and attention to this matter.

Wado,

Elizabeth Toombs, Tribal Historic Preservation Officer
Cherokee Nation Tribal Historic Preservation Office
elizabeth-toombs@cherokee.org
918.453.5389



The Delaware Nation
Historic Preservation Department
31064 State Highway 281
Anadarko, OK 73005
Phone (405)247-2448

September 10, 2020

To Whom It May Concern:

The Delaware Nation Historic Preservation Department received correspondence regarding the following referenced project(s).

Project(s): Eagle Creek Transmission Line Project, Calloway County, Kentucky and Henry County, Tennessee

Our office is committed to protecting tribal heritage, culture and religion with particular concern for archaeological sites potentially containing burials and associated funerary objects.

The Lenape people occupied the area indicated in your letter prior to European contact until their eventual removal to our present locations. According to our files, the location of the proposed project does not endanger cultural, or religious sites of interest to the Delaware Nation. Please continue with the project as planned keeping in mind during construction should an archaeological site or artifacts inadvertently be uncovered, all construction and ground disturbing activities should immediately be halted until the appropriate state agencies, as well as this office, are notified (within 24 hours), and a proper archaeological assessment can be made.

Please note the Delaware Nation, the Delaware Tribe of Indians, and the Stockbridge Munsee Band of Mohican Indians are the only Federally Recognized Delaware/Lenape entities in the United States and consultation must be made only with designated staff of these three tribes. We appreciate your cooperation in contacting the Delaware Nation Historic Preservation Office to conduct proper Section 106 consultation. Should you have any questions, feel free to contact our offices at 405-247-2448 ext. 1403.

A handwritten signature in black ink that reads "Erin N. Paden".

Erin Paden
Director of Historic Preservation
Delaware Nation
31064 State Highway 281
Anadarko, OK 73005
Ph. 405-247-2448 ext. 1403
epaden@delawarenation-nsn.gov

May 20, 2020

Ms. Marianne Shuler, Senior Specialist,
Archaeologist & Tribal Liaison
Cultural Compliance
Tennessee Valley Authority
400 W. Summit Hill Drive
460 WT 7D-K
Knoxville, TN 37902

Dear Ms. Shuler:

Thank you for the letters of notification regarding the proposed projects delineated in the attached table. We accept the invitation to consult under Section 106 of the National Historic Preservation Act.

The Chickasaw Nation is in support of the proposed undertakings and is not presently aware of any specific historic properties, including those of traditional religious and cultural significance, in the project areas. In the event the agency becomes aware of the need to enforce other statutes we request to be notified under ARPA, AIRFA, NEPA, NAGPRA, NHPA and Professional Standards.

Your efforts to preserve and protect significant historic properties are appreciated. If you have any questions, please contact Ms. Karen Brunso, tribal historic preservation officer, at (580) 272-1106, or by email at karen.brunso@chickasaw.net.

Sincerely,

A handwritten signature in black ink, appearing to read 'Lisa John', with a long horizontal flourish extending to the right.

Lisa John, Secretary
Department of Culture and Humanities

Cc: mmshuler@tva.gov

Enclosure

Ms. Shuler

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May 20, 2020

Project Description	Location
Proposed construction of a new 16 mile transmission line and 25 miles of associated access routes from Murray KY Substation to the Paris Board of Public Utilities' proposed new Eagle Creek, Tennessee Substation.	Calloway County Kentucky and Henry County, Tennessee.
Proposed Power Purchase Agreement with Orgis Energy from a proposed solar photovoltaic facility.	Obion and Weakley Counties, Tennessee

**Appendix C – Tennessee Valley Authority's Transmission Line
Process Summary for Siting, Construction, and Operation &
Maintenance**

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Tennessee Valley Authority's Transmission Line Process Summary for Siting, Construction, and Operation & Maintenance

The general steps and processes the Tennessee Valley Authority (TVA) utilizes when planning, siting, constructing, operating and maintaining its transmission system are well-established. TVA has developed and follows standard procedures and guidance documents to avoid, minimize and mitigate impacts. Many of these standard procedures and guidelines can be found on TVA's Transmission website (TVA 2020). This document provides details pertaining to the siting, construction, operation, and maintenance of transmission lines, access roads, and construction assembly areas.

Transmission Line Siting Process

TVA's process for siting proposed transmission lines follows basic steps used to guide the determination of potential routes. These steps include the following:

- 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; and
- Incorporate public input into the final selection of the transmission line route.

Study Area Determination

The study area is in part defined by the location of the substation(s) for which a new power supply is needed. The boundaries are further contingent on the location(s) of an existing power source (i.e., transmission line or substation) that can supply the proposed new transmission line.

Siting Tools Used for Data Collection

Once the study area has been defined, TVA collects geographic data, such as topography, land use, transportation, environmental features, and cultural resources for the study area. A geographic information system (GIS) database, including U.S. Geological Survey digital line graphs, and tax maps, are utilized and an electronic map is developed to define the proposed transmission line connection. TVA also collects 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).

In addition to TVA sourced aerial photography for some projects, TVA utilizes NAIP, BING, and World imagery from various years for study areas. The aerial photography alongside topographical map overlays as well as other layers in the GIS database are used (e.g., wetlands, streams and rivers, floodplains, open water/ponds, highways, cemeteries, open land, and property boundaries) to refine a proposed route. Light Detection and Ranging imagery (also known as LiDAR) is also obtained, if possible. The collected data is then

consolidated. These GIS layers along with imagery showing other features such as homes, barns, bridges, and other constraints as well as field reconnaissance is utilized to establish the potential transmission line segments and/or routes.

There are several general guidelines used when establishing a proposed transmission line route. These include the avoidance of major constraints such as residences, residential developments, and other structures. Rivers and streams are crossed at 90 degrees, where possible, to reduce the amount of clearing of the stream bank vegetative cover. Also, rivers and streams are not paralleled at a distance that would require clearing of this vegetated cover. Environmental and historic areas are also considered and outlined as constraints and avoided wherever possible. Potential for access to the transmission line for construction and maintenance is typically a consideration as well. Other factors taken into consideration during siting a transmission line include, but are not limited to, engineering requirements, the ability to utilize an existing transmission line right-of-way easement and to incorporate a landowner's request during the final transmission line routing.

Establishment and Application of Siting Criteria

In consideration of data collected for a proposed project, TVA uses a set of evaluation criteria that represent opportunities and constraints for development of alternative transmission line routes composed of various segments. 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 right-of-way acquisition costs being important elements. Identifying feasible transmission line routes involves weighing and balancing these criteria.

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 are identified and scored. In the evaluation, typically a higher score would mean a bigger 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, more unfavorable score.

Engineering and Constructability Criteria

Includes considerations such as terrain (steeper slopes can present major challenges for design and construction), total length of the transmission line route, pivot-irrigation systems (existing and planned, which can create operational challenges for both the irrigation system and the transmission line), number of primary and secondary road crossings, the presence of pipeline and transmission line crossings, and total transmission line cost.

Social Criteria

Includes the total acreage of new right-of-way, number of affected property parcels, public comments, consideration of visual aesthetics, and proximity to schools, houses, commercial or industrial buildings, and barns.

Environmental Criteria

Includes the number of forested acres within the proposed right-of-way, the number of open water crossings, the number of floodplain or floodway crossings, the presence of wetlands, rare species habitat, sinkholes, 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.

Once potential route segments and/or routes have been identified from known available data, TVA would then gather public input by contacting landowners, and by asking appropriate local, state and federal agencies and the public for comments. Additional information could be gathered by holding a(n) public information day(s)/open house(s), as needed, and by providing project details on TVA's Transmission organization's public web site. Information gathered during this process is used to eliminate and/or redefine general route segments/routes.

Following data collection, a tally of the number of occurrences for each of the individual criteria is then calculated for each potential alternative route. Next, a normalized ranking of alternative routes is performed for each individual feature based on each route's value as it relates to the other alternative routes. Weights reflecting the severity of potential effects are then developed for each individual criterion. These criterion-specific weights are multiplied by the individual alternative rankings to create a table of weighted rankings. The weighted and normalized scores for each individual criteria are then added to develop overall scores of each alternative route by engineering, social, environmental, and overall total. For each of these categories, a ranking of each alternative route would be calculated based on the relationship between the various route's scores.

These rankings make it possible to recognize which potential 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 are combined into an overall score. The alternative route options are then rank ordered by their overall scores.

Identification the Preferred Transmission Line Route

Ultimately, TVA would propose a preferred transmission line route for additional environmental field studies. Pending the outcome of the environmental review of the proposed transmission line, TVA would then decide whether or not to approve the construction of proposed transmission line project and subsequent operation and maintenance.

Construction, Operation, and Maintenance of a Transmission Line

Transmission Line Construction

Right-of-Way Acquisition and Clearing

A right-of-way utilizes an easement that would be designated for the 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 right-of-way provides a safety margin between the high-voltage conductors and surrounding structures and vegetation.

For approved proposed transmission line projects, TVA would purchase easements from landowners whose land the proposed new right-of-way would cross. These easements would give TVA the right to clear the right-of-way and to construct, operate, and maintain the transmission line, as well as remove “danger trees” adjacent to the right-of-way. Danger trees include any trees located off the right-of-way that, under maximum sag and blowout conditions, could strike a transmission line structure or come within an unsafe distance of a transmission line, if it were to fall toward the transmission line. For most transmission lines, this distance is five feet, but for higher voltage transmission lines, the distance is generally 10 feet. The fee simple ownership of the land within the right-of-way 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 right-of-way 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 right-of-way.

Equipment used during this right-of-way clearing would include chain saws, skidders, bulldozers, tractors, and/or low ground-pressure feller-bunchers². Marketable timber would be salvaged where feasible; otherwise, woody debris and other vegetation would be piled and burned, chipped, or taken off-site. Prior to burning, TVA would obtain any necessary permits. In some instances, vegetation may be windrowed along the edge of the right-of-way to serve as sediment barriers.

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 has developed guidance and specification documents (listed below) for right-of-way clearing and construction activities. These documents are provided on TVA’s transmission system projects web page and are taken into account when considering the effects of a proposed transmission line (TVA 2020). TVA transmission projects also utilize best management practices (BMPs) to provide guidance for clearing and construction activities (TVA 2017a) and programmatic right-of-way vegetation management guidelines (TVA 2019).

² 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.

1. *Right-of-Way 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 2017a”)*
6. *Transmission Environmental Protection Procedures Right-of-Way Vegetation Management Guidelines (TVA 2017b)*

The emission of criteria pollutants or their precursors would not exceed de minimis levels specified in 40 Code of Federal Regulations (CFR) § 93.153(b). Thus, consistent with Section 176(c) of the Clean Air Act, project activities would conform to state implementation plans for attaining air quality standards.

Following clearing and construction, an appropriate vegetative cover on the right-of-way would be restored. TVA would utilize appropriate seed mixtures as described in TVA’s BMP manual (TVA 2017a), or work with property owners with impacted cropland, 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 right-of-way following construction per BMPs.

Access Roads

Access roads would be needed to allow vehicular access to each structure and other points along the right-of-way. TVA attempts to utilize existing roads for access, to the extent practical. Typically, new permanent or temporary access roads used for transmission lines are located on the right-of-way wherever possible and are designed and located to avoid severe slope conditions and to minimize impacts to environmental resources such as stream crossings. Access roads are typically about 12 to 16 feet wide and are surfaced with dirt, mulch, or gravel.

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 ephemeral³ 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.

³ Ephemeral streams are also known as wet-weather conveyances or streams that run only following a rainfall.

Additional applicable right-of-way clearing and environmental quality protection specifications are listed in *TVA Right-of-Way Clearing Specifications*, *Environmental Quality Protection Specifications for Transmission Line Construction*, and *Transmission Construction Guidelines Near Streams* which can be found on TVA's Transmission web page (TVA 2020).

Construction Assembly Areas

A construction assembly area (or "laydown yard") would typically 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. Properties utilized for laydown yards are 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 yards because site preparation is minimal. Selection criteria used for locating potential laydown yards 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, depending on site conditions, some minor grading and installation of drainage structures, such as culverts, may be required.

Likewise, the area may require graveling and fencing. Trailers used during the construction process for material storage and office space could be parked at these locations. Following completion of construction activities, all trailers, unused materials, and construction debris would be removed from the sites. Removal of TVA-installed fencing and site restoration would be performed by TVA at the discretion of the landowners. Any offsite construction assembly areas would be subject to additional environmental review prior to approval and development.

Structures and Conductors

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 that are either suspended from the structure cross arms or attached directly to the structure. A smaller overhead ground wire or wires are attached to the top of the structures.

Poles at angles (angle points) in the transmission line may require supporting screw, rock, or log-anchored guys. 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.

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 per TVA BMPs (TVA 2017a).

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 transmission 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.

Operation and Maintenance of a Transmission Line and Rights-of-Way

Inspection

Periodic inspections of 161-kV transmission lines are performed by helicopter aerial surveillance or by drones 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 transmission line or adversely affect the surrounding area. During these inspections, the condition of vegetation within the right-of-way, as well as that immediately adjoining the right-of-way, is noted. These observations are then used to plan corrective maintenance and routine vegetation management.

Vegetation Management

Management of vegetation along the right-of-way 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 National Electric Safety Code requirements in order to ensure reliability. TVA uses a minimum ground clearance of 24 feet for a 161-kV transmission line at the maximum transmission line operating temperature. TVA released the final Transmission System Vegetation Management Programmatic EIS (PEIS) in 2019, which outlined TVA's preferred vegetation management alternative moving forward (TVA 2019). TVA released its Record of Decision in October 2019 (84 FR 55995).

Current vegetation management practices are restricted under the injunction currently in place in the *Sherwood v. TVA* litigation under which TVA has stopped removing woody vegetation except for trees that are an immediate hazard. Under the PEIS, vegetation management along the right-of-way would consist of two different activities: felling danger trees adjacent to the cleared right-of-way (as described in the "Right-of-Way Acquisition and Clearing" section) and controlling vegetation within the total width of the cleared right-of-way. These activities would occur periodically as identified by LiDAR inspections.

After tall trees and other tall-growing vegetation are removed from the right-of-way during construction, routine management of vegetation within the cleared right-of-way would include an integrated vegetation management approach designed to encourage the low-growing plant species and discourage tall-growing plant species. TVA divides its entire transmission system into discrete geographic areas called "sectors" and develops a vegetation maintenance plan for each transmission line sector, based on the results of the periodic inspections described above. Vegetation control methods or tools and their appropriate uses for various transmission line right-of-way conditions have been described in TVA's PEIS (TVA 2019). These methods include manual (chainsaw, machete, brush hooks, axes, bush blades), mechanical cutting or trimming (mower or brush hog, bulldozer, track-hoe, skid steer, shears [e.g., feller-buncher], mulcher/chipper, Hydro-ax [including various other attachments], tracked equipment such as compact track loader, helicopter tree saw, Jarraff & Kershaw line trimmers, or aerial lifts) and herbicide spraying and growth

regulators. Herbicides are normally applied in areas where heavy growth of woody vegetation is occurring on the right-of-way and mechanical or manual methods are not practical.

Herbicides can be applied in a variety of ways; however, all herbicides would be applied under the supervision of a licensed applicator in accordance with applicable state and federal laws and regulations. Additionally, only TVA-approved herbicides registered with the EPA or those approved by another managing agency as appropriate are used and applied in accordance with manufacturers' label directions. A list of the herbicides currently used by TVA in right-of-way vegetation control and pre-emergent herbicides TVA currently uses on bare ground areas in transmission line rights-of-way is presented in TVA's *Transmission Environmental Protection Procedures Right-Of- Way Vegetation Management Guidelines* (TVA 2017b). This list may change over time as new herbicides are developed or new information on presently approved herbicides becomes available.

Structure Replacement

Other than vegetation management within right-of-ways, only minor maintenance work is generally required once transmission line structures and other components (e.g., conductor, insulators, arms) are installed as these items typically last several decades. In the event that a structure needs to be replaced, the structure would normally be lifted out of the ground by crane-like equipment. 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.

Literature Cited

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- TVA. 2020. Tennessee Valley Authority. Energy, Transmission, Investing in New Power Lines. Learn More About Transmission Projects Currently Under Way. Related Guidelines and Specifications. Available to the public at <https://www.tva.com/Energy/Transmission-System/Transmission-System-Projects>.

**Appendix D – Stream Crossings Along the Proposed
Transmission Line Right-of-Way**

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Table D-1. Stream Crossings Along the Proposed Eagle Creek 161-kV Transmission Line Route in Calloway County, Kentucky and Henry County, Tennessee

Stream ID	Stream ID	Stream Type	Streamside Management Zone (SMZ) Category	Stream Name	Field Notes
ab01	001	Perennial	Category A (50 feet)	Clarks River	Clarks River. Fish present. Large channel 30 feet wide x 10 feet deep.
ab08	002	Intermittent	Category A (50 feet)		TDEC score 18.5. DATOS. 10 feet wide x 8 feet deep.
BWA07	003	Intermittent	Category A (50 feet)		30+ feet wide x 10+ feet deep, gravely substrate, dry with some pools.
BWA11	004	Intermittent	Category A (50 feet)		Mostly DATOS, rocky substrate, 5 feet wide x 5 feet deep, running across access road.
BWA12	005	Perennial	Category A (50 feet)		Fish Present
ab09d	006	Intermittent	Category A (50 feet)		TDEC score 18. DATOS except for a few pools. Becomes more stream-like further downstream.
ab11	007	Intermittent	Category A (70 feet)		TDEC score 18. DATOS. Better defined within wood line. Steep slope of adjacent land.
ab12	008	Intermittent	Category A (70 feet)		TDEC score 18. DATOS. Well-incised channel with some plants present, moderate substrate sorting.
ab14	009	Intermittent	Category A (70 feet)		TDEC score 25. DATOS. 20 feet wide with cobble substrate, good sorting, lots of bars, frogs in pool, algae mat in ROW.
ab16	010	Intermittent	Category A (70 feet)		TDEC score 21. DATOS. Highly incised. Moderate sorting, no standing water or

Stream ID	Stream ID	Stream Type	Streamside Management Zone (SMZ) Category	Stream Name	Field Notes
					biology. 20 feet wide x 30 feet deep. High adjacent slope.
BWA18	011	Perennial	Category A (50 feet)		Fish present, gravel substrate, 10 feet wide x 2 feet deep
BWA19	012	Intermittent	Category A (50 feet)		TDEC score of 19, DATOS, gravel sub, 3 feet wide x 3 feet deep
BWA21	013	Intermittent	Category A (50 feet)		DATOS
BWA16	014	Intermittent	Category A (50 feet)	Lax Creek	TDEC score of 25. 25 feet wide x 10 feet deep, sandy rock substrate, mostly dry.
BWA22	015	Perennial	Category A (50 feet)		15 feet wide x 3 feet deep, flowing, gravel bottom, fish present
BWA29	016	Intermittent	Category A (50 feet)		TDEC score of 19, flowing water, soil substrate, 3 feet wide x 2 feet deep
BWA31	017	Perennial	Category A (50 feet)	Blood River Tributary	Fish Present
BWA32	018	Perennial	Category A (50 feet)		Fish Present
BWA32b	019	Perennial	Category A (50 feet)		Fish Present
ab24	020	Perennial	Category A (50 feet)	Rabbit Creek	Rabbit Creek. Fish present in small pools, DATOS otherwise.
ab24b	021	Perennial	Category A (50 feet)	Rabbit Creek	Rabbit Creek. Fish present in small pools, DATOS otherwise.

Stream ID	Stream ID	Stream Type	Streamside Management Zone (SMZ) Category	Stream Name	Field Notes
ab25	022	Intermittent	Category A (50 feet)		TEDC score 20.5. DATOS. 20 feet wide x 6 feet deep. Good sorting, few plants in channel.
ab30b	023	Intermittent	Category A (70 feet)		TDEC score 18.5. DATOS. Geomorph indicators improve downstream. Steep adjacent slope.
ab34	024	Intermittent	Category A (70 feet)		DATOS. Channel & indicator features disappear near ROW. 3 feet wide x 1 foot deep. Good sorting and sequences. Steep adjacent slope.
ab35	025	Intermittent	Category A (50 feet)		TDEC score 20. DATOS except for some pools. Features are stronger in woods than in ROW. Saw three frogs.
pond	p001	Other	Category A (50 feet)		
pond1	p002	Other	Category A (50 feet)		
pond3	p003	Other	Category A (50 feet)		
pond4	p004	Other	Category A (50 feet)		
BWA04	ar001	Perennial	Best Management Practices		Fish Present, road crossing stream is concreted and water flows across, 10 feet wide x 1 foot deep in access road

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Appendix E – Bat Strategy Project Screening Form

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Project Review Form - TVA Bat Strategy (12/2018)

This form should **only** be completed if project includes activities in Tables 2 or 3 (STEP 2 below). This form is not required if project activities are limited to Table 1 (STEP 2) or otherwise determined to have no effect on federally listed bats. If so, include the following statement in your environmental compliance document (e.g., add as a comment in the project CEC): "Project activities limited to Bat Strategy Table 1 or otherwise determined to have no effect on federally listed bats. Bat Strategy Project Review Form NOT required." This form is to assist in determining required conservation measures per TVA's ESA Section 7 programmatic consultation for routine actions and federally listed bats.¹

Project Name: Eagle Creek 161-kV Transmission Line **Date:** Dec 20, 2018
Contact(s): Todd Liskey **CEC#:** **Project ID:** 431696
Project Location (City, County, State): Henry County, TN and Calloway County, KY

Project Description:

TVA will construct a new 16-mile 161-kV Transmission Line from the Murray, KY 161-kV Substation to LPC's new Eagle Creek, TN Substation. The new TL would require 1.5 mile of new 100 foot wide ROW and 14.5 miles of new 60 foot wide ROW; 40 feet of existing ROW will be used in this section. The Murray Substation will also be expanded to add a new switchhouse; no new property required.

SECTION 1: PROJECT INFORMATION - ACTION AND ACTIVITIES

STEP 1) Select TVA Action. If none are applicable, contact environmental staff or Terrestrial Zoologist to discuss whether form (i.e., application of Bat Programmatic Consultation) is appropriate for project:

- | | |
|---|--|
| <input type="checkbox"/> 1 Manage Biological Resources for Biodiversity and Public Use on TVA Reservoir Lands | <input type="checkbox"/> 6 Maintain Existing Electric Transmission Assets |
| <input type="checkbox"/> 2 Protect Cultural Resources on TVA-Retained Land | <input type="checkbox"/> 7 Convey Property associated with Electric Transmission |
| <input type="checkbox"/> 3 Manage Land Use and Disposal of TVA-Retained Land | <input checked="" type="checkbox"/> 8 Expand or Construct New Electric Transmission Assets |
| <input type="checkbox"/> 4 Manage Permitting under Section 26a of the TVA Act | <input type="checkbox"/> 9 Promote Economic Development |
| <input type="checkbox"/> 5 Operate, Maintain, Retire, Expand, Construct Power Plants | <input type="checkbox"/> 10 Promote Mid-Scale Solar Generation |

STEP 2) Select all activities from Tables 1, 2, and 3 below that are included in the proposed project.

TABLE 1. Activities with no effect to bats. Conservation measures & completion of bat strategy project review form NOT required.

<input type="checkbox"/> 1. Loans and/or grant awards	<input type="checkbox"/> 8. Sale of TVA property	<input type="checkbox"/> 19. Site-specific enhancements in streams and reservoirs for aquatic animals
<input type="checkbox"/> 2. Purchase of property	<input type="checkbox"/> 9. Lease of TVA property	<input type="checkbox"/> 20. Nesting platforms
<input type="checkbox"/> 3. Purchase of equipment for industrial facilities	<input type="checkbox"/> 10. Deed modification associated with TVA rights or TVA property	<input type="checkbox"/> 41. Minor water-based structures (this does not include boat docks, boat slips or piers)
<input type="checkbox"/> 4. Environmental education	<input type="checkbox"/> 11. Abandonment of TVA retained rights	<input type="checkbox"/> 42. Internal renovation or internal expansion of an existing facility
<input type="checkbox"/> 5. Transfer of ROW easement and/or ROW equipment	<input type="checkbox"/> 12. Sufferance agreement	<input type="checkbox"/> 43. Replacement or removal of TL poles
<input checked="" type="checkbox"/> 6. Property and/or equipment transfer	<input type="checkbox"/> 13. Engineering or environmental planning or studies	<input type="checkbox"/> 44. Conductor and overhead ground wire installation and replacement
<input type="checkbox"/> 7. Easement on TVA property	<input type="checkbox"/> 14. Harbor limits	<input type="checkbox"/> 49. Non-navigable houseboats

Project Review Form - TVA Bat Strategy (12/2018)

TABLE 2. Activities not likely to adversely affect bats with implementation of conservation measures. Conservation measures and completion of bat strategy project review form REQUIRED; review of bat records in proximity to project NOT required.

<input checked="" type="checkbox"/> 18. Erosion control, minor	<input type="checkbox"/> 57. Water intake - non-industrial	<input type="checkbox"/> 79. Swimming pools/associated equipment
<input type="checkbox"/> 24. Tree planting	<input type="checkbox"/> 58. Wastewater outfalls	<input type="checkbox"/> 81. Water intakes - industrial
<input type="checkbox"/> 30. Dredging and excavation; recessed harbor areas	<input type="checkbox"/> 59. Marine fueling facilities	<input type="checkbox"/> 84. On-site/off-site public utility relocation or construction or extension
<input type="checkbox"/> 39. Berm development	<input type="checkbox"/> 60. Commercial water-use facilities (e.g., marinas)	<input type="checkbox"/> 85. Playground equipment - land-based
<input type="checkbox"/> 40. Closed loop heat exchangers (heat pumps)	<input type="checkbox"/> 61. Septic fields	<input type="checkbox"/> 87. Aboveground storage tanks
<input type="checkbox"/> 45. Stream monitoring equipment - placement and use	<input type="checkbox"/> 66. Private, residential docks, piers, bathhouses	<input type="checkbox"/> 88. Underground storage tanks
<input type="checkbox"/> 46. Floating boat slips within approved harbor limits	<input type="checkbox"/> 67. Siting of temporary office trailers	<input type="checkbox"/> 90. Pond closure
<input checked="" type="checkbox"/> 48. Laydown areas	<input type="checkbox"/> 68. Financing for speculative building construction	<input type="checkbox"/> 93. Standard License
<input type="checkbox"/> 50. Minor land based structures	<input type="checkbox"/> 72. Ferry landings/service operations	<input type="checkbox"/> 94. Special Use License
<input type="checkbox"/> 51. Signage installation	<input type="checkbox"/> 74. Recreational vehicle campsites	<input type="checkbox"/> 95. Recreation License
<input type="checkbox"/> 53. Mooring buoys or posts	<input type="checkbox"/> 75. Utility lines/light poles	<input type="checkbox"/> 96. Land Use Permit
<input type="checkbox"/> 56. Culverts	<input type="checkbox"/> 76. Concrete sidewalks	

Table 3: Activities that may adversely affect federally listed bats. Conservation measures AND completion of bat strategy project review form REQUIRED; review of bat records in proximity of project REQUIRED by OSAR/Heritage eMap reviewer or Terrestrial Zoologist.

<input checked="" type="checkbox"/> 15. Windshield and ground surveys for archaeological resources	<input checked="" type="checkbox"/> 34. Mechanical vegetation removal, includes trees or tree branches > 3 inches in diameter	<input type="checkbox"/> 69. Renovation of existing structures
<input type="checkbox"/> 16. Drilling	<input type="checkbox"/> 35. Stabilization (major erosion control)	<input type="checkbox"/> 70. Lock maintenance/construction
<input checked="" type="checkbox"/> 17. Mechanical vegetation removal, does not include trees or branches > 3" in diameter (in Table 3 due to potential for woody burn piles)	<input checked="" type="checkbox"/> 36. Grading	<input type="checkbox"/> 71. Concrete dam modification
<input checked="" type="checkbox"/> 21. Herbicide use	<input type="checkbox"/> 37. Installation of soil improvements	<input type="checkbox"/> 73. Boat launching ramps
<input type="checkbox"/> 22. Grubbing	<input type="checkbox"/> 38. Drain installations for ponds	<input type="checkbox"/> 77. Construction or expansion of land-based buildings
<input type="checkbox"/> 23. Prescribed burns	<input type="checkbox"/> 47. Conduit installation	<input type="checkbox"/> 78. Wastewater treatment plants
<input checked="" type="checkbox"/> 25. Maintenance, improvement or construction of pedestrian or vehicular access corridors	<input type="checkbox"/> 52. Floating buildings	<input type="checkbox"/> 80. Barge fleeting areas
<input checked="" type="checkbox"/> 26. Maintenance/construction of access control measures	<input type="checkbox"/> 54. Maintenance of water control structures (dewatering units, spillways, levees)	<input type="checkbox"/> 82. Construction of dam/weirs/levees
<input type="checkbox"/> 27. Restoration of sites following human use and abuse	<input type="checkbox"/> 55. Solar panels	<input type="checkbox"/> 83. Submarine pipeline, directional boring operations
<input type="checkbox"/> 28. Removal of debris (e.g., dump sites; hazardous material, unauthorized structures)	<input type="checkbox"/> 62. Blasting	<input type="checkbox"/> 86. Landfill construction
<input type="checkbox"/> 29. Acquisition and use of fill/borrow material	<input checked="" type="checkbox"/> 63. Foundation installation for transmission support	<input type="checkbox"/> 89. Structure demolition
<input checked="" type="checkbox"/> 31. Stream/wetland crossings	<input checked="" type="checkbox"/> 64. Installation of steel structure, overhead bus, equipment, etc.	<input type="checkbox"/> 91. Bridge replacement
<input type="checkbox"/> 32. Clean-up following storm damage	<input checked="" type="checkbox"/> 65. Pole and/or tower installation and/or extension	<input type="checkbox"/> 92. Return of archaeological remains to former burial sites
<input checked="" type="checkbox"/> 33. Removal of hazardous trees/tree branches		

STEP 3) Project includes one or more activities in Table 3?

☒ YES (Go to Step 4)☐ NO (Go to Step 13)

Project Review Form - TVA Bat Strategy (12/2018)

STEP 4) Answer questions a through e below (applies to projects with activities from Table 3 ONLY)

- a) Will project involve continuous noise (i.e., ≥ 24 hrs) that is greater than 75 decibels measured on the A scale (e.g., loud machinery)? ☐ NO (NV2 does not apply) ☒ YES (NV2 applies, subject to records review)
- b) Will project involve entry into/survey of cave, bridge, other structure (potential bat roost)? ☒ NO (HP1/HP2 do not apply) ☐ YES (HP1/HP2 applies, subject to review of bat records)
- c) If conducting prescribed burning (activity 23), estimated acreage: and timeframe(s) below: ☒ N/A

STATE	SWARMING	WINTER	NON-WINTER	PUP
GA, KY, TN	<input type="checkbox"/> Oct 15 - Nov 14	<input type="checkbox"/> Nov 15 - Mar 31	<input type="checkbox"/> Apr 1 - May 31, Aug 1 - Oct 14	<input type="checkbox"/> Jun 1 - Jul 31
VA	<input type="checkbox"/> Sep 16 - Nov 15	<input type="checkbox"/> Nov 16 - Apr 14	<input type="checkbox"/> Apr 15 - May 31, Aug 1 - Sept 15	<input type="checkbox"/> Jun 1 - Jul 31
AL	<input type="checkbox"/> Oct 15 - Nov 14	<input type="checkbox"/> Nov 15 - Mar 15	<input type="checkbox"/> Mar 16 - May 31, Aug 1 - Oct 14	<input type="checkbox"/> Jun 1 - Jul 31
NC	<input type="checkbox"/> Oct 15 - Nov 14	<input type="checkbox"/> Nov 15 - Apr 15	<input type="checkbox"/> Apr 16 - May 31, Aug 1 - Oct 14	<input type="checkbox"/> Jun 1 - Jul 31
MS	<input type="checkbox"/> Oct 1 - Nov 14	<input type="checkbox"/> Nov 15 - Apr 14	<input type="checkbox"/> Apr 15 - May 31, Aug 1 - Sept 30	<input type="checkbox"/> Jun 1 - Jul 31

- d) Will the project involve vegetation piling/burning? ☒ NO (SSPC4/SHF7/SHF8 do not apply) ☐ YES (SSPC4/SHF7/SHF8 applies, subject to review of bat records)

- e) If tree removal (activity 33 or 34), estimated amount: ☒ ac ☐ trees ☐ N/A

STATE	SWARMING	WINTER	NON-WINTER	PUP
GA, KY, TN	<input type="checkbox"/> Oct 15 - Nov 14	<input type="checkbox"/> Nov 15 - Mar 31	<input checked="" type="checkbox"/> Apr 1 - May 31, Aug 1 - Oct 14	<input checked="" type="checkbox"/> Jun 1 - Jul 31
VA	<input type="checkbox"/> Sep 16 - Nov 15	<input type="checkbox"/> Nov 16 - Apr 14	<input type="checkbox"/> Apr 15 - May 31, Aug 1 - Sept 15	<input type="checkbox"/> Jun 1 - Jul 31
AL	<input type="checkbox"/> Oct 15 - Nov 14	<input type="checkbox"/> Nov 15 - Mar 15	<input type="checkbox"/> Mar 16 - May 31, Aug 1 - Oct 14	<input type="checkbox"/> Jun 1 - Jul 31
NC	<input type="checkbox"/> Oct 15 - Nov 14	<input type="checkbox"/> Nov 15 - Apr 15	<input type="checkbox"/> Apr 16 - May 31, Aug 1 - Oct 14	<input type="checkbox"/> Jun 1 - Jul 31
MS	<input type="checkbox"/> Oct 1 - Nov 14	<input type="checkbox"/> Nov 15 - Apr 14	<input type="checkbox"/> Apr 15 - May 31, Aug 1 - Sept 30	<input type="checkbox"/> Jun 1 - Jul 31

If warranted, does project have flexibility for bat surveys (May 15-Aug 15)? ☐ MAYBE ☒ YES ☐ NO

SECTION 2: REVIEW OF BAT RECORDS (applies to projects with activities from Table 3 ONLY)**STEP 5) Review of bat/cave records conducted by Heritage/OSAR reviewer?**

- ☐ YES ☒ NO (If NO and includes Table 3 activities, submit project / relevant information [e.g., maps] for review by Terrestrial Zoologist.)

Info below completed by: ☐ Heritage Reviewer (name) Date
☐ OSAR Reviewer (name) Date
☐ Terrestrial Zoologist (name) Date

Gray bat records: ☐ None ☐ Within 3 miles* ☐ Within a cave* ☐ Within the County

Indiana bat records: ☐ None ☐ Within 10 miles* ☐ Within a cave* ☐ Capture/roost tree* ☐ Within the County

Northern long-eared bat records: ☐ None ☐ Within 5 miles* ☐ Within a cave* ☐ Capture/roost tree* ☐ Within the County

Virginia big-eared bat records: ☐ None ☐ Within 10 miles* ☐ Within the County

Caves: ☐ None within 3 mi ☐ Within 3 miles but > 0.5 mi ☐ Within 0.5 mi but > 0.25 mi* ☐ Within 0.25 mi but > 200 feet* ☐ Within 200 feet*

Bat Habitat Inspection Sheet completed? ☐ NO ☐ YES

Amount of SUITABLE habitat to be removed/turned (may differ from STEP 4e): (☐ ac ☐ trees)* ☐ N/A

Project Review Form - TVA Bat Strategy (12/2018)

STEP 6) If reviewed by Heritage/OSAR reviewer, does records review trigger need for additional review by Terrestrial Zoologist (noted by * in Step 5)?

- ☐ NO (Go to Step 13)
 ☐ YES (Submit for Terrestrial Zoology review)
 ☐ YES, however, based on Heritage Data review guidelines (or discussion with Terrestrial Zoology), project does not need to be submitted to Terrestrial Zoology for review. (Go to Step 13)

Notes (additional information from field review or explanation of no impact):

STEPS 7-12 To be Completed by Terrestrial Zoologist (if warranted):

STEP 7) Project will involve:

- ☐ Removal of suitable trees within 0.5 mile of P1-P2 Indiana bat hibernacula or 0.25 mile of P3-P4 Indiana bat hibernacula or any NLEB hibernacula.
☐ Removal of suitable trees within 10 miles of documented Indiana bat (or within 5 miles of NLEB) hibernacula.
☐ Removal of suitable trees > 10 miles from documented Indiana bat (> 5 miles from NLEB) hibernacula.
☐ Removal of trees within 150 feet of a documented Indiana bat or northern long-eared bat maternity roost tree.
☐ Removal of suitable trees within 2.5 miles of Indiana bat roost trees or within 5 miles of Indiana bat capture sites.
☐ Removal of suitable trees > 2.5 miles from Indiana bat roost trees or > 5 miles from Indiana bat capture sites.
☐ Removal of documented Indiana bat or NLEB roost tree, if still suitable.
☐ N/A

STEP 8) Presence/absence surveys were/will be conducted: ☐ YES ☐ NO ☐ TBD

STEP 9) Presence/absence survey results, on ☐ NEGATIVE ☐ POSITIVE ☐ N/A

STEP 10) Project ☐ WILL ☐ WILL NOT **require use of Incidental Take in the amount of** **acres or** ☐ trees **proposed to be used during the** ☐ WINTER ☐ VOLANT SEASON ☐ NON-VOLANT SEASON ☐ N/A

STEP 11) Available Incidental Take (prior to accounting for this project) as of

TVA Action	Total 20-year	Winter	Volant Season	Non-Volant Season
8 Expand or Construct New Electric Transmission Assets				

STEP 12) Amount contributed to TVA's Bat Conservation Fund upon activity completion: \$ **OR** ☐ N/A

SECTION 3: REQUIRED CONSERVATION MEASURES

STEP 13a) If answer to STEP 3 is NO, (Project Lead or OSAR/Heritage Reviewer) is to review Conservation Measures in Table 4 and ensure these selected Conservation Measures are relevant to project. If not manually override and uncheck. **Go to Step 14**

STEP 13b) If answer to STEP 3 is YES, and answer to STEP 6 is NO, OSAR/Heritage Reviewer is to review Conservation Measures in Table 4 that and ensure these selected Conservation Measures are relevant to project. If not manually override and uncheck. **Go to Step 14**

STEP 13c) If answer to STEP 3 is YES, and answer to STEP 6 is YES, Terrestrial Zoologist is to review Conservation Measures in Table 4 and ensure these selected Conservation Measures are relevant to project. If not manually override and uncheck. **Go to Step 15**

Project Review Form - TVA Bat Strategy (12/2018)

Table 4. TVA's ESA Section 7 Programmatic Bat Consultation Required Conservation Measures

The Conservation Measures in Table 4 are automatically selected based on your choices in Tables 2 and 3 but can be manually overridden, if necessary. To Manually override, press the button and enter your name.

Manual Override

Check if applies to Project	Activities Subject to Conservation Measure	Conservation Measure Description
<input checked="" type="checkbox"/>	15, 16, 17, 18, 22, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 45, 47, 48, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 90, 91, 92, 93, 94, 95, 96	NV1 - Noise will be short-term, transient, and not significantly different from urban interface or natural events (i.e., thunderstorms) that bats are frequently exposed to when present on the landscape.
<input checked="" type="checkbox"/>	16, 25, 26, 37, 47, 52, 62, 63, 64, 65, 70, 71, 73, 78, 80, 82, 83, 86, 91	NV2 - Drilling, blasting, or any other activity that involves continuous noise (i.e., longer than 24 hours) disturbances greater than 75 decibels measured on the A scale (e.g., loud machinery) within a 0.5 mile radius of documented winter and/or summer roosts (caves, trees, unconventional roosts) will be conducted when bats are absent from roost sites.
<input checked="" type="checkbox"/>	16, 26, 62	NV3 - Drilling or blasting within a 0.5 mile radius of documented cave (or unconventional) roosts will be conducted in a manner that will not compromise the structural integrity or alter the karst hydrology of the roost site.
<input checked="" type="checkbox"/>	16, 26, 62	NV4 - Drilling or blasting within 0.5 miles of a documented roost site (cave, tree, unconventional roost) that needs to occur when bats are present will first involve development of project-specific avoidance or minimization measures in coordination with the USFWS.
<input checked="" type="checkbox"/>	15, 26, 92	HP1 - Site-specific cases in which potential impact of human presence is heightened (e.g., conducting environmental or cultural surveys within a roost) will be closely coordinated with staff bat biologists to avoid/minimize impacts below any potential adverse effect. Any take from these activities would be covered by TVA's Section 10 permit.
<input checked="" type="checkbox"/>	15, 26, 92	HP2 - Entry into roosts known to be occupied by federally listed bats will be communicated to the USFWS when impacts to bats may occur if not otherwise communicated (i.e., via annual monitoring reports per TVA's Section 10 permit). Any take from these activities would be covered by TVA's section 10 permit.
<input type="checkbox"/>	23	SHF1 - Fire breaks will be used to define and limit burn scope.
<input type="checkbox"/>	23	SHF2 - Site-specific conditions (e.g., acres burned, transport wind speed, mixing heights) will be considered to ensure smoke is limited and adequately dispersed away from caves so that smoke does not enter cave or cave-like structures.
<input type="checkbox"/>	23	SHF3 - Acreage will be divided into smaller units to keep amount of smoke at any one time or location to a minimum and reduce risk for smoke to enter caves.
<input type="checkbox"/>	23	SHF4 - If burns need to be conducted during April and May, when there is some potential for bats to present on the landscape and more likely to enter torpor due to colder temperatures, burns will only be conducted if the air temperature is 55° or greater, and preferably 60° or greater.
<input type="checkbox"/>	23	SHF5 - Fire breaks will be plowed immediately prior to burning, will be plowed as shallow as possible, and will be kept to minimum to minimize sediment.
<input type="checkbox"/>	23	SHF6 - Tractor-constructed fire lines will be established greater than 200 feet from cave entrances. Existing logging roads and skid trails will be used where feasible to minimize ground disturbance and generation of loose sediment.
<input checked="" type="checkbox"/>	22, 23, 32, 33, 34, 35, 36	SHF7 - Burning will only occur if site specific conditions (e.g. acres burned, transport wind speed, mixing heights) can be modified to ensure that smoke is adequately dispersed away from caves or cave-like structures. This applies to prescribed burns and burn piles of woody vegetation.
<input checked="" type="checkbox"/>	22, 23, 32, 33, 34, 35, 36	SHF8 - Brush piles will be burned a minimum of 0.25 mile from documented, known, or obvious caves or cave entrances and otherwise in the center of newly established ROW when proximity to caves on private land is unknown.

Project Review Form - TVA Bat Strategy (12/2018)

Check if applies to Project	Activities Subject to Conservation Measure	Conservation Measure Description
<input type="checkbox"/>	23	SHF9 - A 0.25 mile buffer of undisturbed forest will be maintained around documented or known gray bat maternity and hibernation colony sites, documented or known Virginia big-eared bat maternity, bachelor, or winter colony sites, Indiana bat hibernation sites, and northern long-eared bat hibernation sites. Prohibited activities within this buffer include cutting of overstory vegetation, construction of roads, trails or wildlife openings, and prescribed burning. Exceptions may be made for maintenance of existing roads and existing ROW, or where it is determined that the activity is compatible with species conservation and recovery (e.g., removal of invasive species).
<input checked="" type="checkbox"/>	33, 34	TR1* - Removal of potentially suitable summer roosting habitat during time of potential occupancy has been quantified and minimized programmatically. TVA will track and document alignment of activities that include tree removal (i.e., hazard trees, mechanical vegetation removal) with the programmatic quantitative cumulative estimate of seasonal removal of potential summer roost trees for Indiana bat and northern long-eared bat. Project will therefore communicate completion of tree removal to appropriate TVA staff.
<input checked="" type="checkbox"/>	33, 34	TR2 - Removal of suitable summer roosting habitat within 0.5 mile of Priority 1/Priority 2 Indiana bat hibernacula, or 0.25 mile of Priority 3/Priority 4 Indiana bat hibernacula or any northern long-eared bat hibernacula will be prohibited, regardless of season, with very few exceptions (e.g., vegetation maintenance of TL ROW immediately adjacent to a known cave).
<input checked="" type="checkbox"/>	33	TR3* - Removal of suitable summer roosting habitat within documented bat habitat (i.e., within 10 miles of documented Indiana bat hibernacula, within 5 miles of documented northern long-eared bat hibernacula, within 2.5 miles of documented Indiana bat summer roost trees, within 5 miles of Indiana bat capture sites, within 1 mile of documented northern long-eared bat summer roost trees, within 3 miles of northern long-eared bat capture sites) will be tracked, documented, and included in annual reporting. Project will therefore communicate completion of tree removal to appropriate TVA staff.
<input checked="" type="checkbox"/>	33, 34	TR4* - Removal of suitable summer roosting habitat within potential habitat for Indiana bat or northern long-eared bat will be tracked, documented, and included in annual reporting. Project will therefore communicate completion of tree removal to appropriate TVA staff.
<input checked="" type="checkbox"/>	33, 34	TR5 - Removal of any trees within 150 feet of a documented Indiana bat or northern long-eared bat maternity summer roost tree during non-winter season, range-wide pup season or swarming season (if site is within known swarming habitat), will first require a site-specific review and assessment. If pups are present in trees to be removed (determined either by mist netting and assessment of adult females, or by visual assessment of trees following evening emergence counts), TVA will coordinate with the USFWS to determine how to minimize impacts to pups to the extent possible. May include establishment of artificial roosts before removal of roost tree(s).
<input checked="" type="checkbox"/>	33, 34	TR6 - Removal of a documented Indiana bat or northern long-eared bat roost tree that is still suitable and that needs to occur during non-winter season, range-wide pup season, or swarming season (if site is within known swarming habitat) will first require a site-specific review and assessment. If pups are present in trees to be removed (determined either by mist netting and assessment of adult females, or by visual assessment of trees following evening emergence counts), TVA will coordinate with USFWS to determine how to minimize impacts to pups to the extent possible. This may include establishment of artificial roosts before removal of roost tree(s).
<input checked="" type="checkbox"/>	33, 34	TR7 (Existing Transmission ROW only) - Tree removal within 100 feet of existing transmission ROWs will be limited to hazard trees. On or adjacent to TLs, a hazard tree is a tree that is tall enough to fall within an unsafe distance of TLs under maximum sag and blowout conditions and/or are also dead, diseased, dying, and/or leaning. Hazard tree removal includes removal of trees that 1) currently are tall enough to threaten the integrity of operation and maintenance of a TL or 2) have the ability in the future to threaten the integrity of operation and maintenance of a TL.
<input checked="" type="checkbox"/>	33, 34	TR8 (TVA Reservoir Land only) - Requests for removal of hazard trees on or adjacent to TVA reservoir land will be inspected by staff knowledgeable in identifying hazard trees per International Society of Arboriculture and TVA's checklist for hazard trees. Approval will be limited to trees with a defined target.
<input checked="" type="checkbox"/>	33, 34	TR9 - If removal of suitable summer roosting habitat occurs when bats are present on the landscape, a funding contribution (based on amount of habitat removed) towards future conservation and recovery efforts for federally listed bats would be carried out. Project can consider seasonal bat presence/absence surveys (mist netting or emergence counts) that allow for positive detections without resulting in increased constraints in cost and project schedule. This will enable TVA to contribute to increased knowledge of bat presence on the landscape while carrying out TVA's broad mission and responsibilities.

Project Review Form - TVA Bat Strategy (12/2018)

Check if applies to Project	Activities Subject to Conservation Measure	Conservation Measure Description
<input type="checkbox"/>	69, 77, 89, 91	<p>AR1 - Projects that involve structural modification or demolition of buildings, bridges, and potentially suitable box culverts, will require assessment to determine if structure has characteristics that make it a potentially suitable unconventional bat roost. If so a survey to determine if bats may be present will be conducted. Structural assessment will include:</p> <ul style="list-style-type: none"> o Visual check that includes an exhaustive internal/external inspection of building to look for evidence of bats (e.g., bat droppings, roost entrance/exit holes); this can be done at any time of year, preferably when bats are active. o Where accessible and health and safety considerations allow, a survey of roof space for evidence of bats (e.g., droppings, scratch marks, staining, sightings), noting relevant characteristics of internal features that provide potential access points and roosting opportunities. Suitable characteristic may include: gaps between tiles and roof lining, access points via eaves, gaps between timbers or around mortise joints, gaps around top and gable end walls, gaps within roof walling or around tops of chimney breasts, and clean ridge beams. o Features with high-medium likelihood of harboring bats but cannot be checked visually include soffits, cavity walls, space between roof covering and roof lining. o Applies to box culverts that are at least 5 feet (1.5 meters) tall and with one or more of the following characteristics. Suitable culverts for bat day roosts have the following characteristics: <ul style="list-style-type: none"> • Location in relatively warm areas • Between 5-10 feet (1.5-3 meters) tall and 300 ft (100 m) or more long • Openings protected from high winds • Not susceptible to flooding • Inner areas relatively dark with roughened walls or ceilings • Crevices, imperfections, or swallow nests o Bridge survey protocols will be adapted from the Programmatic Biological Opinion for the Federal Highway Administration (Appendix D of USFWS 2016c, which includes a Bridge Structure Assessment Guidance and a Bridge Structure Assessment Form). o Bat surveys usually are NOT needed in the following circumstances: <ul style="list-style-type: none"> • Domestic garages/sheds with no enclosed roof space (with no ceiling) • Modern flat-roofed buildings • Metal framed and roofed buildings • Buildings where roof space is regularly used (e.g., attic space converted to living space, living space open to rafters) or where all roof space is lit from skylights or windows. Large/tall roof spaces may be dark enough at apex to provide roost space
<input type="checkbox"/>	69, 77, 89, 91	AR2 - Additional bat P/A surveys (e.g., emergence counts) conducted if warranted (i.e., when AR1 indicates that bats may be present).
<input type="checkbox"/>	91	AR3 - Bridge survey protocols will be implemented, either by permittee (e.g., state DOT biologists) or qualified personnel. If a bridge is determined to be in use as an unconventional roost, subsequent protocols will be implemented.
<input type="checkbox"/>	69, 89	AR4 - Removal of buildings with suitable roost characteristics within six miles of known or presumed occupied roosts for Virginia big-eared bat would occur between Nov 16 and Mar 31. Buildings may be removed other times of the year once a bat biologist evaluates a buildings' potential to serve as roosting habitat and determines that this species is not present and/or is not using structure(s).

Project Review Form - TVA Bat Strategy (12/2018)

Check if applies to Project	Activities Subject to Conservation Measure	Conservation Measure Description
<input checked="" type="checkbox"/>	16, 17, 18, 21, 22, 24, 25, 26, 27, 28, 29, 31, 32, 33, 34, 35, 36, 37, 38, 39, 48, 50, 51, 56, 61, 62, 63, 64, 65, 67, 69, 84, 89	<p>SSPC1 (Transmission only) - Transmission actions and activities will continue to Implement A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities. This focuses on control of sediment and pollutants, including herbicides. Following are key measures:</p> <ul style="list-style-type: none"> ○ BMPs minimize erosion and prevent/control water pollution in accordance with state-specific construction storm water permits. BMPs are designed to keep soil in place and aid in reducing risk of other pollutants reaching surface waters, wetlands and ground water. BMPs will undertake the following principles: <ul style="list-style-type: none"> • Plan clearing, grading, and construction to minimize area and duration of soil exposure. • Maintain existing vegetation wherever and whenever possible. • Minimize disturbance of natural contours and drains. • As much as practicable, operate on dry soils when they are least susceptible to structural damage and erosion. • Limit vehicular and equipment traffic in disturbed areas. Keep equipment paths dispersed or designate single traffic flow paths with appropriate road BMPs to manage runoff. • Divert runoff away from disturbed areas. • Provide for dispersal of surface flow that carries sediment into undisturbed surface zones with high infiltration capacity and ground cover conditions. • Prepare drainage ways and outlets to handle concentrated/increased runoff. • Minimize length and steepness of slopes. Interrupt long slopes frequently. • Keep runoff velocities low and/or check flows. • Trap sediment on-site. • Inspect/maintain control measures regularly & after significant rain. • Re-vegetate and mulch disturbed areas as soon as practical. ○ Specific guidelines regarding sensitive resources and buffer zones: <ul style="list-style-type: none"> • Extra precaution (wider buffers) within SMZs is taken to protect stream banks and water quality for streams, springs, sinkholes, and surrounding habitat. • BMPs are implemented to protect and enhance wetlands. Select use of equipment and seasonal clearing is conducted when needed for rare plants; construction activities are restricted in areas with identified rare plants. • Standard requirements exist to avoid adverse impacts to caves, protected animals, unique/important habitat (e.g., cave buffers, restricted herbicide use, seasonal clearing of suitable habitat).
<input checked="" type="checkbox"/>	16, 17, 18, 21, 22, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 48, 50, 51, 52, 53, 54, 55, 58, 59, 60, 61, 62, 63, 64, 65, 67, 70, 71, 73, 76, 77, 78, 80, 81, 82, 83, 86, 87, 88, 89, 90	<p>SSPC2 - Operations involving chemical/fuel storage or resupply and vehicle servicing will be handled outside of riparian zones (streamside management zones) in a manner to prevent these items from reaching a watercourse. Earthen berms or other effective means are installed to protect stream channel from direct surface runoff. Servicing will be done with care to avoid leakage, spillage, and subsequent stream, wetland, or ground water contamination. Oil waste, filters, other litter will be collected and disposed of properly. Equipment servicing and chemical/fuel storage will be limited to locations greater than 300-ft from sinkholes, fissures, or areas draining into known sinkholes, fissures, or other karst features.</p>

Project Review Form - TVA Bat Strategy (12/2018)

Check if applies to Project	Activities Subject to Conservation Measure	Conservation Measure Description
<input checked="" type="checkbox"/>	16, 17, 18, 21, 22, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 48, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 61, 62, 63, 64, 65, 67, 69, 70, 71, 73, 76, 77, 80, 81, 82, 83, 84, 86, 87, 88, 89, 90, 91	<p>SSPC3 (Power Plants only) - Power Plant actions and activities will continue to implement standard environmental practices. These include:</p> <ul style="list-style-type: none"> ○ Best Management Practices (BMPs) in accordance with regulations: <ul style="list-style-type: none"> • Ensure proper disposal of waste, ex: used rags, used oil, empty containers, general trash, dependent on plant policy • Maintain every site with well-equipped spill response kits, included in some heavy equipment • Conduct Quarterly Internal Environmental Field Assessments at each sight • Every project must have an approved work package that contains an environmental checklist that is approved by sight Environmental Health & Safety consultant. • When refueling, vehicle is positioned as close to pump as possible to prevent drips, and overfilling of tank. Hose and nozzle are held in a vertical position to prevent spillage ○ Construction Site Protection Methods <ul style="list-style-type: none"> • Sediment basin for runoff - used to trap sediments and temporarily detain runoff on larger construction sites • Storm drain protection device • Check dam to help slow down silt flow • Silt fencing to reduce sediment movement ○ Storm Water Pollution Prevention (SWPP) Pollution Control Strategies <ul style="list-style-type: none"> • Minimize storm water contact with disturbed soils at construction site • Protect disturbed soil areas from erosion • Minimize sediment in storm water before discharge • Prevent storm water contact with other pollutants • Construction sites also may be required to have a storm water permit, depending on size of land disturbance (>1ac) ○ Every site has a Spill Prevention and Control Countermeasures (SPCC) Plan and requires training. Several hundred pieces of equipment often managed at the same time on power generation properties. Goal is to <ul style="list-style-type: none"> • Minimize fuel and chemical use Ensure proper disposal of waste, ex: used rags, used oil, empty containers, general trash, dependent on plant policy • Maintain every site with well-equipped spill response kits, included in some heavy equipment • Conduct Quarterly Internal Environmental Field Assessments at each sight • Every project must have an approved work package that contains an environmental checklist that is approved by sight Environmental Health & Safety consultant. • When refueling, vehicle is positioned as close to pump as possible to prevent drips, and overfilling of tank. Hose and nozzle are held in a vertical position to prevent spillage ○ Construction Site Protection Methods <ul style="list-style-type: none"> • Sediment basin for runoff - used to trap sediments and temporarily detain runoff on larger construction sites • Storm drain protection device • Check dam to help slow down silt flow • Silt fencing to reduce sediment movement ○ Storm Water Pollution Prevention (SWPP) Pollution Control Strategies <ul style="list-style-type: none"> • Minimize storm water contact with disturbed soils at construction site • Protect disturbed soil areas from erosion • Minimize sediment in storm water before discharge • Prevent storm water contact with other pollutants • Construction sites also may be required to have a storm water permit, depending on size of land disturbance (>1ac) ○ Every site has a Spill Prevention and Control Countermeasures (SPCC) Plan and requires training. Several hundred pieces of equipment often managed at the same time on power generation properties. Goal is to minimize fuel and chemical use
<input checked="" type="checkbox"/>	17, 22, 32, 33, 34, 35, 36	<p>SSPC4 (Transmission only) - Woody vegetation burn piles associated with transmission construction will be placed in the center of newly established ROWs to minimize wash into any nearby undocumented caves that might be on adjacent private property and thus outside the scope of field survey for confirmation. Brush piles will be burned a minimum of 0.25 miles from documented caves and otherwise in the center of newly established ROW when proximity to caves on private land is unknown.</p>

Project Review Form - TVA Bat Strategy (12/2018)

Check if applies to Project	Activities Subject to Conservation Measure	Conservation Measure Description
<input checked="" type="checkbox"/>	17, 18, 21, 22, 24, 25, 26, 30, 31, 33, 34, 35, 36, 40, 46, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 66, 67, 68, 69, 70, 72, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 87, 88, 91, 93, 95, 96	SSPC5 (26a, Solar, Economic Development only) - Section 26a permits and contracts associated with solar projects, economic development projects or land use projects include standards and conditions that include standard BMPs for sediment and contaminants as well as measures to avoid or minimize impacts to sensitive species or other resources consistent with applicable laws and Executive Orders.
<input checked="" type="checkbox"/>	21, 54	SSPC6 - Herbicide use will be avoided within 200 ft of portals associated with caves, cave collapse areas, mines and sinkholes are capable of supporting cave-associated species. 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 label requirements.
<input checked="" type="checkbox"/>	17, 21, 25, 26, 27, 28, 29, 31, 32, 33, 34, 35, 36, 37, 38, 54, 55	SSPC7 - Clearing of vegetation within a 200-ft radius of documented caves will be limited to hand or small machinery clearing only (e.g., chainsaws, bush-hog, mowers). This will protect potential recharge areas of cave streams and other karst features that are connected hydrologically to caves.
<input checked="" type="checkbox"/>	16, 26, 36, 37, 38, 39, 48, 50, 52, 59, 60, 62, 66, 67, 69, 72, 75, 77, 78, 79, 86	L1 - Direct temporary lighting away from suitable habitat during the active season.
<input checked="" type="checkbox"/>	16, 26, 36, 37, 38, 39, 48, 50, 52, 59, 60, 62, 66, 67, 69, 72, 75, 77, 78, 79, 86	L2 - Evaluate the use of outdoor lighting during the active season and seek to minimize light pollution when installing new or replacing existing permanent lights by angling lights downward or via other light minimization measures (e.g., dimming, directed lighting, motion-sensitive lighting).

¹Bats addressed in consultation (02/2018), which includes gray bat (listed in 1976), Indiana bat (listed in 1967), northern long-eared bat (listed in 2015), and Virginia big-eared bat (listed in 1979).

Hide All Unchecked Conservation Measures

- ☐ HIDE
☐ UNHIDE

Project Review Form - TVA Bat Strategy (12/2018)

STEP 14) Save completed form in project environmental documentation (e.g., CEC, Appendix to EA) AND send a copy of form to batstrategy@tva.gov. Submission of this form indicates that Project Lead/Applicant:

Scott Scharf

(name) is (or will be made) aware of the requirements below.

- Implementation of conservation measures identified in Table 4 is required to comply with TVA's Endangered Species Act programmatic bat consultation.
- TVA may conduct post-project monitoring to determine if conservation measures were effective in minimizing or avoiding impacts to federally listed bats.

STEP 15) For Use by Terrestrial Zoologist if Project and Form are Submitted for Review

☐ Terrestrial Zoologist acknowledges that Project Lead/Contact (name) [] has been informed on [] (date) of any relevant conservation measures and/or provided a copy of this form.

☐ For projects that require use of Take and/or contribution to TVA's Bat Conservation Fund, Terrestrial Zoologist acknowledges that Project Lead/Contact has been informed that project will result in use of Incidental Take [] ☐ ac ☐ trees and that use of Take will require [] contribution to TVA's Conservation Fund upon completion of activity (amount entered should be \$0 if cleared in winter).

Finalize and Print to Noneditable PDF. Changes to form cannot be made after this button is selected.

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Appendix F – Detailed Wetland Descriptions

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APPENDIX F - Wetlands located within the proposed Eagle Creek 161-kV Transmission Line Right-of-way

Wetland Identifier	Wetland Type ¹	Wetland Acreage in Footprint	TRAM ² Functional Capacity (Score)	Watershed		State
				HUC-10	HUC-8	
W001-AR	PEM1E	0.53	Moderate (45)	Upper Clarks River (0604000601) 303(d)	Lower Tennessee River (06040006)	K E N T U C K Y
W001a	PEM1E	0.12	Moderate (66)			
W001b	PEM1E	1.82				
W001c	PFO1E	0.92				
W001d	PEM1E	1.75				
W001e	PSS1E	0.41				
W001f	PFO1E	0.09				
W002a	PFO1E	0.15	Moderate (52)			
W002b	PEM1Ef	1.11				
W002c	PFO1E	1.08				
W002d	PEM1Ef	1.76				
W003	PEM1E	0.03	Low (9)	Blood River (0604000508) 303(d)	Kentucky Lake (06040005)	T E N N E S S E E
W004	PEM1Ef	0.13	Low (17)			
W005	PFO1E	0.04	Low (41)			
W006	PFO1E	0.11	Low (41)			
W007a	PFO1E	1.16	Moderate (62)			
W007b	PEM1E	1.18				
W008a	PFO1E	1.45	Moderate (62)			
W008b	PEM1E	1.87				
W008c	PFO1E	0.12				
W009a	PFO1E	3.03	Moderate (67)			
W009b	PEM1E	2.65				
W010	PEM1E	0.65	Low (29)			
W011a	PFO1E	0.79	Moderate (55.5)			
W011b	PEM1E	0.46				
W011c	PEM1E	0.54				
W012	PEM1E	0.03	Low (33)	TN River (0604000509)		
TOTAL ACRES		23.98				

¹Classification codes as defined in Cowardin et al. (1979): E = Seasonally flooded/saturated; EM1=Emergent, persistent vegetation; FO1=Forested, broadleaf deciduous vegetation; P=Palustrine; SS1=Scrub-shrub, broadleaf deciduous vegetation;

²TRAM = Tennessee Rapid Assessment Method that categorizes wetland quality by their functional capacity

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Appendix G – Noise During Transmission Line Construction and Operation

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Appendix G - Noise During Transmission Line 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. EPA 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 EPA 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 gives consideration to 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 H-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 in order 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. 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.

Literature Cited

Bolt, Beranek, and Newman Inc. 1971. *Noise From Construction Equipment and Operations, Building Equipment, and Home Appliances*. U.S. Environmental Protection Agency Report NTID300.1.

Cowan, J. P. 1993. *Handbook of Environmental Acoustics*. Wiley, New York.

Federal Interagency Committee on Noise (FICON). 1992. *Federal Agency Review of Selected Airport Noise Analysis Issues*. Fort Walton Beach, Fla.: Spectrum Sciences and Software Inc.

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