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OXFORD-COFFEEVILLE 161-KV TRANSMISSION LINE

FINAL ENVIRONMENTAL ASSESSMENT

Lafayette and Yalobusha Counties, Mississippi

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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
BMP	Best management practice or accepted construction practice designed to reduce environmental effects
bus	A conductor, which may be a solid bar or pipe, normally made of aluminum or copper, used to connect one or more circuits to a common interface. An example would be the bus used to connect a substation transformer to the outgoing circuits.
CAA	Clean Air Act
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
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
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 heavy equipment that grasps a tree while cutting it, which can then lift the tree and place it in a suitable location for disposal; this equipment is used to prevent trees from falling into sensitive areas, such as a wetland
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
hydrophytic vegetation	Aquatic and wetland plants that have developed physiological adaptations allowing a greater tolerance to saturated soil conditions including with limited or absence of oxygen
IPaC	Information, planning, and assessment database (USFWS)
kV	Symbol for kilovolt (1 kV equals 1,000 volts)
load	That portion of the entire electric power in a network consumed within a given area; also synonymous with “demand” in a given area
MDAH	Mississippi Department of Archives and History
MDEQ	Mississippi Department of Environmental Quality
NEMEPA	North East Mississippi Electric Power Association
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
NESC	National Electric Safety Code
NHPA	National Historic Preservation Act
NLEB	Northern Long-Eared Bat
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
outage	An interruption of the electric power supply to a user
PA	Programmatic Agreement
PI	Point of intersection at which two straight transmission line sections intersect to form an angle
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
SR	State Route
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
threatened species	A species likely to become endangered within the foreseeable future
TL	Transmission line
TVA	Tennessee Valley Authority
TVARAM	TVA Rapid Assessment Method, a version of the Ohio Rapid Assessment Method for categorizing wetlands, designed specifically for the TVA region
TVEPA	Tallahatchie Valley Electric Power Association
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
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
WMA	Wildlife Management Area
WWC	Wet-weather conveyance (see ephemeral stream)

CHAPTER 1

1.0 PURPOSE OF AND NEED FOR ACTION

1.1 Proposed Action – Improve Power Supply

The Tennessee Valley Authority (TVA) proposes to improve the existing power supply in an area of northern Mississippi served by Tallahatchie Valley Electric Power Association (TVEPA) and North East Mississippi Electric Power Association (NEMEPA). TVA's proposal would construct, operate, and maintain a new 29-mile 161-kilovolt (kV) transmission line (TL) south of Oxford, Mississippi and between a point just north of County Road 300 and TVA's Coffeeville 161-kV Substation (see Figure 1-1). This new line would complete the connection to the Oxford 161-kV Substation, creating an Oxford-Coffeeville TL. The proposed project would require approximately 243 acres of new right-of-way (ROW) and 109 acres of existing ROW. The new TL would be constructed using mostly single steel-pole, single-circuit structures.

The ROW to be utilized for this project is as follows:

- Approximately 11.9 miles of existing 75-foot-wide ROW from the point south of County Road 300 to the Lafayette/Yalobusha county line at Water Valley. NEMEPA purchased this easement from TVA years ago and would transfer the ROW ownership back to TVA for this project. TVA would purchase an additional 25 feet of new ROW easement in this section from landowners whose land the proposed new ROW would cross. TVA would retire the existing NEMEPA TL structures and conductor along this section before installing the new TL. This section is depicted in green on Figure 1-1.

- Approximately 9.7 miles of new 100-foot-wide TVA ROW from the Lafayette/Yalobusha county line to an existing TVEPA line, depicted in red on Figure 1-1.

- Approximately 7.4 miles of new 100-foot-wide ROW parallel to an existing TVEPA 26-kV TL, depicted in yellow on Figure 1-1.

NEMEPA plans to build a new Taylor 161-kV Substation adjacent to and south of Highway 328 in Taylor, Mississippi to replace their existing 46-kV substation. TVA would provide metering equipment for NEMEPA to install in their new substation, and would provide a delivery point by installing two switch structures. One switch structure would be located inside the proposed Taylor Substation property, with access to this switch directly from the adjacent road, State Route (SR) 329. The other switch would be located outside of the substation, in the ROW of the new Oxford-Coffeeville 161-kV TL and would require an approximately 350-foot long permanent access road.

Additionally, TVA would install a new breaker bay with associated metering, communication, and protective equipment at its Oxford 161-kV Substation, and two new bays and a switchhouse at its Coffeeville 161-kV Substation. The new equipment at the Coffeeville 161-kV Substation would require the purchase of approximately 2.12 acres of new property to facilitate the substation expansion. TVA would also install new fiber optic ground wire on the new TL to facilitate communications with the TVA network. The TVA

map board display at TVA's System Operations Center and Regional Operations Center would be updated to reflect this work. The scheduled in-service date for this project would be summer of 2020 or as soon as possible after that date

1.2 Need for the Proposed Action

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

The Oxford area is currently supported by three separate, long 161-kV TLs coming from Batesville, Holly Springs and Tupelo. These long, single source feeds can cause voltage and thermal loading issues when any of these TLs are taken out of service for maintenance. In addition, Resolute Forest Products in Grenada has a current load of 150 megawatts (MW) with plans to increase by 60 MW in the near future. This substantial load often presents problems with operational flexibility and maintenance for the Grenada area. Further, the Grenada Industrial Park wishes to bring additional load to the area in the next several years. TVA's proposed project would alleviate the voltage and thermal loading problems and improve the operational and generational flexibility, which would support the planned economic development in the Grenada area.

Unless action is taken, the increasing power loads caused by commercial and residential growth in the area would result in overloaded transformers and other electrical equipment damage or failure. Overloading of a TL can cause alternating heating and cooling of the conductor material, thus weakening the TL over time. Overloading can also cause a TL to sag in excess of design criteria, resulting in inadequate clearance between the TL and the ground. If a transformer and/or TL fail, the result is a power outage.

To ensure that the Oxford area has a continuous, reliable source of electric power for its future load growth, TVA needs to provide additional electric service to the area and replace existing infrastructure. The construction of a new 161-kV TL would meet these needs by preventing the Batesville-Oxford, Holly Springs-Oxford, and Tupelo-Oxford lines from becoming overloaded during times of heavy power use and would provide voltage support to the Oxford area. This would add necessary capacity to TVA's Bulk Transmission System and allow TVA to meet NERC reliability criteria. Additionally, the proposed project would further enhance TVA's Bulk Transmission System by improving operational and maintenance flexibility, and finally would support economic development in the Grenada area.

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

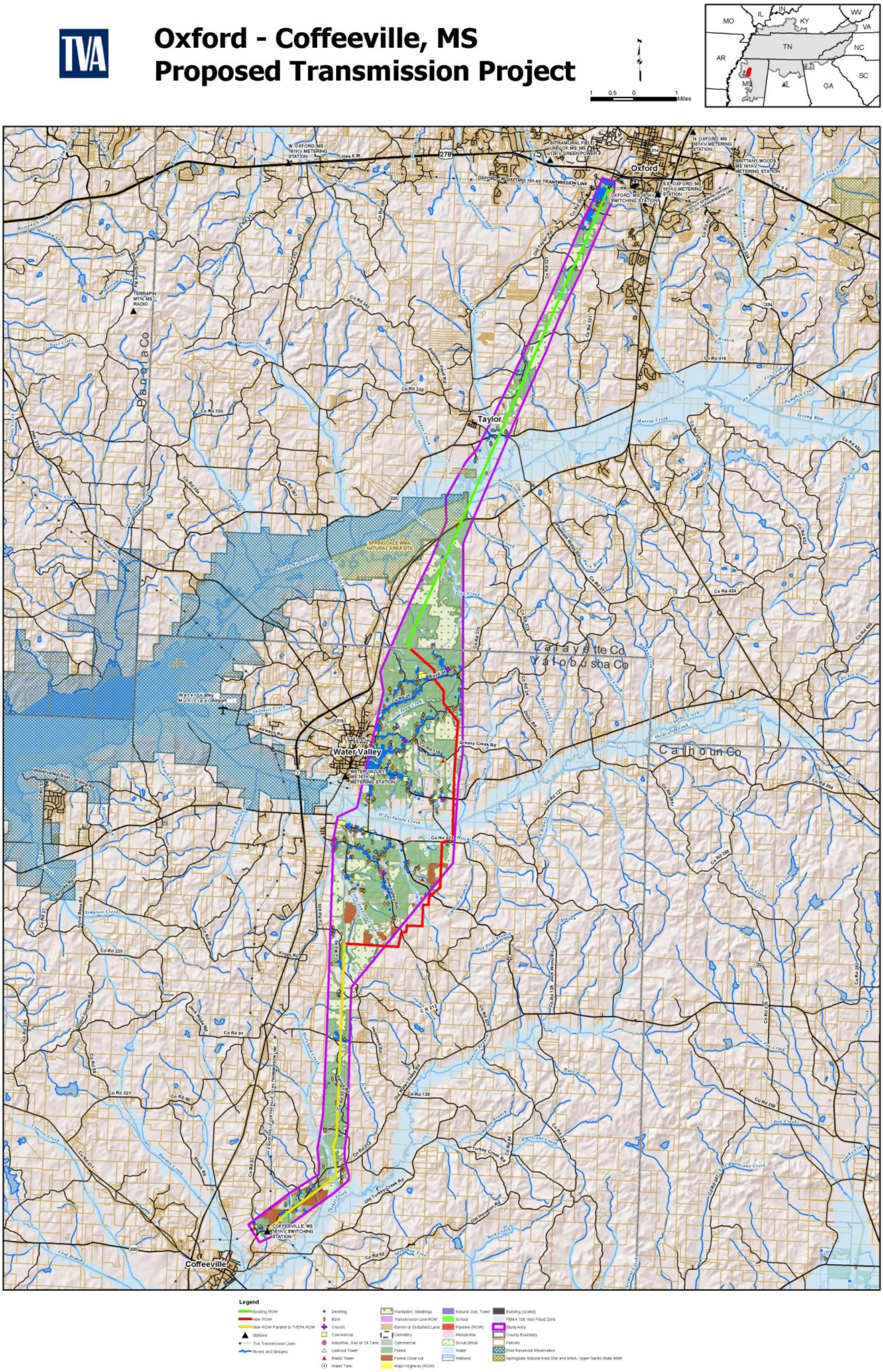

Figure 1-1 Proposed Oxford-Coffeeville 161-kV Transmission Line in Lafayette and Yalobusha Counties, Mississippi

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1.3 Decisions to be Made

The primary decision before TVA is whether to provide more reliable electric power to the northern Mississippi service area by constructing a new 161-kV TL. If the proposed TL is to be built, other secondary decisions are involved. These include:

- Timing of the proposed improvements;
- Most suitable route for the proposed TL; 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 2015, TVA completed the Integrated Resource Plan (TVA 2015a) that provides a direction for how TVA will meet the long-term energy needs of the Tennessee Valley region. This document and the associated Supplemental Environmental Impact Statement (EIS) evaluate scenarios that could unfold over 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. This report indicated that a diverse portfolio is the best way to deliver low-cost, reliable electricity. TVA released the accompanying Final Supplemental EIS for TVA's Integrated Resource Plan in July 2015 (TVA 2015b) and its Record of Decision in October 2015 (80 FR 65282).

On January 23, 2017, a Notice of Intent was published in the Federal Register announcing TVA planned to prepare a programmatic EIS to address potential environmental, social, and economic impacts associated with the management of vegetation within its existing active transmission ROW. On August 8, 2018, TVA released the draft programmatic EIS (TVA 2018) for public comment and a Federal Register Notice of Availability was published in the Federal Register on August 17, 2018. The purpose of TVA's transmission system vegetation management program is to develop a policy to strategically manage TVA's existing TL ROWs in a manner consistent with applicable laws, orders, standards, practices and guidance while providing reliable energy and protecting environmental resources to the extent possible. TVA expects to finalize this document that will guide future vegetation management within its transmission system in Spring 2019.

1.5 Scoping Process and Public Involvement

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

- Alabama-Coushatta Tribe of Texas
- Chickasaw Nation
- Choctaw Nation of Oklahoma
- Jena Band of Choctaw Indians
- Mississippi Band of Choctaw Indians

- Mississippi Department of Environmental Quality (MDEQ)
- Mississippi State Historic Preservation Office (SHPO)
- United States Army Corps of Engineers (USACE)
- United States Fish and Wildlife Service (USFWS)

TVA developed a public communication plan that included a website with information about the project, a map of the alternative routes, and numerous feedback mechanisms. TVA held an open house in Water Valley, Mississippi, on March 3, 2016. Property owners potentially affected by, or near to, any of the route alternative segments as well as elected officials were invited to the open house. TVA used local news outlets and notices placed in local newspapers to notify other interested members of the public. This open house was attended by 47 people.

At the open house, TVA presented maps with a network of alternative TL routes, comprised of 21 different line segments, to the public for comment (see Figure 1-2). The primary interest of those who attended the open houses pertained to the effects of the proposed TL on the individual landowners, including impacts on development and/or property values.

A 30-day public review and comment period was held following the open house, during which TVA accepted public comments on the alternative TL routes and other issues. A toll-free phone number and facsimile number were made available to facilitate comments. A total of 19 comments were received during the comment period. Segment 17 received the most comments, followed by segments 16 and 18. Most of comments revolved around the proximity of the proposed TL to existing dwellings or more populated areas and the possibility of decreased property values that could result from the proposed TL. Environmental concerns included health/safety risks and the effect on streams and the ecosystem.

At the conclusion of the comment period, TVA considered the comments and additional information, described in Section 2.3, and developed a preferred route. TVA announced the preferred route to the public in Spring 2016 (Figure 1-1). Letters were sent to affected property owners and information was provided to the public through TVA's website.

As a result of information obtained following the announcement of the preferred route from public comments, as well as from environmental field surveys, TVA made additional route adjustments to the preferred TL route (Figure 1-1). These adjustments are described in Section 2.4.

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 TL, as well as the purchase of TL ROW easements and property for the substation expansion for this purpose, or taking no action.

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

- Water quality (surface waters and groundwater)

- Aquatic ecology
- Vegetation
- Wildlife
- Endangered and threatened species and their critical habitats
- Floodplains
- Wetlands
- Aesthetic resources (including visual, noise, and odors)
- Archaeological and historic resources
- Land use
- Recreation, parks, and managed areas
- Socioeconomics and environmental justice

TVA's action would satisfy the requirements of Executive Order (EO) 11988 (Floodplain Management), EO 11990 (Protection of Wetlands), EO 12372 (Intergovernmental Review), EO 12898 (Environmental Justice), EO 13112 as amended by 13751 (Invasive Species), and applicable laws including the Farmland Protection Policy Act, the National Historic Preservation Act of 1966 (NHPA), the Endangered Species Act of 1973 (ESA) as amended, the Clean Air Act (CAA), and the Clean Water Act (CWA). Correspondence received from agencies related to this review and coordination is included in Appendix A.

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

1.7 Necessary Federal Permits and Licenses

A permit would be required from the State of Mississippi and/or the local municipality for the discharge of construction site storm water associated with the construction of the TL. 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 and for other combustible materials removed during construction of the proposed TL. 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 result in the discharge of dredge or fill into waters of the United States. A permit would be obtained from the Mississippi Department of Transportation for crossing state highways or federal interstates during TL construction. A general permit for application of pesticides, as part of construction or maintenance activities, would be obtained from MDEQ.

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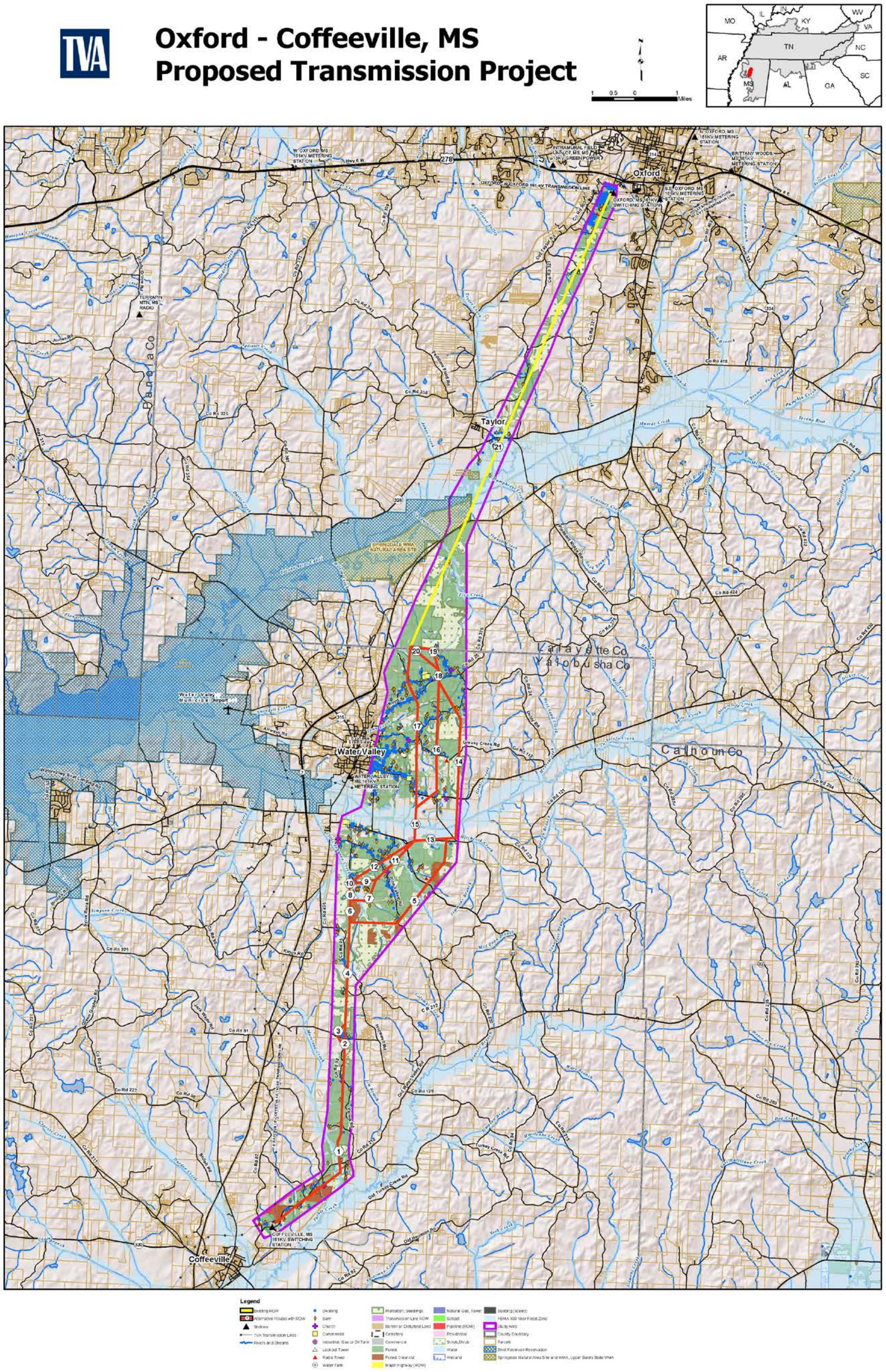

Figure 1-2 Alternative Route Segments for the Proposed Oxford-Coffeeville 161-kV Transmission Line

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CHAPTER 2

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

As described in Chapter 1, TVA proposes to construct a new, approximately 29-mile long 161-kV TL from a point just north of County Road 300 in Lafayette County, Mississippi to the Coffeeville Substation located in Yalobusha County, Mississippi. The new TL would complete the connection from the Oxford 161-kV Substation, creating an Oxford-Coffeeville TL. A description of the proposed action is provided below in Section 2.1.2. Additional background information about construction, operation, and maintenance of a TL is also provided and would be applicable if the Action Alternative is chosen, regardless of the location of the proposed facilities.

This chapter has seven major sections:

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

2.1 Alternatives

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

2.1.1 The No Action Alternative – TVA Does Not Provide a New Power Supply to the Northern Mississippi Area

Under the No Action Alternative, TVA would not construct the proposed TL. As a result, the TVA power system in the TVEPA and NEMEPA service areas would continue to operate under current conditions, increasing the risk of substation and TL overloading, loss of service, and occurrence of violations of NERC reliability criteria. TVA's ability to provide reliable service to address economic development and future residential and commercial growth in the northern Mississippi area, including Grenada, would be jeopardized, which would not support TVA's overall mission.

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

2.1.2 Action Alternative – TVA Provides a New Power Supply to the Northern Mississippi Service Area

Under the Action Alternative, TVA would construct, operate, and maintain approximately 29 miles of 161-kV TL starting south of Oxford at County Road 300 and ending at the existing Coffeeville Substation, creating an Oxford-Coffeeville TL (see Figure 1-1). TVA would also provide a delivery point to NEMEPA's proposed new Taylor 161-kV Substation by installing two switch structures. One switch structure would be located inside the proposed Taylor Substation property, with access to this switch directly from the adjacent road, SR-329. The other switch would be located outside of the substation, in the ROW of the new Oxford-Coffeeville 161-kV TL and would require an approximately 350-foot long permanent access road. Additionally, TVA would install a new breaker bay with associated metering, communication, and protective equipment at its Oxford 161-kV Substation, and two new bays and a switchhouse at its Coffeeville 161-kV Substation. The expansion of the Coffeeville Substation requires the purchase of approximately 2.12 acres adjacent to the existing substation and the relocation of an intermittent stream.

TVA would provide the standard equipment for NEMEPA to install in its new substation, which would be constructed along and adjacent to TVA's proposed TL route. The TVA map board display at TVA's System Operations Center and Regional Operations Center would be updated to reflect the new facilities. Temporary access roads would be required for construction and maintenance of the proposed TL.

Additional information describing implementation of the proposed Action Alternative and how the most suitable TL route was determined is provided below in Sections 2.2 through 2.4.

2.1.3 Alternatives Considered but Eliminated from Further Discussion

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

2.1.3.1 Construction of a Coffeeville-North Oakland 161-kV Transmission Line

Under this project, TVA would construct, operate, and maintain approximately 16 miles of 161-kV TL from the existing Coffeeville Substation to the existing North Oakland 161-kV Substation, creating a Coffeeville-North Oakland TL. TVA would also install new breakers with associated metering, communication, and protective equipment in their Coffeeville Substation. While this alternative would resolve the maintenance and reliability issues at Resolute Forest Products, it would not provide as much capacity to TVA's Bulk Transmission System as the Action Alternative. For this reason, this alternative was eliminated from further consideration.

2.1.3.2 Construction of an Interconnection with Entergy

TVA would establish an interconnection with Entergy at the existing North Oakland 230-kV Substation and then construct, operate, and maintain approximately 10 miles of 161-kV TL from the existing North Oakland Substation to TVEPA's West Charleston 161-kV Substation, creating a North Oakland-West Charleston 161-kV TL. This would remove Charleston from being served from Entergy's system radially (i.e., from a single source). While this alternative would resolve the maintenance and reliability issues at Resolute Forest Products, it would not provide as much capacity to TVA's Bulk Transmission System

as the Action Alternative. For this reason, this alternative was eliminated from further consideration.

2.1.3.3 Underground Utility Lines

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

Although power lines can be buried, most buried TLs tend to be low-voltage distribution lines (lines that are 13-kV or less) rather than high-voltage TLs, 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 TLs requires extensive excavation, as these TLs 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 TLs must be maintained for routine inspection and maintenance.

Although buried TLs 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 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 TL 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 TL would likely be greater overall than those associated with a traditional aboveground TL. In addition, the expense of a buried high-voltage TL would be prohibitive. For these reasons, burying the proposed TL is not a feasible option and this alternative was eliminated from further consideration.

2.2 Construction, Operation, and Maintenance of the Proposed Transmission Line

2.2.1 Transmission Line Construction

2.2.1.1 Right-of-Way Acquisition and Clearing

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

TVA would purchase easements from landowners whose land the proposed new ROW would cross. These easements would give TVA the right to clear the ROW and to

construct, operate, and maintain the TL, as well as remove "danger trees" adjacent to the ROW. Danger trees include any trees located off the ROW that, under maximum sag and blowout conditions, would strike a TL structure or come within an unsafe distance of a TL if it were to fall toward the TL. For most TLs, this distance is five feet, but for higher voltage TLs, the distance is generally 10 feet. The fee simple ownership of the land within the ROW would remain with the landowner, and many activities and land uses could continue to occur on the property. However, the terms of the easement agreement prohibit certain activities, such as construction of buildings and any other activities within the ROW that could interfere with the operation or maintenance of the TL or create a hazardous situation.

Because of the need to maintain adequate clearance between tall vegetation and TL conductors, as well as to provide access for construction equipment, all trees and most shrubs would be removed from the entire width of the ROW. Equipment used during this ROW clearing would include chain saws, skidders, bulldozers, tractors, and/or low ground-pressure feller-bunchers[2]. 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 (See Section 1.7). In some instances, vegetation may be windrowed along the edge of the ROW 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 utilizes standard practices for ROW clearing and construction activities. These guidance and specification documents (listed below) are provided on TVA's transmission system projects web page and are taken into account when considering the effects of the proposed Action Alternative (TVA 2017a). TVA transmission projects also utilize best management practices (BMPs) to provide guidance for clearing and construction activities.

1. *TVA ROW Clearing Specifications*

2. *Environmental Quality Protection Specifications for Transmission Line Construction*

3. *Transmission Construction Guidelines Near Streams*

4. *Environmental Quality Protection Specifications for Transmission Substation or Communications Construction*

5. *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities* (hereafter referred to as "TVA 2017b")

The emission of criteria pollutants or their precursors would not exceed *de minimis* levels specified in 40 CFR § 93.153(b). Thus, consistent with Section 176(c) of the CAA, project

[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.

activities would be in conformity with the requirements of Mississippi's state implementation plan for attaining air quality standards.

Following clearing and construction, an appropriate vegetative cover on the ROW would be restored. TVA would utilize appropriate seed mixtures as described in TVA's 2017 BMP manual 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 ROW following construction per BMPs.

2.2.1.2 Access Roads

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

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[3] streams, the culverts would be left or removed, depending on the wishes of the landowner or any permit conditions that might apply. If desired by the property owner, TVA would restore new temporary access roads to previous conditions. Additional applicable ROW clearing and environmental quality protection specifications are listed in *TVA ROW Clearing Specifications, Environmental Quality Protection Specifications for Transmission Line Construction,* and *Transmission Construction Guidelines Near Streams* (TVA 2017a).

2.2.1.3 Construction Assembly Areas

Two construction assembly areas (or "laydown yards") would be required for worker assembly, vehicle parking, and material storage. These areas would 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. One proposed site is located in Oxford at 101 N. Thacker Loop and is 5.4 acres (see Figure 2-1). The second proposed site is located in Water Valley, off Highway 7 and is approximately 7 acres (see Figure 2-2).

Both proposed laydown yards have been previously disturbed. Depending on site conditions, some minor grading and installation of drainage structures, such as culverts, may be required. The areas would be graveled, as needed, and fenced. 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.

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

Figure 2-1 Proposed Construction Laydown Yard in Oxford, Mississippi

Figure 2-2 Proposed Construction Laydown Yard in Water Valley, Mississippi

2.2.1.4 Structures and Conductors

Most of the proposed TL would utilize single steel-pole structures. Double steel-pole structures would be needed in one area to avoid irrigation systems, which can cause outages to the TL. Examples of these structure types are shown in Figure 2-3. Structure heights would vary according to the terrain, but would range between 80 and 120 feet above ground.

Figure 2-3. Typical Single and Double Steel-Pole Structures

Three conductors (the cables that carry the electrical current) are required to make up a single circuit in alternating current TLs. For a 161-kV TL, 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 TL 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.

Switch structures are necessary to periodically isolate sections of a TL for maintenance or in the event of an unplanned outage. Two 35-foot tall switch structures would be installed in the proposed 75-foot-wide Oxford-Coffeeville 161-kV TL ROW to provide a delivery point for NEMEPA's new Taylor 161-kV Substation. These switch structures are similar to that shown in Figure 2-4.

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.

Figure 2-4. Typical Transmission Line Switch Structure

2.2.1.5 Conductor and Ground Wire Installation

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

2.2.1.6 Proposed Substation Expansion

TVA would add one new 161-kV breaker bay with associated metering, communication, and protective equipment to their existing Oxford 161-kV Substation. TVA would also install two breaker bays and a switch house at its existing Coffeeville Substation. TVA would purchase additional property adjacent to the existing substation to accommodate the two new bays at the Coffeeville 161-kV Substation (Figure 2-5). TVA would use some additional property immediately east of the expansion for temporary storage of spoil material resulting from the expansion activities. Any spoil material would be brought back onto the substation property and the area would be restored to its original condition.

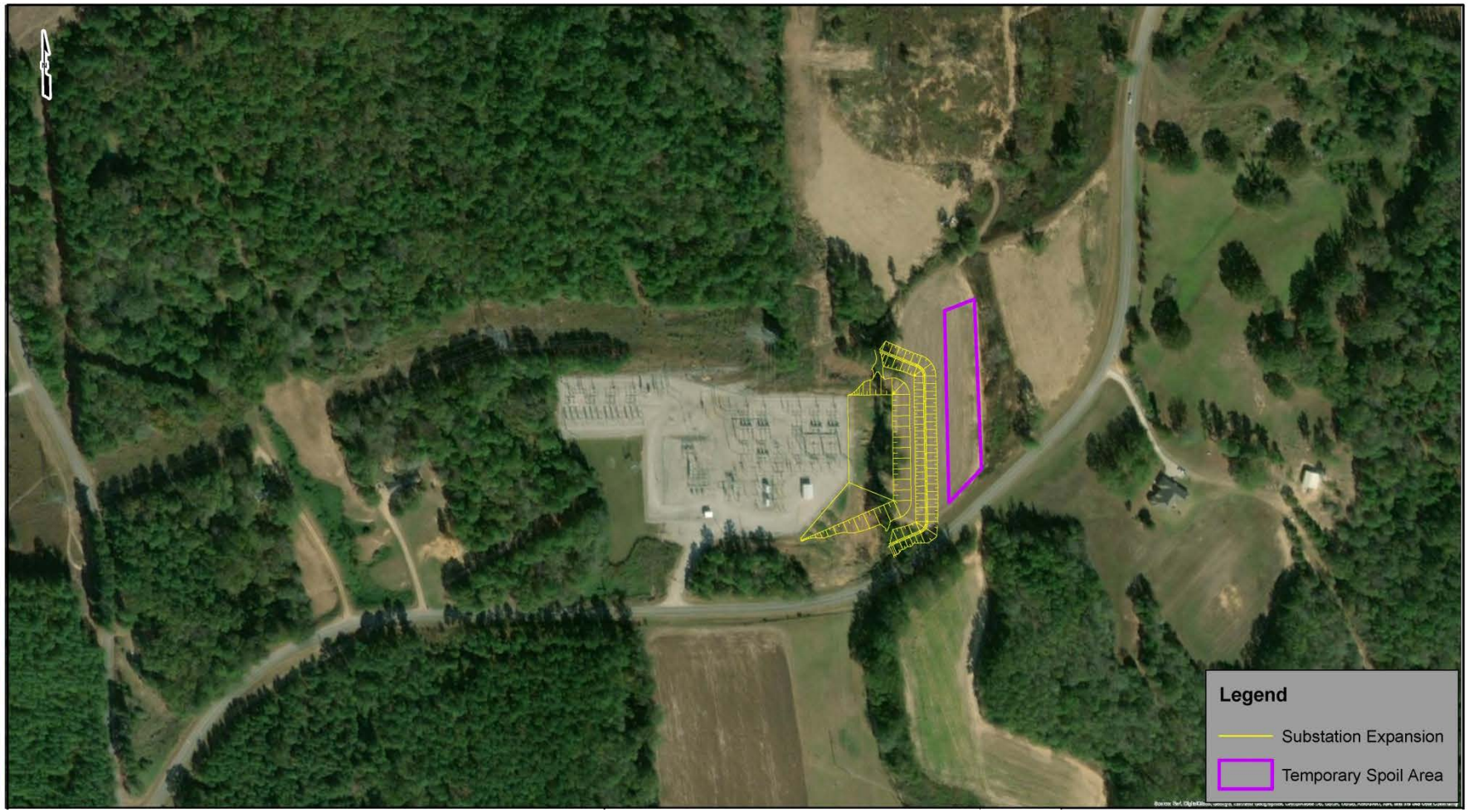

Figure 2-5. Proposed Expansion of TVA's Existing Coffeeville 161-kV Substation

The expansion would necessitate the relocation of 460 linear feet of stream on the substation property, to an area on the adjacent property which TVA would acquire. The 2.12 acres required for the expansion would be obtained in fee simple ownership from a single landowner. The proposed relocation channel would be approximately 555 feet. Due to location requirements and configuration of the existing substation, avoidance of the stream was impossible. Considerable effort was taken to reduce the footprint of the site, and is now at the minimum to safely install the new equipment. The footprint of the site cannot be reduced or adjusted any further without impacting the ability to install, access, and maintain TVA's equipment. The expansion must occur to the east because there is no room to the north or south and space is limited to the west due to an existing structure and TL constraints. Further, additional connections to the existing substation infrastructure are not feasible.

TVA would clear vegetation on the expansion site, remove the topsoil, and grade the property in accordance with TVA's *Site Clearing and Grading Specifications* (TVA 2017a). Equipment used during clearing would include chain saws, skidders, bulldozers, tractors, and/or low ground-pressure feller-bunchers. However, because the site is an open pasture, essentially no marketable timber exists on the parcel. As necessary, any woody debris and other vegetation would likely 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 project site to serve as sediment barriers. Implementation of *TVA ROW Clearing Specifications*, *Environmental Quality Protection Specifications for Transmission Substation or Communications Construction*, *Transmission Construction Guidelines Near Streams*, and *Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities* (TVA 2017b) provide further guidance for clearing and construction activities.

Retired equipment at both substations would be handled according to *TVA's Environmental Quality Protection Specifications for Transmission Substation or Communications Construction* (TVA 2017a).

2.2.2 Operation and Maintenance

Inspection

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

Vegetation Management

Management of vegetation along the ROW would be necessary to ensure access to structures and to maintain an adequate distance between TL conductors and vegetation. Adequate ground clearance is important to account for construction, design, and survey tolerances (e.g., conductor sagging). TVA uses more conservative distances than NESC requirements in order to ensure reliability. TVA uses a minimum ground clearance of 24 feet for a 161-kV TL at the maximum line operating temperature. A draft Transmission System Vegetation Management Programmatic EIS (TVA 2018) is projected to be finalized in 2019 which will outline the preferred vegetation management alternative moving forward.

Until then, vegetation management is prescribed by the court 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. Upon court approval of the Transmission System Vegetation Management Programmatic EIS, vegetation management along the ROW would consist of two different activities: felling danger trees adjacent to the cleared ROW (as described in Section 2.2.1.1), and controlling vegetation within the total width of the cleared ROW. These activities will occur periodically as identified by LIDAR inspections.

After tall trees and other tall-growing vegetation are removed from the ROW during construction, routine management of vegetation within the cleared ROW would include an integrated vegetation management approach designed to encourage the low-growing plant species and discourage tall-growing plant species. A vegetation maintenance plan would be developed for each TL sector, based on the results of the periodic inspections described above. Vegetation control methods or tools and their appropriate uses for various transmission line ROW conditions have been described in TVA's draft Transmission System Vegetation Management Programmatic EIS (TVA 2018). 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 ROW 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 U.S. Environmental Protection Agency (USEPA) 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 ROW vegetation control and pre-emergent herbicides TVA currently uses on bare ground areas in transmission line ROWs is presented in TVA's *Transmission Environmental Protection Procedures Right-Of-Way Vegetation Management Guidelines* (TVA 2017a). This list may change over time as new herbicides are developed or new information on presently approved herbicides becomes available.

Structure Replacement

TVA would retire the existing TL structures and conductor along the 11.9 miles of existing 75-foot-wide ROW from the point south of County Road 300 to the Lafayette/Yalobusha county line at Water Valley. Any retired wooden poles would be offered to NEMEPA or property owners. If any wooden poles remain and require disposal, a special permit would be obtained and TVA would follow its Environmental Protection Procedures for reuse and/or disposal (TVA 2017a). Likewise, any lead pins removed from the retired insulators would be handled according to TVA's Environmental Protection Procedures (TVA 2017a).

Other than vegetation management within ROWs, only minor maintenance work is generally required once TL 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.

2.3 Siting Process

The process of siting the proposed TL followed the basic steps used by TVA to determine a TL route. These include:

- Determine the potential existing power sources to supply the TL.
- Define the study area.
- Collect data to minimize potential impacts to social, engineering, and environmental (cultural and natural) features.
- Identify general route segments producing potential routes.
- Gather public input.
- Redefine general route segments.
- Incorporate public input into the final selection of the TL route.

2.3.1 Definition of the Study Area

The study area was chosen to meet three basic objectives: provide necessary TL access to the TVA Oxford and Coffeeville 161-kV substations; allow for the construction of a TL on or parallel to existing utility corridors to the maximum extent possible; and allow a reasonable area for multiple candidate corridors to be identified in multiple alignments.

The study area was determined primarily by the geographic boundaries of existing power system assets. The northern project boundary was set by the location of the Oxford 161-kV Substation, while the southernmost boundary was set by the Coffeeville 161-kV Substation. The presence of existing TL ROW greatly limited the eastern and western study area boundaries that required analysis. The existing, 11.9-mile long NEMEPA TL ROW would be utilized to the Lafayette/Yalobusha county line, just north of Water Valley. The middle section of the proposed TL route is the only one which would require alternative route segments and analysis. The town of Water Valley was the western study area boundary. The eastern boundary was established with three primary objectives: to avoid steeper terrain further east, maintain close proximity to the existing transmission assets (thereby minimizing line length), and reduce the number of water resource crossings (also more prevalent further east). The final 7.4 miles to the Coffeeville Substation would begin south of Water Valley and would parallel the existing TVEPA 26-kV TL to the substation.

2.3.2 Description of the Study Area

The study area is essentially divided in three sections and consists of four cities/towns: Oxford to the north, Taylor to the south, Water Valley to the southwest, and Coffeeville the farthest to the south (See Figure 1-1). The first section begins on the south side of Oxford at County Road 300 in a highly developing residential area and runs to Water Valley using an existing 75-foot-wide ROW. This area has a mix of flat and rolling terrain that is mostly forested. The forest is a combination of commercial (pine plantations) and noncommercial timber (hardwoods). The existing ROW continues to a point just east of the Taylor Community. On the south side of Taylor is the Yocona River Canal which has a large floodway area. The Yocona River Canal flows through the Upper Sardis State Wildlife Management Area. This section ends at the Lafayette/Yalobusha county line.

The second section starts at the county line north of the town of Water Valley. This section runs just east of Water Valley and the homes are clustered around the county road systems. There is very little agricultural farmland in the majority of the study area, due to the terrain. The farming is generally pastured for cattle except where the O'Tuckalofa Creek basin is located. The Water Valley Municipal Airport is located just west of Water Valley, but is located greater than 5 miles from the closest route alternative and does not pose TL design concerns for this project.

The third section between Water Valley and Coffeeville parallels the existing Tallahatchie Valley 26-kV TL. The population is more rural with fewer homes and road crossings. This section consists of rolling terrain, mostly covered in timber, with very little pasture land and no agricultural farming.

2.3.3 Data Collection

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

Additionally, TVA used aerial color orthophotography of the study area. These images were geo-referenced to produce an accurate image of the Earth by removing the distortions caused by camera tilt and topographic relief displacements, and then digitized for use in the GIS. This aerial photography was then interpreted to obtain land use and land cover data, such as forests, agriculture, pivot irrigation systems, wetlands, houses, barns, commercial and industrial buildings, churches, and cemeteries. Calculations from aerial photographs, tax maps, and other sources included, but were not limited to, the number of road crossings, stream crossings, and property parcels. An airspace model was developed for the Water Valley Municipal Airport due to the close proximity of Water Valley study area to the airport. The model results were used to determine TL height restrictions.

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

The aerial photography, GIS-based map, and other maps and drawings were supplemented by reconnaissance throughout the study area by TVA personnel.

2.3.4 Establishment and Application of Siting Criteria

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

Specific criteria used to evaluate TL route options are described below. For each feature identified as occurring along a proposed route option, specific considerations related to these features were identified and scored. In the evaluation, a higher score means a bigger constraint or obstacle for locating a TL. For example, a greater number of streams crossed, a longer TL route length, or a greater number of historic resources affected would produce a higher, more unfavorable score.

- **Engineering and Constructability Criteria** include considerations such as terrain (steeper slopes can present major challenges for design and construction), total length of the TL, pivot-irrigation systems (existing and planned, which can create operational challenges for both the irrigation system and the TL), number of primary and secondary road crossings, accessibility, the presence of pipeline and TL crossings, and total TL cost.

- **Social Criteria** include the total acreage of new ROW, number of affected property parcels, public comments, consideration of visual aesthetics, and proximity to schools, houses, commercial or industrial buildings, and barns.

- **Environmental Criteria** include the number of forested acres within the proposed ROW, the number of open water crossings, the number of floodplain or floodway crossings, the presence of wetlands, rare species habitat, 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.

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

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

2.3.5 Development of General Route Segments and Potential Transmission Line Routes

As described in Section 2.3.3, the collected data were analyzed to develop possible TL route segments that would best meet the project needs while avoiding or reducing conflict with constraints. Additional potential segments were identified by using known opportunities such as existing utility corridors and existing ROW.

The straight-line distance between the identified power sources and the Oxford and Coffeeville 161-kV substations, is about 26 miles. That distance, along with the presence of

several existing TL ROWs in the area and developed residential and commercial areas limited the number of alternative corridors that could be practicably identified and studied for the project.

Using the siting criteria identified in Section 2.3.4 and the identified termination points in Section 2.3.1, a total of 21 potential TL route segments were developed and presented at the open house (Figure 1-2).

Potential Transmission Line Corridors

As a result of the constraints mentioned in the previous section, 40 alternate TL routes were developed, consisting of a combination of 21 constituent segments (see Figure 1-2 and Table 2-1).

Table 2-1 Alternative Route Corridors with Constituent Segments

Route Number	Route Segments
1	1, 2, 4, 6, 8, 10, 12, 15, 17, 21
2	1, 2, 4, 6, 8, 10, 12, 15, 16, 18, 20, 21
3	1, 2, 4, 6, 8, 10, 12, 15, 16, 18, 19, 21
4	1, 2, 4, 6, 8, 10, 12, 13, 14, 18, 20, 21
5	1, 2, 4, 6, 8, 10, 12, 13, 14, 18, 19, 21
6	1, 2, 4, 6, 8, 9, 11, 15, 17, 21
7	1, 2, 4, 6, 8, 9, 11, 15, 16, 18, 20, 21
8	1, 2, 4, 6, 8, 9, 11, 15, 16, 18, 19, 21
9	1, 2, 4, 6, 8, 9, 11, 13, 14, 18, 20, 21
10	1, 2, 4, 6, 8, 9, 11, 13, 14, 18, 19, 21
11	1, 2, 4, 6, 7, 11, 15, 17, 21
12	1, 2, 4, 6, 7, 11, 15, 16, 18, 20, 21
13	1, 2, 4, 6, 7, 11, 15, 16, 18, 19, 21
14	1, 2, 4, 6, 7, 11, 13, 14, 18, 20, 21
15	1, 2, 4, 6, 7, 11, 13, 14, 18, 19, 21
16	1, 2, 4, 5, 13, 15, 17, 21
17	1, 2, 4, 5, 13, 15, 16, 18, 20, 21
18	1, 2, 4, 5, 13, 15, 16, 18, 19, 21
19	1, 2, 4, 5, 14, 18, 20, 21
20	1, 2, 4, 5, 14, 18, 19, 21
21	1, 3, 4, 6, 8, 10, 12, 15, 17, 21
22	1, 3, 4, 6, 8, 10, 12, 15, 16, 18, 20, 21

Route Number	Route Segments
23	1, 3, 4, 6, 8, 10, 12, 15, 16, 18, 19, 21
24	1, 3, 4, 6, 8, 10, 12, 13, 14, 18, 20, 21
25	1, 3, 4, 6, 8, 10, 12, 13, 14, 18, 19, 21
26	1, 3, 4, 6, 8, 9, 11, 15, 17, 21
27	1, 3, 4, 6, 8, 9, 11, 15, 16, 18, 20, 21
28	1, 3, 4, 6, 8, 9, 11, 15, 16, 18, 19, 21
29	1, 3, 4, 6, 8, 9, 11, 13, 14, 18, 20, 21
30	1, 3, 4, 6, 8, 9, 11, 13, 14, 18, 19, 21
31	1, 3, 4, 6, 7, 11, 15, 17, 21
32	1, 3, 4, 6, 7, 11, 15, 16, 18, 20, 21
33	1, 3, 4, 6, 7, 11, 15, 16, 18, 19, 21
34	1, 3, 4, 6, 7, 11, 13, 14, 18, 20, 21
35	1, 3, 4, 6, 7, 11, 13, 14, 18, 19, 21
36	1, 3, 4, 5, 13, 15, 17, 21
37	1, 3, 4, 5, 13, 15, 16, 18, 20, 21
38	1, 3, 4, 5, 13, 15, 16, 18, 19, 21
39	1, 3, 4, 5, 14, 18, 20, 21
40	1, 3, 4, 5, 14, 18, 19, 21

2.4 Identification of the Preferred Transmission Line Route

Route Segment 21 follows an existing TL ROW from County Road 300 in Oxford down to the Yalobusha County line. This segment contains approximately 11.9 miles of existing ROW common to all the alternative routes.

Route Segments 1, 2, 4, 6, 8, and 10 parallel an existing TVEPA TL and include route Segments 1 and 4 as common to all the alternative routes. From a siting perspective, making use of existing ROW is typically an opportunity viewed favorably by the public. Each alternative route contains either route Segment 2 or route Segment 3. These two segments are associated with a small subdivision off of County Road 315 midway between Water Valley and Coffeeville. Segment 2 parallels an existing TVEPA TL that runs through the center of the subdivision, and route Segment 3 runs around the western edge of the subdivision. Segment 2 was preferred by TVA over Segment 3 because it requires fewer PIs[4] (angle structures) and public comments were minimal. This selection eliminated alternative routes 21 through 40 from the preferred route selection process.

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

The alternative corridors in the western portion of the study area scored poorly in comparison to the segments to the east. Route Segments 11 and 12 cross heavily populated areas, traversing many more parcels and streams than Segment 5 to the east. Segment 11 runs adjacent to a church. Route Segments 16 and 17 cross smaller residential properties and received the most public opposition. Segments 13 and 15 are connectors to the westernmost routes.

According to TVA's route analysis, Route 11 scored well in the Environmental category because it would cross the fewest number of small streams and has the least impact to forested wetlands. However, TVA received substantial public opposition to this route, as it crossed the most parcels of any route and was in close proximity to the most dwellings of all but a few routes.

Alternative routes 19 and 20 were the top scoring routes in the analysis. The only difference between these two alternative routes is that alternative route 19 uses Segment 20 and alternative route 20 uses Segment 19 (See Table 2-1). Both Segments 19 and 20 cross the same property owners. Segment 20 requires one less angle structure, is slightly shorter with fewer acres of ROW, requires less forest clearing, impacts one less parcel than Alternative Route 19, crosses the fewest acres of wetlands, had the lowest number of open water crossings, had the fewest acres of flood plain crossings, and is located near the fewest number of dwellings of any route. This last point was important to the public and was reflected in the comments. Most of the comments were associated with keeping the route away from populated areas. TVA received several comments recommending route Segment 14 to be part of the preferred route since the segment was the most rural, undeveloped and least populated segment.

TVA announced the agency's preferred TL route as Route 19 in June 2016. Following this announcement, several adjustments were considered as a result of field surveys and additional public comment. These modifications are described below and reflected in Figure 1-1. By making these adjustments, the total number of property owners the preferred route crossed was reduced by six.

- PI 10 was moved an additional 125 feet east and approximately 50 feet south at the request of the property owner. This modification eliminated the impact of the ROW on two property owners.

- TVA reached an agreement between property owners to adjust PI 13 south, which helped accommodate two property owners who requested major adjustments.

    - One property owner requested the TL be moved from the middle of his property to the eastern most property line.

- TVA's Transmission Line Design team requested that PI 10A be relocated approximately 75 feet west to accommodate a structure relocation away from a creek.

- Double steel-pole structures were used to span over properties that had recently installed pivot irrigation systems, which can cause outages to the TL.

2.5 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 2-2.

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

Resource Area	Impacts From Implementing the No Action Alternative	Impacts From Implementing the Action Alternative
Groundwater and Geology	No effects to local groundwater quality or quantity are expected.	Any direct or indirect short-term and long-term effects to groundwater quality or quantity are anticipated to be insignificant.
Surface Water	No changes in local surface water quality are anticipated.	Proper implementation of these controls and mitigation measures identified in the permitting process are expected to result in only minor, temporary and insignificant impacts to surface waters.
Aquatic Ecology	Aquatic life in local streams would not be affected.	With the implementation of BMPs, effects to aquatic life in local surface waters are expected to be minor, temporary, and insignificant.
Vegetation	Local vegetation would not be affected.	Site preparation and clearing of the proposed 161-kV TL ROW and substation expansion would have a minor, temporary effect on most local vegetation. An insignificant direct long-term effect on approximately 213 acres of forested area is anticipated.
Wildlife	Local wildlife would not be affected.	Wildlife inhabiting onsite forest, early successional, and edge habitats along the proposed 161-kV TL ROW and within the substation expansion site would be displaced. Because there are sufficient adjacent local habitats, any effects to wildlife are expected to be temporary and insignificant.
Endangered and Threatened Species	No effects to endangered or threatened species or any designated critical habitats are anticipated.	No impacts to aquatic or plant listed species would occur under the Action Alternative. Impacts to the bald eagle, wood stork, red salamander, mole kingsnake, or red-cockaded woodpecker are not anticipated in association with the proposed actions. Tree clearing would remove about 75.9 acres of potentially suitable summer roosting habitat for the federally threatened northern long-eared bat (NLEB). To remove any potential for direct effects to NLEB, TVA would follow the guidelines in its programmatic biological assessment for bats (Appendix B).
Floodplains	Local floodplain functions would not be affected.	With the implementation of standard mitigation measures, no significant impact on floodplains would occur.

Resource Area	Impacts From Implementing the No Action Alternative	Impacts From Implementing the Action Alternative
Wetlands	No changes in local wetland extent or function are expected.	Although TVA was able to minimize potential wetland impacts through its routing process, TVA found no practicable alternative that avoids all wetlands. A total of 11.08 acres of wetland are located within the proposed ROW, of which 6.13 acres contain woody vegetation comprised of 5.22 acres of forested wetland and 0.91 acre scrub-shrub wetland. Forested and scrub-shrub wetlands would be converted to emergent, meadow-like wetland habitat, thus reducing some wetland functions. With the implementation of identified minimization and mitigation measures, there would be insignificant direct, indirect, and cumulative impacts.
Aesthetics	Aesthetic character of the area is expected to remain virtually unchanged.	Minor visual discord and noise above ambient levels would be produced during construction and maintenance activities. The proposed TL would present a minor cumulative visual effect.
Archaeological and Historic Resources	No effects to archaeological or historic resources are anticipated.	TVA completed consultation with the Mississippi SHPO and federally-recognized Indian Tribes on all the proposed undertakings, except for the Coffeeville Substation spoil storage area, and determined these actions would result in no effects on historic properties. TVA has initiated consultation with the Mississippi SHPO and federally-recognized Indian Tribes regarding the finding of "no historic properties" on the proposed spoil storage area adjacent to the Coffeeville Substation; comments are pending. TVA would not perform any activities within the proposed spoil storage area prior to receiving final concurrence.
Recreation, Parks, and Natural Areas	No changes in local recreation opportunities or natural areas are expected.	There would be no significant direct or indirect impacts to natural areas and parks under this Alternative. Construction of the proposed TL and associated access roads could cause minor and insignificant recreation impacts.
Socioeconomics and Environmental Justice	Over time, the lack of reliable power service could have adverse economic effects to local businesses and residents.	There would be a positive impact from continued reliability of service that would benefit the area and help maintain its economic stability and growth. Any adverse social, economic, or environmental justice effects would be minor and would diminish over time.

2.6 Identification of Mitigation Measures

TVA employs standard practices when constructing, operating, and maintaining TLs, 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 2017a). 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 TL and access roads are as follows:

- TVA would utilize standard BMPs, as described in the BMP manual (TVA 2017b), to minimize erosion during construction, operation, and maintenance activities.
- To minimize the introduction and spread of invasive species in the ROW, access roads and adjacent areas, TVA would follow standard operating procedures consistent with EO 13112 as amended by 13751 (Invasive Species) for revegetating with noninvasive plant species as defined in the BMP manual (TVA 2017b).
- Ephemeral streams that could be affected by the proposed construction would be protected by implementing standard BMPs as identified in the BMP manual (TVA 2017b).
- Perennial and intermittent streams would be protected by the implementation of standard stream protection (Category A) as defined in the BMP manual (TVA 2017b).
- TVA would utilize *Environmental Quality Protection Specifications for Transmission Substation or Communications Construction* during the proposed work at the Oxford and Coffeeville 161-kV substations.
- 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
    - Construction would adhere to the siting, design, construction, and mitigation methods outlined in the TVA subclass review for TL location in floodplains
    - Road construction or improvements would be done in such a manner that upstream flood elevations would not be increased
- Pesticide/herbicide use as part of construction or maintenance activities would comply with the MDEQ general permit for application of pesticides, which also requires a pesticide discharge management plan. In areas requiring chemical treatment, only USEPA-registered and TVA approved herbicides would be used in accordance with manufacturers' label directions designed in part to restrict applications near receiving waters and to prevent unacceptable aquatic impacts.
- Any retired wooden poles would be offered to NEMEPA or property owners. If any wooden poles remain and require disposal, TVA would follow its Environmental Protection Procedures for reuse and/or disposal (TVA 2017a).
- Any lead pins removed from the retired insulators would be handled according to TVA's Environmental Protection Procedures (TVA 2017a).

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

- To compensate for the conversion of 6.13 acres of forested and scrub-shrub wetlands to emergent wetlands, TVA will mitigate the loss of trees by purchasing wetland mitigation credits prior to construction of the proposed TL.
- The relocation of the stream associated with the substation expansion will be conducted in accordance with applicable stream relocation regulations.
- As part of TVA's programmatic biological assessment for bats, TVA will track and document the removal of potentially suitable summer roost trees and include this information in annual reporting in accordance with Section 7(a)(2) consultation. Additionally, if removal of suitable bat roost tree habitat needs to occur when bats may be present on the landscape, TVA would set aside funding to be applied towards future bat-specific conservation projects in accordance with the programmatic biological assessment.
- TVA will arrange the proposed tree clearing schedule with the land manager of the Springdale Natural Area and Wildlife Management Area to minimize conflicts with hunting activities within the protected areas.
- TVA will not perform any activities within the proposed Coffeeville Substation spoil storage area prior to completing consultation with the Mississippi SHPO and federally-recognized Indian tribes.

2.7 The Preferred Alternative

The Action Alternative—TVA Provides a New Power Supply to the Northern Mississippi Service Area—is TVA's preferred alternative for this proposed project. TVA would purchase ROW easements and any associated easements for the permanent access road to accommodate the construction of a new 161-kV TL.

TVA's preferred alternative route for the Action Alternative is Alternative Route 19. This approximate 29-mile route is comprised of alternative route segments 1, 2, 4, 5, 14, 18, 20, and 21.

CHAPTER 3

3.0 AFFECTED ENVIRONMENT

The existing condition of environmental resources that could be affected by the proposed Action Alternative during construction, operation, or maintenance of the proposed 29-mile TL is described in this chapter. The descriptions below of the potentially affected environment are based on field surveys conducted between March 2016 and September 2018, on published and unpublished reports, and on personal communications with resource experts. This information establishes the baseline conditions against which TVA decision-makers and the public can compare the potential effects of implementing the alternatives under consideration.

The analysis of potential effects to endangered and threatened species and their habitats included records of occurrence within a three-mile radius for terrestrial animals, a five-mile radius for plants, and within a 10-digit hydrologic unit code[5] (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 TL route and proposed substation expansion, as well as any areas where the project would alter existing topography or vegetation in view of a historic resource. The APE with respect to archaeological resources included the entire ROW width as described in Section 2.2.1.1 for the proposed route, associated access roads, and substation expansion area.

3.1 Groundwater and Geology

Groundwater is abundant throughout Mississippi. 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 for Yalobusha and Lafayette counties (USEPA 2017). Several Source Water Protection Areas for a public supply well are located within close proximity to the proposed TL ROW (MDEQ 2017).

The project area is located in the Coastal Plain Physiographic Province and is underlain by the Black Warrior River aquifer and a confining unit, the Selma Group. The Black Warrior River aquifer consists of an interbedded mix of fluvial sand and gravel, deltaic sand, silt and clay, and marginal marine sand, silt, and clay. The Black Warrior River aquifer includes unnamed water-yielding rocks of Early Cretaceous age and the Tuscaloosa Group, the Eutaw-McShan Formations, and the Coffee Sand of Late Cretaceous age. The Black Warrior River aquifer is confined by a thick sequence of clay and marl of the Selma Group, which effectively separates it from overlying rocks of the Mississippi embayment aquifer system (Renken 1998).

[5] The United States is divided and subdivided to 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.

Beneath the Selma Group lies the Eutaw-McShan aquifer, which consists of interbedded glauconitic sands, silts, and clays. The Tuscaloosa aquifer system lies below the Eutaw-McShan aquifer and is comprised of four hydraulically connected regional aquifers; e.g., the Gordo, Coker, Massive Sand, and undifferentiated Lower Cretaceous sediments. These aquifers generally consist of interbedded sands, gravels, silts, and clays. The Eutaw-McShan, the Gordo, and the Coker aquifers are sources for large pumping stations used for municipal, industrial, and domestic water supplies in the project area (MDEQ 2004).

3.2 Surface Water

The proposed TL and substation expansion is located in Lafayette and Yalobusha counties, Mississippi. This project area drains to aquatic features within the Bynum Creek-Yocona River, Otoucalofa Creek, Turkey Creek-Skuna River, and Yellow Leaf Creek-Yocona River watersheds. Precipitation in the general area of the proposed project averages about 57.63 inches per year. The average annual air temperature is 60.95 degrees Fahrenheit (U.S. climate data 2017). Stream flow varies with rainfall and averages about 20.82 inches of runoff per year, i.e., approximately 1.53 cubic feet per second, per square mile of drainage area (USGS 2008).

A total of 50 aquatic features including 18 perennial streams, 18 intermittent streams, 13 ponds, and one large seep area, were observed during April 2016, April 2017 and March 2018 field surveys. Other aquatic features were documented on the access roads; however, culverts were already present and no major upgrades would be required. Some of the culverts may require minor upgrades to allow maintenance trucks to access the needed structures. The surface water streams in the vicinity of this project are listed below in Table 3-1.

The CWA 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 USEPA. The term “303(d) list” refers to the list of impaired and threatened streams and water bodies identified by the state. No resources in the project area are currently listed on the 303(d) list of impaired streams (MDEQ 2016). However, a fish consumption advisory for the Yocona River from Enid Reservoir downstream to the confluence with the Tallahatchie River is in place due to mercury (MDEQ 2014). Table 3-1 provides a listing of local streams with their state-designate uses.

Table 3-1 Uses for Streams in the Vicinity of the Proposed 161-kV Transmission Line, Associated Access Roads and Substation Expansion

Stream	Use Classification[1]				
	FW	REC	PWS	SH	ES
Yocona River					
Tributaries of Yocona River	X				
Johnson Creek[2]	X				
Little Johnson Creek	X				
Taylor Creek and Tributaries	X				
Tidwell Creek	X				

Stream	Use Classification[1]				
	FW	REC	PWS	SH	ES
Goodwin Creek	X				
Wilson Creek	X				
Otoucalofa Creek and Tributaries	X				
Town Creek	X				
Unnamed Tributary of Town Creek	X				
Moreland Creek and Tributaries	X				
Turkey Creek and Tributaries	X				

[1] Codes: FW = Fish and Wildlife; REC = Recreation; PWS = Public Water Supply; SH = Shellfish Harvesting; ES = Ephemeral Stream

[2] Not part of the project area, just shown for river network path.

3.3 Aquatic Ecology

The proposed TL would cross portions of the Yocona River, Taylor Creek, Tidwell Creek, Goodwin Creek, Wilson Creek, Town Creek, Otoucalofa Creek, L. Johnson Creek, Moreland Creek, and Turkey Creek watersheds. Overall, 50 watercourse and 121 ephemeral/wet-weather conveyance[6] intersections occur along the proposed TL route, access roads, and/or within the proposed ROW and substation expansion. These watercourses include 18 perennial streams, 18 intermittent streams, 13 ponds, and one large seep area.

Because TL and substation expansion construction and maintenance activities primarily affect riparian conditions and instream habitat, TVA evaluated the condition of these factors at each stream crossing along the proposed TL and substation expansion site. Riparian condition was evaluated during April 2016, April 2017 and March 2018 field surveys using the TVA habitat assessment form. The proposed substation expansion would require the relocation of 460 linear feet of the intermittent, partially forested stream. A listing of stream crossings in the project area, excluding ephemeral/WWC conveyances, is provided in Appendix C. Streams encountered along the proposed route were typical of the area. The dominate substrate was clay/silt. 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 TL and access roads, as defined below, and accounted for in Table 3-2.

- 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.

[6] Ephemeral streams are those small creeks and streams that typically flow only following rainfall events. They are also known as wet-weather conveyances or "WWCs." The defined term that would be used is dependent on the location and the permitting agency.

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

Table 3-2 Riparian Condition of Streams Located Along the Proposed 161-kV - Transmission Line Route, Associated Access Roads and Substation Expansion Site

Riparian Condition	Perennial Streams	Intermittent Streams	Total
Forested	9	13	22
Partially forested	4	3	7
Non-forested	5	2	7
Total	**18**	**18**	**36**

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). Appropriate application of the BMPs minimizes the potential for impacts to water quality and instream habitat for aquatic organisms.

Landcover associated with most of the documented streams consisted of forested lands. While some channelization and removal of riparian areas have impacted streams along the proposed TL route, the majority of aquatic resources observed in the project vicinity appeared stable with intact riparian zones in forested areas. The primary impact to watercourses in the project vicinity appeared to be logging operations and in some instances livestock access to stream channels.

3.4 Vegetation

The proposed TL and substation expansion would occur in the Northern Hilly Gulf Coastal Plain ecoregion (Chapman et al. 2004). This ecoregion contains several north-south bands of sand and clay formations, and extends north to the Kentucky-Tennessee border. This ecoregion is cooler and contains more upland hardwood forest than the Southern Hilly Gulf Coastal Plain to the south. Currently, land cover is mostly forest intermixed with pasture and cropland.

Field surveys were conducted in July 2016, March 2017 and March 2018 to document plant communities, infestations of invasive plants, and to search for possible threatened and endangered plant species in areas where work would occur. All areas along the proposed ROW, access roads, and substation expansion were visited during the survey. 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 substation expansion is comprised of agricultural and mixed deciduous-evergreen forest and has been heavily disturbed by previous land uses, with pasture and horticultural fields being the primary source. Vegetation in the proposed TL ROW is characterized by two main types: forest (67 percent) and herbaceous (36 percent).

Evergreen forest, which accounts for about 50 percent of total forested areas, has low species diversity and is dominated by 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. Other evergreen forest stands are the result of land use. Here, loblolly pine and short leaf pine were the first tree species to colonize a site after disturbance. While these stands were not planted, they are often similar in structure and species composition to their managed counterparts.

Deciduous forest (places where deciduous trees account for more than 75 percent of total canopy cover) occupies about 35 percent of total forested areas. Deciduous forest can be further subdivided into dry upland forest, mesic upland forest, and wetland forest. While there is some overlap in the species composition between these subtypes, there are basic differences in the common plants found in each habitat types. The canopy of dry deciduous forest is dominated by oaks (blackjack, post, southern red, and white) and hickories (mockernut and pignut) with the occasional evergreen species such as eastern red cedar, loblolly, or shortleaf pine. This forest type typically occurs on ridge tops and upper slopes and contains relatively few plants in the understory. Typical understory species include cat greenbrier, cranefly orchid, farkleberry, muscadine, Virginia creeper, and western bracken fern. Mesic upland forest occurs on mid to lower slopes and supports a greater number of species. Common overstory trees in this forest type include American beech, American elm, blackgum, oaks (cherrybark, water and white), persimmon, sassafras, slippery elm, southern sugar maple, sweetgum, and yellow-poplar, often with some component of loblolly pine. Common understory trees and shrubs include Carolina buckthorn, eastern redbud, Elliott's blueberry, flowering dogwood, hophornbeam, ironwood, oak leaf hydrangea, and Alabama supple jack vine. The herbaceous layer was rich compared to dry deciduous forest and contained species like Christmas fern, devil's grandmother, false Solomon's seal, green dragon, heart's a busting, Indian pink, jack in the pulpit, mayapple, poison ivy, slender and longleaf woodoats, twoflower melicgrass, violet woodsorrel, and Virginia snakeroot. The invasive plants Chinese privet and Japanese honeysuckle were common in this habitat type.

Mixed evergreen-deciduous forest, defined as stands where both evergreen and deciduous species contribute between 25 to 75 percent of total canopy cover, occurs on about 15 percent of total forested areas. In general, these forest types are similar to the dry and mesic deciduous forests described above, but contain a greater percentage of loblolly pine, and to a lesser extent, Eastern red cedar and shortleaf pine.

Herbaceous vegetation is characterized by greater than 75 percent cover of forbs and grasses and less than 25 percent cover of other types of vegetation. The majority of this habitat type occurs along existing unmaintained TL ROWs, but cropland, hayfields, recent clear-cuts, heavily manipulated pastures, and residential development 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 bahia grass, broomsedge bluestem, cypress panic grass, dallis grass, dog fennel, field clover, garden vetch, hairy buttercup, Italian rye grass, lyreleaf sage, openflower rosette grass, prairie fleabane, southern blackberry, spoonleaf purple everlasting, tall fescue, tall goldenrod, velvet panicum, purpletop tridens, Virginia plantain, weedy dwarf dandelion, and white clover. The woody vines Japanese honeysuckle and kudzu are also found throughout the area. Areas of

emergent wetlands were present in the project area. See Section 3.8 and Appendix D for species indicative of wetlands.

Executive Order 13751, as amended by 13751, serves to prevent the introduction of invasive species and provides for their control to minimize the economic, ecological, and human health impacts that those species potentially cause. In this context, invasive species are nonnative species that invade natural areas, displace native species, and degrade ecological communities or ecosystem processes (Miller 2010). During field surveys, invasive plants were prevalent in both forest and herbaceous vegetation types. However, no federally listed noxious weeds were observed. Invasive species present across significant portions of the landscape include Chinese lespedeza, Chinese privet, dallis grass, Japanese honeysuckle, Japanese stilitgrass, and kudzu.

3.5 Wildlife

Habitat assessments for terrestrial animal species were conducted in July 2016, April 2017, and March 2018 for the proposed TL ROW, access roads, and substation expansion. The project area occupies approximately 317 acres. Landscape features within and surrounding the project area consist of a variety of forested habitat, wetlands, stream crossings, ponds, early successional habitat (i.e., pasture and agricultural), and residential or otherwise disturbed areas. Approximately 213 acres of the project footprint is forested, including about 75.9 acres of trees considered potentially suitable summer roosting bat habitat, would be cleared for the new TL maintained as early successional habitat. Each of the varying community types offers suitable habitat for species common to the region, both seasonally and year-round.

Evergreen forests (mostly planted pine forests with some natural stands) occupy approximately 107 acres of the project footprint. These forests provide habitat for terrestrial wildlife such as barred owl, sharp-shinned hawk, brown creeper, golden-crowned kinglet, hermit thrush, pine siskin, pine warbler, yellow-rumped warbler, and yellow-throated warbler (National Geographic 2002; Turcotte and Watts 1999). White-footed deer mouse, eastern fox squirrel, Seminole bat, and wild boar are mammals that may utilize resources found in pine forests (Kays and Wilson 2002; Reid 2006). Southeastern five-lined skink, southern black racer, eastern hognose snake, and red corn snake are found in open pine forests in this region (Bailey et al. 2006, Conant and Collins 1998, Dorcas and Gibbons 2005).

Deciduous and mixed evergreen-deciduous forests make up approximately 105 acres of the project footprint. These forest types provide habitat for an array of terrestrial animal species. Birds typical of this habitat include Acadian flycatcher, downy and hairy woodpecker, eastern screech-owl, tufted titmouse, eastern wood-pewee, indigo bunting, red-breasted nuthatch, red-headed woodpecker, red-tailed hawk, summer tanager, wood thrush, chestnut-sided warbler, wild turkey, 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 partially open. Common bat species likely found within this habitat include big brown bat, eastern red bat, evening bat, silver-haired bat, and tricolored bat. Eastern chipmunk, eastern woodrat, gray fox, and woodland vole are other mammals likely to occur within this habitat (Kays and Wilson 2002). Box turtle, coal skink, green anole, smooth earth snake, and gray rat snake are common reptiles of eastern deciduous forests (Bailey et al. 2006; Conant and Collins 1998; Dorcas and Gibbons 2005). In forests with aquatic features, amphibians likely found in the area include marbled, mole, Mississippi slimy, and spotted salamanders, eastern narrowmouth toad,

eastern spadefoot toad, Fowler's toad, gray treefrog, and southern leopard frog (Bailey et al. 2006; Conant and Collins 1998).

About 11.08 acres of wetlands are located within the project footprint. Wetland habitat provides resources for birds including pileated woodpecker, northern harrier, red-winged blackbird, wood duck, song sparrow, northern parula, swamp sparrow, and white-throated sparrow (National Geographic 2002). American beaver, golden mouse, muskrat, and nutria are common mammals in emergent wetland and aquatic communities. Southern painted turtle, slider, eastern garter snake, cottonmouth, northern water snake, speckled kingsnake, rough green snake, and timber rattlesnake are common reptiles likely present within wetlands along the proposed ROW (Bailey et al. 2006, Dorcas and Gibbons 2005). Amphibians typical of this region and found in and around emergent wetlands and open streams include American bullfrog, southern cricket frog, eastern red-spotted newt, bronze frog, spring peeper, and upland chorus frog (Conant and Collins 1998).

Pastures and agricultural fields comprise approximately 104 acres of the project footprint. Common inhabitants of this type of early successional habitat include brown-headed cowbird, brown thrasher, common yellowthroat, dickcissel, eastern bluebird, white-eyed vireo, eastern kingbird, eastern meadowlark, field sparrow, and grasshopper sparrow (National Geographic 2002). Bobcat, coyote, eastern cottontail, hispid cotton rat, and red fox are mammals typical of fields and cultivated land (Kays and Wilson 2002). Reptiles including northern copperhead, Mississippi ring-necked snake, and prairie kingsnake are also known to occur in this habitat type (Bailey et al. 2006; Dorcas and Gibbons 2005).

Developed areas and areas otherwise previously disturbed by human activity are home to a large number of common species. American robin, American crow, Carolina chickadee, blue jay, European starling, house finch, house sparrow, mourning dove, Carolina wren, northern cardinal, northern mockingbird, black vulture, and turkey vulture are birds commonly found along ROWs, road edges, and residential neighborhoods. Mammals found in this community type include eastern gray squirrel, nine-banded armadillo, raccoon, and Virginia opossum (Kays and Wilson 2002). Road-side ditches provide potential habitat for amphibians including American toad, upland chorus frog, and spring peeper. Reptiles potentially present include red-bellied snake, gray rat snake, and rough earth snake (Bailey et al. 2006; Conant and Collins 1998; Dorcas and Gibbons 2005).

Review of the TVA Regional Natural Heritage database in February 2017 indicated no recorded caves within three miles of the project area, and no caves were identified during the field surveys in July 2016, April 2017 or March 2018. No other unique or important terrestrial habitats were identified within the project area. Further, no aggregations of migratory birds or wading bird colonies have been documented within three miles of the project area and none were observed during field surveys.

3.6 Endangered and Threatened Species

Endangered species are those determined to be in danger of extinction throughout all or a significant portion of their range. Threatened species are those determined to be likely to become endangered within the foreseeable future. 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.

The State of Mississippi provides protection for species considered threatened, endangered, or of special concern within the state other than those federally listed under the ESA. The listing is handled by the Mississippi Commission on Wildlife, Fisheries and Parks; however, the Mississippi Natural Heritage Program and the TVA Regional Natural Heritage database both maintain a list of species considered threatened, endangered, of special concern, or tracked in Mississippi. A listing of these federally and state-listed species known to occur near the proposed TL ROW and substation expansion is provided as Table 3-3.

Table 3-3 Federally and State-listed Species from and/or within Lafayette and Yalobusha Counties, Mississippi[1]

Common Name	Scientific Name	Federal Status[2]	State Status[2]	State Rank[3]
Plants[4]				
Sedge	*Carex stricta*	-	SLNS	S2
Crayfish[5]				
Shutispear Crayfish	*Procambarus lylei*	-	-	S2
Fishes[5]				
Spotfin Shiner	*Cyprinella spiloptera*	-	-	S2
Steelcolor Shiner	*Cyprinella whipplei*	-	-	S2
Yazoo Darter	*Etheostoma raneyi*	-	-	S2
Mussels[5]				
Rayed Creekshell	*Anodontoides radiates*	-	-	S2
Amphibians				
Red salamander	*Pseufotriton ruber*		TRKD	S3
Reptiles				
Mole kingsnake	*Lampropeltis calligaster rhombomaculata*		TRKD	S3?
Birds				
Bald eagle[7]	*Haliaeetus leucocephalus*	DM	TRKD	S2BS2N
Red-cockaded woodpecker[7]	*Picoides borealis*	LE	LE	S1
Wood stork	*Mycteria Americana*	LT	TRKD	S2N
Mammals				
Northern long-eared bat[6]	*Myotis septentrionalis*	LT	TRKD	S1N

[1] Sources: TVA Regional Natural Heritage database, Mississippi Natural Heritage data, and USFWS Ecological Conservation Online System, USFWS Information, Planning, and Assessment (IPaC) database.

[2] Status Codes: END = Endangered; LE = Listed Endangered; LT = Listed Threatened; THR = Threatened; TRKD = Tracked by state natural heritage program (no legal status); SLNS = State Listed, no status assigned.

[3] State Ranks: S1 = Critically imperiled; S2 = Imperiled; S3 = Vulnerable; S4 = Apparently Secure; S#S# = Denotes a range of ranks because the exact rarity of the element is uncertain (e.g., S1S2); S#B = Rank of Breeding Population, S#N = rank of non-breeding population, S3? = Inexact Rank.

[4] Plant species previously reported from within five miles of ROW.

[5] Aquatic animal species from watersheds located within a 10-mile radius of the project area and/or within Lafayette or Yalobusha counties

[6] Federally threatened species whose range includes the project footprint, though no records are known from within Lafayette or Yalobusha counties, Mississippi.

[7] Federally endangered or protected species that has been documented in Lafayette or Yalobusha Counties, Mississippi, but not within three miles of the project footprint.

3.6.1 Aquatic Animals

A review of the TVA Regional Natural Heritage database, which combines data from various sources including Mississippi Natural Heritage database indicated no federally or state-listed aquatic species are known from the potentially affected watersheds.

Additionally, the State of Mississippi tracks species suspected to occur in low numbers and. designates them as species of special concern. From the potentially affected watersheds one mussel, one crayfish, and three fish species were identified as species of special concern.

3.6.2 Plants

A review of the TVA Regional Natural Heritage database indicated one state-listed and no federally listed plant species have been previously reported within a five-mile vicinity of the project area (Table 3-3). No federally listed plant species have been previously reported from Lafayette and Yalobusha counties, Mississippi. No federally or state-listed plants were observed in the proposed ROW, access roads, or substation expansion during the field surveys conducted in July 2016, March 2017 and March 2018. No DCH for plants occurs in the project area.

3.6.3 Terrestrial Animals

A review of literature and the TVA Regional Natural Heritage database in February 2017 identified two state-listed terrestrial animals (red salamander and mole kingsnake) and one federally listed species (wood stork) within three miles of the project area. Additionally, one federally protected species (bald eagle) and one federally listed species (red-cockaded woodpecker) are known from Lafayette County. The federally listed as threatened NLEB is thought by USFWS to have the potential to occur in Lafayette and Yalobusha counties, although no records of the species are known to date (Table 3-3).

Red salamanders are found beneath rocks and leaf litter in or near cold, clear, rocky streams and springs in wooded and open areas. Adults sometimes disperse into woods. Eggs are attached to underside of rocks in water. Larvae occur in still pools. The nearest record of red salamander is 1.3 miles away from the project area; however, all known records within Lafayette County are historic and this species may no longer be present.

Mole kingsnakes' preferred habitat is open fields with loose, dry soil, typically on the edge of a forested region. These snakes are secretive and very fossorial and are rarely seen above ground during the day unless they are forced out by heavy rains. Mole kingsnakes are mainly nocturnal and commonly seen on paved roads at night. Mole kingsnake has been recorded 1.3 miles from the project footprint, although records in this area are historic and this species may no longer be present.

Bald eagles are protected under the Bald and Golden Eagle Protection Act (USFWS 2013) and the Migratory Bird Treaty Act (16 United States Code §§ 703–712). This species is associated with larger mature trees capable of supporting its massive nests, which are usually found near larger waterways where the eagles forage (Natureserve 2016). The nearest bald eagle nesting record is 9.2 miles outside of the project footprint. No additional nests or individuals were observed during field surveys in July 2016, April 2017 or March 2018. Suitable bald eagle nesting and foraging habitat may exist for this species within proximity to the Yocona River and several other smaller creeks and tributaries within the project footprint.

Red-cockaded woodpecker typically inhabits open, mature pine forests with a dense groundcover consisting of a variety of grass, forb and shrub species. These woodpeckers are thought to be extirpated from most of their habitat. The closest records of this species are 12.5 miles away in Holly Springs National Forest in Lafayette County, however, none have been recorded in the area since 1978.

Wood storks are highly colonial and require wetland habitat for nesting and foraging. They form large rookeries in upper parts of cypress trees, mangroves, or dead hardwoods over swamps, on islands, and along streams and shallow lakes. The wood stork breeds in Florida, Georgia, South Carolina, and from Mexico to Argentina (Natureserve, 2016). Wood storks feed on small fish, crayfish, reptiles, and amphibians in shallow fresh waterbodies and wetlands (Turcotte and Watts 1999). Vagrant individuals are believed to occur statewide in Mississippi and one record is known from Lafayette County (Turcotte and Watts 1999).

Northern long-eared bats (NLEB) predominantly overwinter in large hibernacula, such as caves and abandoned mines, with high humidity and low air flow. During the fall and occasionally in spring, this species utilizes entrances of caves and surrounding forested areas for swarming (mating). In the summer, NLEBs roost individually or in colonies beneath exfoliating bark or in crevices of both live and dead trees. They switch roosts approximately every two days and have a high site fidelity to summer roosting areas and winter hibernacula. NLEBs are thought to be opportunistic in roost site selection, roosting beneath the exfoliating bark and within cracks and crevices of both live and dead (snag) trees. This species is also known to roost in abandoned buildings and under bridges, though primary summer roosting sites appear to be trees. NLEBs emerge at dusk to forage below the canopy of mature forests on hillsides and roads, and occasionally over forest clearings and along riparian areas (USFWS 2014). The closest documented occurrences of NLEB are historical hibernaculum records approximately 89 miles east of the project area in Franklin County, Alabama and Tishomingo County, Mississippi. There are no documented caves within three miles of the project area. No additional caves were observed during field surveys. Foraging habitat exists throughout the proposed project area in forest fragments and over streams, ponds, and wetlands. Suitable summer roosting habitat for NLEB exists within forested sections of the project area. No suitable summer roosting areas were identified in the substation expansion site.

Assessment of the project area for presence of summer roosting habitat for NLEB followed federal guidance and resulted in the identification of 238 suitable roost trees scattered across 21 forest fragments, totaling about 75.9 acres (USFWS 2014, 2015). Habitat quality ranged from moderate to high, based on the presence of trees with exfoliating bark (i.e., 127 white oaks, 81 snags, 12 live cavity trees, 5 hickories, and 13 trees of other species) within the proposed ROW. Suitable summer roosting areas were comprised of mature

hardwood stands dominated by a mixture of blackjack oak, hickories, post oak, southern red oak, and white oak.

3.7 Floodplains

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 TL route, access roads, laydown yards, and substation expansion would cross floodplain areas associated with streams (see Sections 3.2 and 3.3) in Lafayette and Yalobusha counties.

3.8 Wetlands

Wetlands are those areas inundated by surface or groundwater such that vegetation adapted to saturated soil conditions is prevalent. Examples include bottomland forests, swamps, marshes, wet meadows, and fringe wetlands along the edge of watercourses and impoundments. Wetlands provide many societal benefits including toxin absorption and sediment retention for improved water quality, storm water attenuation for flood control, shoreline buffering for erosion protection, and provision of fish and wildlife habitat for commercial, recreational, and conservation purposes. Field surveys were conducted in August 2016, March 2017, April 2017 and March 2018, to map wetland areas and delineate forested, scrub-shrub, and emergent wetland habitats potentially affected by the TL and substation expansion under the proposed Action Alternative. Wetland determinations were performed according to the USACE standards, which require documentation of hydrophytic (wet-site) vegetation, hydric soil, and wetland hydrology (USACE 2010; Environmental Laboratory 1987; Lichvar et al. 2016).

Using a TVA-developed modification of the Ohio Rapid Assessment Method (Mack 2001) specific to the TVA region (TVA Rapid Assessment Method or "TVARAM"), wetlands were evaluated by their functions and classified into three categories: low quality, moderate quality, and superior quality. Low quality wetlands are degraded aquatic resources which may exhibit low species diversity, minimal hydrologic input and connectivity, recent or ongoing 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 and there is reasonable potential for restoration. Superior quality wetlands include those wetlands offering high functions and values within a watershed or are of regional/statewide concern. Superior quality wetlands may 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. Conditions found in superior quality wetlands often represent restoration goals for wetlands functioning at a lower capacity.

The proposed TL, access roads, laydown yards and substation expansion would traverse a rural landscape dominated by pine plantations, forested uplands and bottomlands, sporadic agricultural fields, and typical low-growing ROW vegetation where ROW vegetation

management is on-going. Wetlands along the proposed corridor are primarily associated with floodplain or riparian habitat of creek bottoms or their unnamed tributaries. Field surveys identified 41 wetland areas, across 33 wetland complexes, totaling 11.08 wetland acres within the TL ROW construction area and access roads (Table 3-4). No wetlands were identified on the substation expansion site. Of this, forested wetland comprises 5.22 acres (1.5 percent of project footprint), scrub-shrub wetland comprises 0.91 acres (less than 1 percent of project footprint), and emergent wetland habitat comprises 4.95 acre (1.4 percent of project footprint). The wetland habitat within the project area is of varying levels of quality, thus provides varying levels of wetland function and value to the surrounding landscape. The combination of land-use practices and landscape dictates the type of wetland habitat and wetland functional capacity. These wetlands were generally identified in association with ephemeral or intermittent drainage features, hillside seeps, or large floodplain bottoms. A detailed description of all wetlands identified during the surveys can be found in Appendix D.

Table 3-4 Wetlands within the Proposed Transmission Line Right-of-Way and Access Roads

Wetland Identifier	Wetland Type[1]	TVARAM[2] Existing Functional Capacity	Wetland Acres within the Project Footprint	Forested and Scrub-Shrub Impacted Wetland Acreage
W001	PEM1E	Moderate	0.03	0
W002	PEM1E	Moderate	0.02	0
W003	PEM1E	Moderate	0.02	0
W004	PEM1E	Moderate	1.73	0
W005	PEM1E	Low	0.06	0
W006	PEM1E	Low	0.01	0
W007	PFO1E	Moderate	0.12	0.12
W008	PFO1E	Moderate	0.10	0.10
W009	PEM1E	Moderate	0.19	0
W010	PEM1E	Moderate	0.02	0
W011	PEM1E	Moderate	0.03	0
W012	PEM1E	Moderate	0.3	0
W013	PEM1E	Moderate	0.02	0
W014	PFO1E	Moderate	0.12	0.12
W015	PFO1E	High	0.13	0.13
W016	PFO1E	Moderate	0.61	0.61
W017	PSS1E	Moderate	0.38	0.38
W018	PFO1E	High	3.32	3.32
W019	PEM1E	High	0.04	0
W020a	PEM1E	Moderate	0.22	0
W020b	PFO1E	Moderate	0.12	0.12
W021	PEM1E	Low	0.50	0
W022	PEM1E	Moderate	0.45	0
W023a	PEM1E	Moderate	0.17	0
W023b	PFO1E	Moderate	0.19	0.19
W024	PFO1E	Moderate	0.02	0.02
W025	PEM1E	Moderate	0.21	0
W026	PEM1E	Moderate	0.10	0
W027a	PEM1E	Moderate	0.16	0
W027b	PFO1E	Moderate	0.19	0.19

Wetland Identifier	Wetland Type[1]	TVARAM[2] Existing Functional Capacity	Wetland Acres within the Project Footprint	Forested and Scrub-Shrub Impacted Wetland Acreage
W028a	PEM1E	Moderate	0.13	0
W028b	PFO1E	Moderate	0.19	0.19
W029a	PEM1E	Moderate	0.07	0
W029b	PFO1E	Moderate	0.11	0.11
W030a	PEM1E	Moderate	0.13	0
W030b	PSS1E	Moderate	0.18	0.18
W031a	PEM1E	Moderate	0.10	0
W031b	PSS1E	Moderate	0.16	0.16
W032a	PEM1E	Moderate	0.07	0
W032b	PSS1E	Moderate	0.19	0.19
W001-AR[3]27	PEM1E	Moderate	0.17	0
		Total Acres	**11.08**	**6.13**

[1]Classification codes as defined in Cowardin et al. (1979): E = Seasonally flooded/saturated; f=Farmed; H=Permanently Flooded; EM1=Emergent, persistent vegetation; FO1=Forested, broadleaf deciduous vegetation; FO4=Forested, needle-leaved evergreen; P=Palustrine; SS1=Scrub-shrub, broadleaf deciduous vegetation; SS4=Scrub-shrub, needle-leaved evergreen.
[2]TVARAM = A TVA Rapid Assessment Method that categorizes wetland quality by their functions, sensitivity to disturbance, rarity, and ability to be replaced.
[3]AR=access road

A field survey was conducted in September 2018 to determine the presence of wetlands within the Oxford and Water Valley laydown yards proposed for use during TL construction. The Oxford site has been previously cleared and graded, with a portion re-sodded with grass. No aquatic features were found on the Oxford site. The Water Valley site has also been previously cleared and graded; however, much of the site has become naturalized with opportunistic or weedy upland vegetation. Water Valley contained one upland swale, which drains precipitation off-site. No hydric soil, wetland hydrology, or dominant wetland vegetation was found on either parcel. Therefore, no wetlands were present at either of the proposed laydown yards.

3.9 Aesthetics

3.9.1 Visual Resources

The physical, biological, and cultural features of an area combine to make the visual landscape character both identifiable and unique. Scenic integrity indicates the degree of unity or wholeness of the visual character. Scenic attractiveness is the evaluation of outstanding or unique natural features, scenic variety, seasonal change, and strategic location. Where and how the landscape is viewed affects the more subjective perceptions of its aesthetic quality and sense of place. Views of a landscape are described in terms of what is seen in foreground, middle ground, and background distances.

In the foreground, defined as an area within 0.5 miles of the observer, details of objects are easily distinguished in the landscape. In the middle ground, normally between 0.5 and 4 miles from an observer, objects may be distinguishable, but their details are weak and they tend to merge into larger patterns. Details and colors of objects in the background, the distant part of the landscape, are not normally discernable unless they are especially large

and standing alone. The impressions of an area's visual character can have a significant influence on how it is appreciated, protected, and used.

The criteria for classifying the quality and value of scenery have been adapted from a scenic management system development by the U.S. Forest Service (USFS) and integrated with current planning methods used by the TVA. The classification process (i.e., the scenic value criteria for scenery inventory and management) is also based on fundamental methodology and descriptions adapted from USFS (USDA 1995).

The proposed TL would travel through a mixture of pastures, agricultural fields, and partially forested lands with relatively flat topography throughout the entire project area. There are several existing TLs located in the project area including the Oxford-West Oxford 161-kV TL, which runs east-west in the northern part of the study area. TVA would utilize an existing 75-foot-wide ROW that TVA previously sold to NEMEPA for the first 11.9-mile section beginning south of County Road 300 and extending to Water Valley. An existing TVEPA 26-kV TL runs parallel to the final 7.4 miles of the proposed TL into the Coffeeville Substation. The proposed TL would be visible from three state highways, one U.S. highway, and various local and county roads along the route. The highest visibility of the proposed TL would likely occur across SR 315 and U.S. Highway 32 due to heavier volumes of traffic and the location of the proposed TL across the road.

Certain facilities, such as churches, schools and outdoor recreation sites can be vulnerable to visual modifications in the surrounding landscape. As shown in Figures 3-1 and 3-2, there are several churches, cemeteries, schools and recreational facilities within a four mile radius of the proposed TL. However, most facilities occur within the proposed TL's middleground. The proposed TL would be less visible and obtrusive to the facilities located within the middleground, as it would largely fall into an observer's view where objects are less distinguishable.

There are six cemeteries and four churches within the proposed TL's foreground. These facilities are dispersed along the corridor of the proposed TL and range in distance from 100 feet to 0.5 mile (Table 3-5). The facilities closest to the proposed TL include Wyatt Chapel Cemetery, Rocky Mount Church and Cemetery, and Gray Rock Church. Wyatt Chapel Cemetery is located south of SR 315/Blackmur Drive and is approximately 600 feet east of the proposed ROW. The Rocky Mount Church and Cemetery are located south of Velma Crossing road and are both approximately 100 feet west of the proposed ROW. Gray Rock Church is situated approximately 100 feet southeast of the proposed TL and is located on the east side of Pine Valley Road. Although there are several recreational facilities clustered near the city of Oxford where the project begins, there are none within proposed TL's foreground.

Table 3-5 Facilities within the Foreground of the Proposed Transmission Line

Facilities in Foreground (less than 0.5 mile)	Resource Location	Distance from Proposed Right-of-way (ROW)
Springdale Cemetery	South of SR 7	Approximately 0.5 mile
Palestine Church and Cemetery	South of the Lafayette/Yalobusha County Line	Approximately 0.3 mile
Wyatt Chapel Cemetery	South of SR 315/Blackmur Drive	Approximately 600 feet
Piney Grove Church and Cemetery	South of Coleman Road	Approximately 0.4 mile
Rocky Mount Church and Cemetery	South of Velma Crossing Road	Approximately 100 feet
Gray Rock Church	East side of Pine Valley Road	Approximately 100 feet
Cedar Grove Cemetery	West side of Pine Valley Road	Approximately 0.2 mile
Brooms Cemetery	North of Lane Road	Approximately 0.4 mile

3.9.2 Noise and Odors

Water Valley Municipal Airport is located in close proximity to the proposed TL route. Also, some traffic noise is generated along SR 278, SR 315, County Road 300, and US 32 and from the towns of Oxford, Water Valley and Coffeeville, which are in close proximity to the proposed TL route. The traffic noise has become part of the ambient noise.

There are no known major sources of objectionable odors along the route or in the vicinity of the proposed TL.

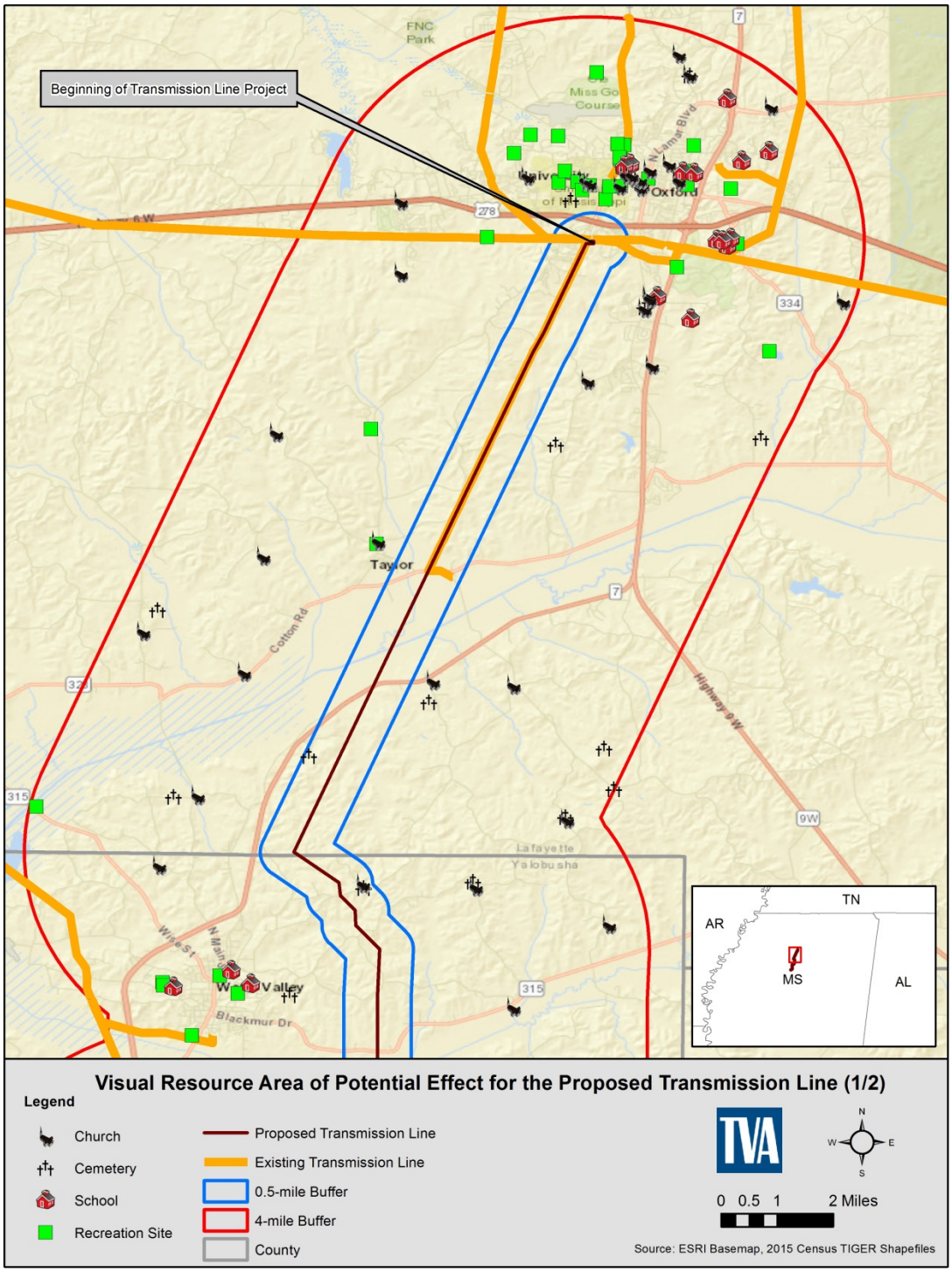

Figure 3-1 Visual Resources Area of Potential Effect for the Proposed Transmission Line – Part 1

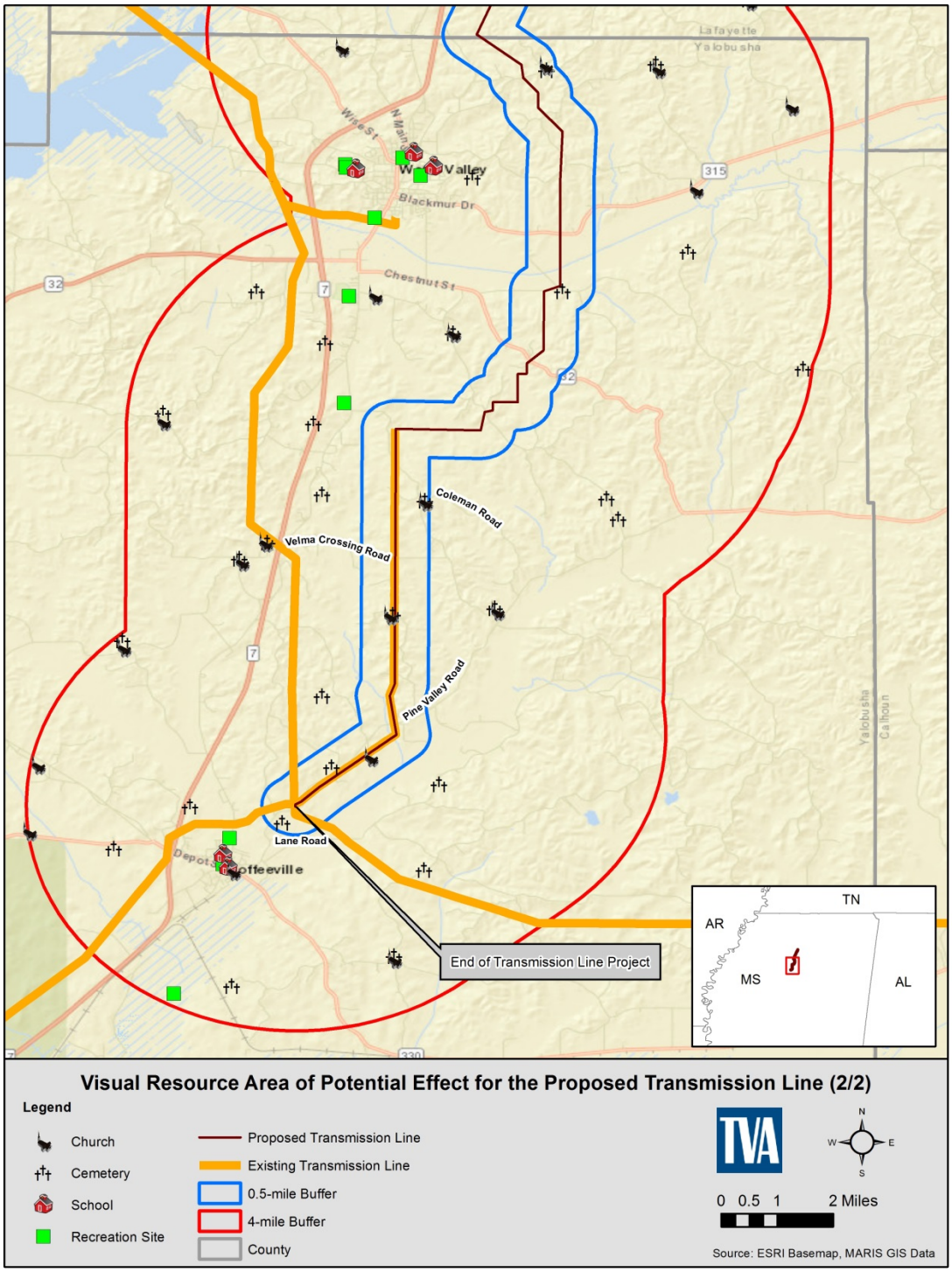

Figure 3-2 Visual Resources Area of Potential Effect for the Proposed Transmission Line – Part 2

3.10 Archaeological and Historic Resources

Federal agencies are required by Section 106 of the NHPA and by NEPA to consider the possible effects of their proposed actions (or undertakings) on historic properties. The term "historic property" includes any historic or prehistoric site, district, building, structure, or object included in, or eligible for inclusion in, the NRHP maintained by the National Park Service. "Undertaking" means any project, activity, or program that has the potential to have an effect on a historic property and that is under the direct or indirect jurisdiction of a federal agency, or is licensed or assisted by a federal agency.

To determine an undertaking's possible effects on historic properties, a four-step review process is conducted. These steps are:

1. Initiation (defining the undertaking and its APE, and identifying the parties to be consulted in the process);
2. Identification of historic properties within 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 Mississippi SHPO), federally-recognized tribes that have an interest in the undertaking, 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.

The archaeological APE for this undertaking consists of the 29-mile TL corridor with a 75- to 100-foot wide ROW; access roads to be used during construction and maintenance; 6 guy wire locations outside the TL ROW; laydown yards, and the proposed expansion area for the Coffeeville Substation and associated spoil storage area. For historic architectural resources, the APE is defined as areas within a 0.5-mile radius surrounding the proposed TL centerline, as well as any areas where the proposed TL would alter existing topography or vegetation in view of a historic resource. The historic architectural APE also includes any areas within a 0.5 mile radius of the substation expansion footprint, from which unobstructed views to the new breaker bays and switch house would be possible.

TVA conducted several Phase I cultural resources surveys of the APE to identify any historic properties that may be impacted by the undertaking. These included archaeological surveys of those parts of the APE where the undertaking could have direct effects on historic properties, and surveys for historic above ground (architectural) resources in the viewshed within the 0.5-mile radius of the proposed new TL and substation expansion. Surveys were performed separately for the ROW, access roads, laydown yards, off-ROW guy wire anchor installations, substation expansion area, and substation spoil storage area, as TVA's plans for each part of the undertaking were developed at different times.

TVA performed the archaeological and historic architectural survey of the proposed Coffeeville Substation expansion area in 2016. The expansion area occupied approximately 4.2 acres adjacent to the existing substation. Background research performed prior to the archaeological survey indicated that no archaeological sites had been identified previously within the APE. The survey confirmed there are no archaeological sites. One previously recorded architectural resource (161-COF-5102-

DIE/Riddick House) is located within the 0.5-mile radius of the proposed substation expansion. However, no views to the proposed project would be visible from this resource, due to the presence of a stand of timber between the house and the Coffeeville Substation. Therefore, 161-COF-5102-DIE/Riddick House is not within the proposed project's APE. The survey identified one previously unrecorded architectural resource, designated IS-1. Based on the survey, TVA found this resource to be ineligible for inclusion in the NRHP due to a lack of architectural distinction and historic merit, as well as to a loss of integrity caused by modern alterations.

TVA performed a cultural resources survey of the proposed ROW in 2017. Background research conducted prior to the survey indicated that five previous archaeological surveys have included portions of the proposed ROW, but no archaeological sites had been recorded in the proposed ROW. TVA's survey resulted in the identification of 16 archaeological sites, a non-site locale, and 11 isolated finds of archaeological material. TVA determined, in consultation with the Mississippi SHPO, that 13 of the sites, the non-site locale (a modern garbage dump) and 11 isolated finds are ineligible for inclusion in the NRHP because they do not satisfy criterion (d) of 36 CFR Part 60.4. TVA determined that three of the identified sites (22LA840, 22LA842, and 22LA843) could be eligible for the NRHP and should be avoided or if avoidance is not possible, investigated further in order to determine their NRHP eligibility.

In order to fully evaluate the NRHP eligibility of archaeological sites 22LA840, 22LA842, and 22LA843, TVA carried out Phase II testing at all three sites. One Phase II testing study was performed at 22LA842, and a separate Phase II testing study was performed at 22LA840 and 22LA843. These investigations included non-invasive geophysical survey followed by shovel test probing and test unit excavations. Based on the investigations, TVA determined all three sites are ineligible for the NRHP as they fail to meet the Criteria for Evaluation listed at 36 CFR Part 60.4 and are not eligible for inclusion in the NRHP.

The historic architectural survey for the proposed TL ROW indicated the presence of one previously documented architectural resource (071-OXF-5312) and identified 28 previously unrecorded properties (designated IS-1 through IS-28). Historical site 071-OXF-5312 is a one-story, bungalow-influenced house built around 1920. Based on the results of the survey, TVA has determined that property 071-OXF-5312 is ineligible for the NRHP due to its lack of architectural distinction and to the loss of historic integrity caused by modern alterations. TVA has also determined that all 28 newly identified properties are ineligible for the NRHP due to loss of historic integrity caused by modern alterations and/or to their lack of historic significance.

In 2017, TVA identified the location of all transmission structures, including those to be secured with guy wires. The majority of guy wire anchors are located within the proposed ROW. However, six of the structures require guy wire anchors located outside the proposed ROW. These off-ROW guy wire anchor locations were not included in the prior surveys. Therefore, TVA performed an archaeological survey of these six locations. Background research indicated that no archaeological sites have been recorded previously within these six locations. TVA's field survey confirmed there are no archaeological sites.

After determining the locations of each transmission structure, TVA was able to identify the access roads by which vehicles and equipment would be moved to and from the ROW during vegetation clearing and construction phases of the project. Access roads are typically 12 to 16-feet wide and may be surfaced with gravel or dirt. TVA included dirt-

surfaced proposed access roads in the undertaking's APE because vehicular traffic and equipment use on dirt roads has the potential to result in ground disturbance. TVA performed an archaeological survey of the proposed access roads in 2017. These access roads total 22.2 miles in length. In addition, TVA re-routed three sections of the proposed ROW in order to resolve landowner objections. This resulted in a 4.1-mile section of newly proposed ROW that was not included in the previous archaeological surveys. TVA included this area in the 2017 survey along with the 22.2 miles of proposed access roads. Background research indicated that no archaeological sites have been recorded previously within this survey area. The TVA survey resulted in the identification of 13 previously unrecorded archaeological sites and seven isolated finds. In addition, two historic cemeteries adjacent to the APE were noted. The survey also included revisits of two archaeological sites (22LA843 and 22YA938) identified during the archaeological survey of the ROW. Based on the results of the survey, TVA determined that the portions of each of these two sites within the project's APE do not meet NRHP eligibility criteria, and all 13 archaeological sites and all seven isolated finds are ineligible for inclusion in the NRHP. TVA did not evaluate the NRHP eligibility of the two cemeteries.

In late 2018, TVA conducted archaeological surveys of the proposed two temporary laydown yards required for worker assembly, vehicle parking, and material storage during construction of the TL. One proposed laydown yard encompasses approximately 5.4 acres and is located in Oxford, Lafayette County; the other encompasses 7 acres and is located in Water Valley, Yalobusha County. Background research indicated that no archaeological sites have been recorded, and no archaeological investigations have taken place, previously in this survey area. The field survey did not result in the identification of any archaeological sites or features. Shovel testing indicated both proposed laydown yards have been previously disturbed by construction related activities.

One late change to the project design consisted of the proposal to use a 0.5-acre area near the Coffeeville Substation for temporary storage of spoil excavated during the proposed substation expansion. Given that the archaeological survey of the substation expansion area in 2016 failed to identify archaeological sites, and historic satellite imagery suggests this area may have been previously disturbed, TVA conducted a reconnaissance survey of this area. The reconnaissance survey included pedestrian survey and excavation of three shovel tests. This investigation failed to identify archaeological sites, and indicated that the proposed spoil storage area has been graded in the past with mechanized equipment.

In summary, TVA's efforts to identify historic properties in the undertaking's APE have included six Phase I archaeological surveys, an archaeological reconnaissance survey, Phase II testing studies of three archaeological sites, and two surveys of historic architectural resources. All the studies have met the guidelines for cultural resources surveys promulgated by the Mississippi SHPO. The studies have included the entire APE, and have failed to identify any NRHP-eligible or NRHP-listed resources in the APE.

3.11 Recreation, Parks, and Natural Areas

This section describes recreational opportunities and natural areas near the proposed TL, ROW, laydown yards, substation expansion, and access roads. Natural areas include ecologically significant sites; federal, state, or local park lands; national or state forests; wilderness areas; scenic areas; wildlife management areas (WMAs); recreational areas; greenways; trails; Nationwide Rivers Inventory streams; and Wild and Scenic Rivers. Managed areas include lands held in public ownership that are managed by an entity (e.g.,

TVA, U.S. Department of Agriculture (USDA), U.S. Forest Service, State of Mississippi, and local counties and municipalities) to protect and maintain certain ecological and/or recreational features. Ecologically significant sites are either tracts of privately owned land that are recognized by resource biologists as having significant environmental resources or identified tracts on TVA lands that are ecologically significant but not specifically managed by TVA's Natural Areas Program. National River Inventory streams are free-flowing segments of rivers recognized by the National Park Service as possessing remarkable natural or cultural values. There is one natural area within the footprint of the TL ROW, and six natural areas with five miles of the project (Figure 3-3).

Springdale Natural Area and WMA would be crossed by the proposed TL along the northern portion of the proposed project. This 1,537 acre area is managed exclusively for deer hunting and is comprised of old river runs, sloughs, high-quality old growth bottomland forests, marshes, and a mixture of hardwood and pine. The site provides critical migration and wintering habitat for waterfowl and other migratory birds. Upper Sardis State WMA is immediately adjacent to the project footprint, located 0.12 miles to the west. At 42,774 acres, Upper Sardis WMA is a popular area for deer and waterfowl hunting.

There are six natural areas within five miles of the proposed project footprint. A small parcel of Holly Springs National Forest, located 0.5 miles northwest of the project footprint, is part of a larger 155,000 acre national forest comprised of upland hardwoods, short leaf pine forests, and unique bottomlands. Two larger parcels of Holly Springs National Forest are located 4.5 miles northeast and 3.8 miles southwest of the project footprint, respectively.

Located 4.5 miles west of the project footprint is Dean Hill Wildlife Management Area at "Wildcat Brake", located on the eastern edge of Enid Lake. This 2,276 acre parcel, managed by the USACE, is a popular hunting spot for deer, squirrel, rabbit, turkey, and duck. Habitats include river runs, sloughs, bottomlands, wetlands, and pine stands.

There are no developed public outdoor recreation areas within the pathway or in the immediate vicinity of the proposed TL project. Some informal recreational activity such as hunting, target practice, nature observation, and walking for pleasure may occur in the vicinity of the proposed TL corridor and associated access roads. There are no developed outdoor recreation areas in the vicinity of the proposed expansion site. Because the expansion area is small and is immediately adjacent to an existing substation facility, it is unlikely that any dispersed recreation use occurs on the site.

Figure 3-3 Natural Areas within 5 Miles of the Proposed Transmission Line

3.12 Socioeconomics and Environmental Justice

The proposed TL would fall within five census tracts that consist of seven block groups as shown in Figure 3-4. According to the U.S. Census Bureau American Community Survey (ACS) 2012-2016 5-year estimates, the population of Lafayette and Yalobusha counties is 52,193 and 12,380, respectively. The combined population of the six block groups within the project area is 10,522. The estimated percentage of black or African American populations vary widely in the project area from 4.4 percent in Block Group 2 (Census Tract 9505.03) located south of Oxford in Lafayette County, to 57.6 percent in Block Group 1 (Census Tract 9502) located in the city of Water Valley in Yalobusha County. The percentage of Hispanic or Latino individuals is comparable throughout the project area ranging from 0 to 5.9 percent. Block Group 1(Census Tract 9502.02) has a slightly higher percentage of Hispanic or Latino individuals than Lafayette County and the State of Mississippi.

Economic conditions for the block groups within the project area vary in comparison to their respective counties and the state of Mississippi (Table 3-6). Block Group 1 (Census Tract 9502) and Block Group 4 (Census Tract 9502), located in Yalobusha County, have lower per capita income, lower median household income, and significantly higher poverty levels than the county, the state, and surrounding block groups in the project area. Similarly, Block Group 1 (Census Tract 9502.02), located in Lafayette County, has a lower per capita income, lower median household income, and a higher poverty level than the county and the state. The remaining block groups in the project area are more reflective of the economic conditions in their respective counties and the state.

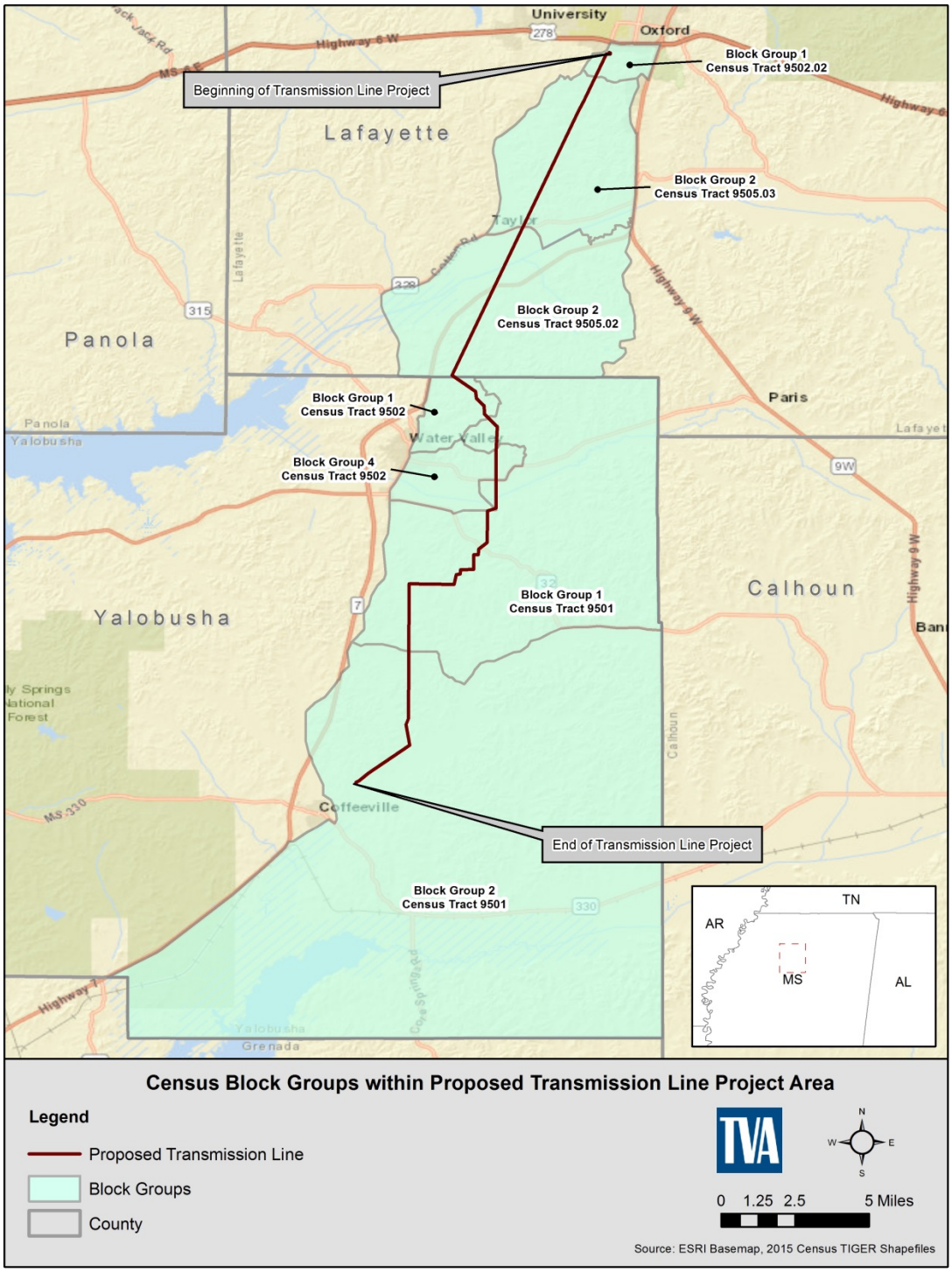

Figure 3-4 Census Block Groups within Proposed Transmission Line Project Area

Table 3-4 Socioeconomic and Demographic Conditions in Lafayette and Yalobusha Counties, Mississippi

Demographic Characteristic	Block Group 1, Census Tract 9501	Block Group 2, Census Tract 9501	Block Group 1, Census Tract 9502	Block Group 4, Census Tract 9502	Block Group 1, Census Tract 9502.02	Block Group 2, Census Tract 9505.02	Block Group 2, Census Tract 9505.03	Lafayette County	Yalobusha County	Mississippi
Estimated population	1,062	1,094	832	1,136	2,887	1,276	2,235	52,193	12,380	2,989,192
Black or African American population	30.3%	18.3%	57.6%	35.7%	21.0%	12.6%	4.4%	24.0%	39.9%	37.5%
Hispanic or Latino	-	2.3%	-	0.7%	5.9%	0.2%	3.4%	2.4%	1.5%	2.9%
White (excluding Hispanic or Latino)	69.7%	81.0%	42.4%	62.4%	77.7%	87.0%	92.4%	72.2%	58.7%	59.0%
Per capita income	$18,599	$21,185	$13,107	$14,311	$17,979	$21,671	$21,671	$23,833	$18,802	$21,651
Median household income	$36,397	$34,271	$22,344	$20,313	$23,310	$47,969	$40,417	$43,162	$34,749	$40,528
Below poverty level	22.0%	16.9%	33.3%	43.9%	44.4%	19.9%	18.4%	25.3%	21.6%	22.3%

Source: U.S. Census Bureau, 2012-2016 American Community Survey 5-Year Estimates

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CHAPTER 4

4.0 ENVIRONMENTAL CONSEQUENCES

The potential effects of adopting and implementing the No Action Alternative and the Action Alternative on the various resources described in Chapter 3 were analyzed, and the findings are documented in this chapter. The potential effects are presented below by resource in the same order as in Chapter 3. Cumulative effects are discussed, as appropriate and necessary, under the respective resource areas.

4.1 No Action Alternative

As stated in Section 2.1.1, under the No Action Alternative, TVA would not construct the proposed TL or expand its existing substation to improve the existing power supply in an area of northern Mississippi. As a result, no property easements for locating the proposed TL would be purchased by TVA, and the proposed transmission facilities would not be built. TVA would continue to supply power to the power service area of northern Mississippi under the current conditions. TVA would also not expand the Coffeeville-161-kV Substation or complete the related project associated activities.

Because the proposed construction, operation, and maintenance of the new TL facilities and substation expansion would not occur under the No Action Alternative, no direct effects to those environmental resources listed in Chapter 3 are anticipated. However, changes to the project area and resources in this area may occur over time, independently of TVA's actions, due to factors such as population increases, changes in land use, and development in the area. These changes are not expected to be the result of implementing the No Action Alternative.

Under the No Action Alternative, a future decline in the reliability of electric service for some customers would be likely. Service problems and interruptions likely would gradually become more frequent and more severe. These outages would have negative impacts on the ability of businesses in the area to operate. Residents of the area would also incur negative impacts from outages, such as more frequent loss of power for household heating or cooling, as well as other activities such as cooking or clothes washing. These conditions would clearly diminish the quality of life for residents in the area and would likely have negative impacts on property values in the area. Any such impacts would negatively affect all populations in the region.

4.2 Action Alternative

4.2.1 Groundwater and Geology

Under the Action Alternative, the proposed TL, laydown yards, and substation expansion construction activities have the potential to impact groundwater. Site clearing and grading for structures and access roads could cause erosion, resulting in the movement of sediment into springs or groundwater infiltration zones. BMPs would be used to control sediment infiltration from storm water runoff.

Portions of the proposed ROW are located within State-Designated Source Water Protection Areas for public water supply. 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, herbicides used during clearing and subsequent vegetation management activities have the potential to enter groundwater. Some herbicides break down quickly while others may persist in groundwater. Use of fertilizers and herbicides would be considered with caution before application and applied according to the manufacturer's label. TVA's BMPs for herbicide and herbicide-related fertilizer application would also be used to prevent impacts to groundwater.

The use of petroleum fuels, lubricants, and hydraulic fluids in construction and maintenance vehicles could result in the potential for small on-site spills. However, the use of BMPs to properly maintain vehicles to avoid leaks and spills and procedures to immediately address any spills that did occur would minimize the potential for adverse impacts to groundwater.

With proper implementation of the appropriate BMPs during construction, operation, and maintenance of the proposed TL and substation expansion, potential direct and indirect effects to groundwater under the Action Alternative would be insignificant. No cumulative impacts are anticipated.

4.2.2 Surface Water

Soil disturbances associated with ROW clearing and site grading for structures, access roads, or other construction, maintenance, and operation activities can potentially result in adverse water quality impacts. Soil erosion and sedimentation can clog small streams and threaten aquatic life. Removal of the tree canopy along stream crossings can increase water temperatures, algal growth, and dissolved oxygen depletion, and cause adverse impacts to aquatic biota. Improper use of herbicides to control vegetation could result in runoff to streams and subsequent aquatic impacts.

To minimize such impacts, appropriate soil erosion prevention BMPs would be followed, 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. Coverage under the small or large construction storm water general permit would be required if the project disturbs more than one acre (small) or more than five acres (large). These permits also require the development and implementation of a storm water pollution prevention plan (SWPPP). This SWPPP would identify specific BMPs to address construction-related activities that would be adopted to minimize storm water impacts. Additional BMPs, as described in *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority* (TVA 2017b), would be used to avoid contamination of surface water in the project area. A USACE Section 404 and State 401 Water Quality Certification would be obtained, as necessary, for stream alterations or crossings located within the project area.

The expansion of the substation would require 460 linear feet of an intermittent stream (unnamed tributary to Turkey Creek) to be disturbed and relocated. Efforts were made during the TL siting process to avoid or minimize streams identified via desktop review. However, due to location requirements and configuration of the existing substation, there was no practicable alternative that would allow for complete avoidance of the stream. Efforts were taken to minimize impacts to the stream by reducing the substation expansion footprint (see Section 2.2.16). TVA would adhere to the conditions of the USACE and

MDEQ permits for this action. The proposed relocated stream would be longer than the existing stream; therefore, there would be "no net loss" and no mitigation would be necessary. See Appendix C for stream crossing details.

TVA routinely includes precautions in the design, construction, and maintenance of its TL projects to minimize 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's BMP manual (2017b). ROW maintenance would employ manual and low-impact methods wherever possible. Proper implementation of these controls and mitigation measures identified in the permitting process are expected to result in only minor temporary impacts to surface waters. No cumulative impacts are anticipated.

Additionally, impervious infrastructure prevents rain from percolating through the soil and results in additional runoff of water and pollutants into storm drains, ditches, and streams. Because the steel transmission poles and substation expansion have relatively small footprints, the construction would not significantly impact impervious surface area. All flows would need to be properly treated with either implementation of the proper BMPs or an engineered discharge drainage system that could handle any increased flows.

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. Equipment washing and dust control discharges would be handled in accordance with BMPs described in the SWPPP for water-only cleaning.

Improper use of herbicides to control vegetation could result in runoff to streams and subsequent aquatic impacts. Therefore, any pesticide/herbicide use as part of construction or maintenance activities would comply with the MDEQ general permit for application of pesticides, which also requires a pesticide discharge management plan. In areas requiring chemical treatment, only USEPA-registered and TVA approved- herbicides would be used in accordance with manufacturers' 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 to surface waters. No cumulative impacts are anticipated.

4.2.3 Aquatic Ecology

Aquatic life could potentially be affected by the proposed Action Alternative from storm water runoff resulting from construction, operation, and maintenance activities along the TL ROW or the proposed intermittent stream relocation associated with the substation expansion. Impacts could either occur directly from alteration of habitat conditions within the stream (or from relocation activities) or indirectly due to modification of the riparian zone. The aquatic community within the streams located within the project area would potentially be negatively impacted from overland flow, changes in water temperatures, and potentially short-term destabilization of the stream banks due to removal of forest canopy and streamside vegetation. The proposed stream relocation would have minor impacts on aquatic life since intermittent streams are dry for portions of the year and any aquatic animals including fish and macroinvertebrates would repopulate the newly relocated stream in a similar fashion as it would the existing stream.

Potential impacts from removal of streamside vegetation within the riparian zone may include: increased erosion and siltation, loss of instream habitat, and increased stream temperatures. Storm water runoff from construction and maintenance activities along the TL corridor could transport herbicides affecting water quality or affect instream habitat conditions through sedimentation. Other potential effects resulting from construction and maintenance activities include alteration of stream banks and stream bottoms by heavy equipment. 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 which could be affected by the proposed TL route would be protected by standard BMPs as identified in TVA's BMP manual (TVA 2017b) and/or standard storm water permit requirements. These BMPs are designed in part to minimize disturbance of riparian areas and subsequent erosion and sedimentation that can be carried to streams.

TVA would also implement additional protection measures to watercourses directly affected by the Action Alternative based on the variety of species and habitats that exist in the streams, as well as the state and federal requirements to avoid harming certain species. 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 USACE Section 404 and 401 permits would be obtained, as necessary, for stream alterations located within the project area, and the terms and conditions of these permits would be followed in addition to guidelines outlined in TVA's BMP manual (TVA 2017b). A total of 49 watercourses were assigned Category A (standard stream protection) SMZs, as defined in TVA's 2017 BMP manual (see Appendix C). This standard (basic) level of protection for streams and the habitats around them is designed to minimize the amount and length of disturbance to the water bodies without causing adverse impacts on the construction work.

Because appropriate BMPs and SMZs would be implemented during construction, operation, and maintenance activities, any direct or indirect effects to aquatic ecology would be temporary minor, and insignificant as a result of implementing the proposed Action Alternative. No cumulative impacts are anticipated.

4.2.4 Vegetation

Implementation of the Action Alternative would require the clearing of approximately 213 acres of forest in the proposed ROW area and some access roads. Such ground-disturbing activities would directly affect the existing plant communities in these areas. Additionally, vegetation management along the ROW would be necessary following construction to prevent tall, woody vegetation from becoming established within the ROW. Therefore, the type of vegetative cover that occurs on the ROW would be directly affected.

Converting forested land to managed ROW for construction of the proposed TL would be long-term in duration, but insignificant. As of 2015, there were well over 1,900,000 acres of forested land in Lafayette and Yalobusha and the surrounding Mississippi counties (USFS 2016). Cumulatively, project-related effects to forest resources would be negligible (0.0001 percent) when compared to the total amount of forested resources occurring in the region. While project-related TL work would temporarily affect herbaceous plant communities,

these areas would likely recover to their pre-project condition in less than one year. The forested and herbaceous communities currently found on the substation expansion site would be permanently converted to gravel, but these areas do not support unique plant communities.

The majority of the project area has 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. Some areas of the mature deciduous forest currently have low concentrations of invasive plants. Disturbance associated with TL construction, operation and maintenance would likely promote increases of invasive plant species in these areas. The use of TVA standard operating procedure of vegetating with noninvasive species (TVA 2017b) would serve to minimize the potential introduction and spread of invasive species in the project area.

Almost all of the forests within the footprint of the proposed ROW area have been previously cleared. Plant communities found within the proposed ROW and substation expansion site are common and well represented throughout the region. No unique plant habitats possessing conservation value would be negatively impacted by construction, operation, and maintenance of the new TL or substation expansion. Adoption of the proposed Action Alternative would not significantly affect the terrestrial plant ecology of the region. Cumulative effects of the project on common plant communities are expected to be negligible.

4.2.5 Wildlife

Under the Action Alternative, TVA would construct the proposed TL, associated access roads, and substation expansion. TVA would clear some or all of the 104 acres of early-successional, herbaceous habitat (pastures, cultivated fields, residential areas). In many areas, the TL would span agricultural and developed areas. Impacts to wildlife habitat would thus be limited to locations where the structures would be established. Ground disturbance would occur in these areas. Any wildlife (primarily common, habituated species) currently using these heavily disturbed areas 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 these actions.

Approximately 213 acres of forest would be removed and then permanently maintained as early successional habitat for the life of the TL. Direct effects to some individuals that may be immobile during the time of construction may occur, particularly if construction activities took place during breeding/nesting seasons. However, the actions are not likely to affect populations of species common to the area, as similar forested and herbaceous habitat exists in the surrounding landscape.

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. 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. The landscape on which the project occurs is already highly fragmented and impacted by human activity (i.e. forestry practices, agricultural fields, residential homes, farm ponds and roads). Thus it is unlikely that species currently occupying adjacent habitat would be negatively impacted by the influx of new residents. Further, it is expected that over time those species that utilize early successional habitat would return to the project area upon completion of construction.

Several local species benefit from disturbance. Construction of the ROW could create habitat for several mammals and birds. American robin, Carolina chickadee, blue jay, eastern cottontail, eastern towhee, gray catbird, house finch, house sparrow, northern cardinal, northern mockingbird, raccoon, song sparrow, tufted tit-mouse, Virginia opossum, white-tailed deer, and white throated sparrow are just a few of the species known to thrive in highly disturbed areas.

Cumulative effects of the project on common wildlife species are expected to be negligible. Most of the proposed TL footprint has previously been heavily impacted by agriculture and timber sales, leaving only small areas of natural, undisturbed vegetation. Proposed actions across the ROW would remove existing forested habitat for common wildlife. Following completion of the project, the ROW would be maintained as early successional herbaceous fields which would provide habitat for several common wildlife species that utilize early successional fields and agricultural/developed areas.

4.2.6 Endangered and Threatened Species

4.2.6.1 Aquatic Animals

As discussed in Sections 4.2.2 and 4.2.3, changes to water quality resulting from the implementation of the Action Alternative could have direct and indirect impacts to aquatic biota within watercourses in the project area. These effects could occur either directly by the alteration of habitat conditions or indirectly due to modification of riparian zones and storm water runoff resulting from construction activities associated with the vegetation removal efforts. Potential impacts due to the removal of streamside vegetation within the riparian zone include increased erosion and siltation, loss of in-stream habitat, and increased stream temperatures. Other potential construction impacts include alteration of stream banks and stream bottoms by heavy equipment and runoff of herbicides into streams.

No federally or state-listed aquatic species or DCH are known to occur within the watershed potentially affected by the proposed TL route, laydown yards, and substation expansion, or within Lafayette and Yalobusha counties or a 10-mile radius of the proposed project. Therefore, no direct, indirect, or cumulative impacts to federally or state-listed as threatened and endangered aquatic species are expected to occur under the Action Alternative.

4.2.6.2 Plants

Implementation of the Action Alternative would not affect federally or state-listed plants, or DCH, because neither occurs in the project area. No protected plant species were observed during surveys of the TL ROW, access roads and substation expansion site. Therefore, no direct, indirect, or cumulative impacts on endangered and threatened species and their critical habitats are anticipated as a result of implementing the Action Alternative.

4.2.6.3 Terrestrial Animals

Three federally or state-listed terrestrial animal species (red salamander, mole kingsnake, and wood stork) were assessed based on documented presence within three miles of the project footprint. Three additional federally listed species were addressed based on presence within Lafayette or Yalobusha counties (bald eagle, red-cockaded woodpecker) or the potential for the species to occur in the project footprint (NLEB). All six of these species have the potential to utilize the project area.

No suitable habitat for red-cockaded woodpecker is present in the project footprint; therefore, this species would not be affected under this alternative. Red salamander and mole kingsnake may utilize riparian, wooded, and open habitats within the project footprint. Construction activities may affect some individuals and cause the loss of wooded habitat. However ample amounts of similar habitat exist in the surrounding landscape. The use of vehicles and equipment within SMZs would be conducted using BMPs (TVA 2017b) to minimize impacts to water bodies within the affected area. This project would not impact populations of red salamander or mole kingsnake.

Suitable nesting and marginal foraging habitat for bald eagle exists within the project area. One bald eagle nest is known approximately 9.2 miles from the project footprint, but has not been observed since 1993. No additional nests or individuals are known from the project footprint and none were observed during field surveys in April 2017 or March 2018 when active nesting behavior would have been apparent. No suitable foraging or breeding habitat for wood storks was observed during field surveys. BMPs (TVA 2017b) would be used to minimize impacts to water bodies within the affected area, thus neither bald eagle nor wood stork foraging habitat would be impacted by the proposed actions. Impacts to bald eagle and wood stork are not anticipated in association with the proposed actions.

No caves or other winter hibernacula for NLEB exist in the project footprint or would be impacted by the proposed actions. However, suitable foraging habitat does exist for this species over ponds, streams, and wetlands within the proposed ROW. BMPs (TVA 2017b) would be utilized in SMZs around these bodies of water, thus minimizing sedimentation and avoiding any changes to hydrology. Additional foraging habitat for NLEB exists along fence rows and within forest fragments. This foraging habitat would be removed in association with the proposed actions, however similarly suitable foraging habitat is plentiful in the surrounding landscape and would be created by the ROW corridor.

Summer roosting habitat surveys were performed in April 2017 and March 2018. During these surveys, 238 suitable roost trees were identified across 21 forest fragments along the proposed ROW. Suitability was determined based on the high number of white oaks and other trees with exfoliating bark, snags, cavity trees and their proximity to water sources. A total of 75.9 acres of suitable summer roosting habitat for NLEB would be removed for the proposed ROW. As part of TVA's ESA programmatic biological assessment for bats, TVA programmatically quantified and minimized removal of potentially suitable summer roosting habitat during the time of potential occupancy by NLEB. There are no records of NLEB within 10 miles of the proposed actions. Accordingly, TVA would track and document the removal of potentially suitable summer roost trees and include this information in annual reporting in accordance with Section 7(a)(2) consultation. Additionally, if removal of suitable bat roost tree habitat needs to occur when bats may be present on the landscape, TVA would conduct mist net surveys and/or set aside funding to be applied towards future bat-specific conservation projects in accordance with the programmatic biological assessment for bats.

A number of activities associated with the proposed action, including tree clearing, were addressed in TVA's programmatic biological assessment for evaluating impacts of routine actions on federally listed bats in accordance with ESA Section 7(a)(2) (TVA 2017). For those activities with the potential to affect federally listed bats, TVA committed to implementing specific conservation measures. Therefore, direct and indirect impacts to federally listed bat species are expected to be minor. These activities and associated conservation measures are identified in TVA's Bat Strategy Project Screening Form

(Appendix B). This form will be updated as needed depending on the project clearing schedule.

4.2.7 Floodplains

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

Under the proposed Action Alternative, the proposed TL and access roads would be constructed. Portions of the TL would cross the 100-year floodplains of several streams in Lafayette and Yalobusha counties. Efforts were made during the siting process to avoid or minimize impacts to floodplains per EO 11988. However, because of other social, environmental, and engineering factors considered in the siting process, as described in Section 2.3, there was no practicable alternative that would allow for complete avoidance of floodplains, or minimization of potential floodplain impacts.

Consistent with EO 11988, overhead TLs and related support structures are considered to be repetitive actions in the 100-year floodplain. The support structures for the TL would not be expected to result in any increase in flood hazard, either as a result of increased flood elevations or changes in flow-carrying capacity of the streams being crossed. The conducting wires of the TL would be located well above the 100-year elevation.

Portions of ten access roads would be located within 100-year floodplains. Consistent with EO 11988, roads are considered to be repetitive actions in the 100-year floodplain. To minimize adverse impacts, any road construction or improvements would be done in such a manner that upstream flood elevations would not be increased. The proposed two laydown yards would be located outside the 100-year floodplains, which would be consistent with EO 11988.

The proposed substation expansion would require the relocation of an intermittent stream. The Federal Emergency Management Agency Flood Insurance Rate Map does not show a 100-year floodplain in this tributary. For compliance with EO 11988, stream relocations are not considered to be repetitive actions in the floodplain. There is no practicable alternative to relocating the stream, because the substation already exists, and there is no other space on the substation parcel for the expansion to occur. The watershed of the tributary at the substation is about 0.4 square miles. The stream relocation would be consistent with EO 11988 provided adverse impacts would be minimized. Adverse impacts to floodplains would be minimized by adherence to regulations applicable to stream relocations.

Construction in the floodplain would be consistent with EO 11988 provided the TVA subclass review criteria for TL location in floodplains are followed. 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

- Construction would adhere to the siting, design, construction, and mitigation methods outlined in the TVA subclass review for TL location in floodplains

- Road construction or improvements would be done in such a manner that upstream flood elevations would not be increased

- The relocation of the stream associated with the substation expansion would be conducted in accordance with applicable stream relocation regulations

Based upon implementation of the above standard mitigation measures, the proposed Oxford-Coffeeville 161-kV TL, access roads and substation expansion would have no significant impact on floodplains.

4.2.8 Wetlands

Activities in wetlands are regulated under Section 401 and 404 of the CWA and are addressed by EO 11990 (Protection of Wetlands). Section 401 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. EO 11990 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.

Under the Action Alternative, the TL would be constructed, TVA's Coffeeville substation would be expanded, and associated access roads would be used or temporarily improved/built for use during construction (see Section 2.2 for descriptions of the methods for construction, operation, and maintenance of the TL, ROW, and access road actions). Efforts were made during the TL siting process to avoid or minimize wetlands identified via desktop review. However, because of other social, environmental, and engineering factors considered in the siting process, as described in Section 2.3, there was no practicable alternative that would allow for complete avoidance of wetlands, or minimization of wetland impacts identified during ground surveys.

A total of 11.08 acres of wetlands are located within the proposed ROW, of which 6.13 acres contain woody vegetation comprised of 5.22 acres of forest and 0.91 acre of scrub-shrub wetland habitat. As described in Section 2.2.2.2, establishing a TL corridor requires tree clearing within the full extent of the ROW, and future management of low-stature vegetation to accommodate clearance and abate interference with overhead wires. As such, emergent wetlands typically experience temporary impacts during construction, but recover relatively quickly. The TL conductors span these wetlands; therefore, the existing functional capacity would be maintained long-term. The woody vegetation in forested and scrub-shrub wetland areas within the proposed ROW would initially be cleared, and the habitat would be permanently converted to emergent wetlands for the perpetuity of the TLs existence. Therefore, a total of 6.13 acres of wetland vegetation would be permanently converted to emergent wetlands during ROW and TL construction. No wetlands were identified on the substation expansion site.

The 0.91 acre of scrub-shrub wetland acres is considered moderate quality. The forested wetland acreage is comprised of 1.77 acres moderate quality forested wetlands and 3.45 acres superior quality forested wetlands. The existing suite of functions and values

provided by moderate quality wetlands are expected to diminish somewhat with the removal of woody vegetation. Moderate quality scrub-shrub or forested wetlands within the project footprint already have experienced some level of disturbance to their habitat. However, landscape position, hydrologic influence, size, and/or intact upland buffers drive the moderate level of function and value these wetlands provide. Although some functional loss from habitat conversion would occur, the other factors would remain intact and support continued wetland function provided by the unaltered hydrologic and geomorphic attributes.

The high functions and values provided by the 3.45 acres of superior quality forested wetland area is expected to incur a greater functional loss, considering their existing superior condition. This includes the clearing and permanent (for the life of the TL) habitat conversion across 0.13 forested acre in W015 and 3.32 forested acres in W018. W015 extends northwest of the ROW to cover approximately 15 acres; and, W018 comprises 3.32 acres of a wetland complex anticipated to cover over 50 acres. These superior quality wetland areas contain mature forest with greater vegetative mass providing increased value for improved water quality. Therefore, habitat conversion within these 3.45 acres of superior quality forested wetland is anticipated to diminish the existing functions and values to a greater extent than the affected lesser quality wetlands. However, similar to moderate quality forested wetlands, other factors feed the superior functionality of these 3.45 forested wetland acres, including landscape position, hydrologic influence, size, and/or intact buffers. These other factors would remain unaffected by the TL ROW.

TVA would minimize wetland disturbance by performing no mechanized clearing in wetlands, using low ground-pressure equipment, or using mats during clearing and construction activities to minimize rutting to less than 12 inches to reduce soil disturbance. TVA would adhere to wetland BMPs (TVA 2017b) for any and all other work necessary within the delineated wetland boundaries. Wetland habitat within the ROW located in areas proposed for heavy equipment travel would experience minor and temporary impacts during TL construction. Vehicular traffic would be limited to narrowed access corridors along the ROW for structure and conductor placement. Similarly, potential structure placement in wetlands can be conducted within the parameters and meet the conditions of an approved USACE permit. Fill associated with pole placement in wetlands is generally considered to be minimal with nominal adverse effects on the larger wetland's functional capacity.

Under the CWA, the USEPA and USACE are tasked to ensure maintenance of the chemical, physical, and biological integrity of the nation's waters, including wetlands. The USACE has the discretionary authority to require special conditions be in place, such as but not limited to mitigation, to ensure the proposed wetland degradation is no more than minimal. Therefore, TVA would comply with all regulatory requirements set forth by the USACE to ensure the proposed forested wetland conversion results in less than minimal adverse impacts to the aquatic environment so that the objective of the CWA is met.

Cumulative impact analysis of wetland effects takes into account wetland loss and conversion at a watershed scale currently and within the reasonable and foreseeable future. Forested wetland conversion resulting from the proposed ROW and access road construction would result in less than 0.01 percent change in existing forested wetland extent within the larger sub-basins, Yocona River and Yalabusha River, based on estimates from office-level resources. Forested wetland conversion across the four sub-watersheds within these two sub-basins would result in a range of less than 0.6 percent change in the estimated forested wetland extent (Table 4-1).

Table 4-1 Forested Wetland Conversion by Watershed Within the Project Area

Sub-Basin (8-HUC) and Nested Sub-Watersheds (12-HUC)	Estimated[1] % Total Wetland Cover	Estimated* % Woody[2] Wetland Cover	Estimated* % Woody Wetland Conversion
Yocona River (08030203)	4.0%	2.7%	0.002%
Murray Creek-Yocona River (080302030107)	1.0%	0.7%	0
Taylor Creek-Yocona River (080302030301)	5.5%	4.3%	0.001%
Johnson Creek-Otoucalofa Creek (080302030203)	4.3%	2.7%	0.6%
Yalobusha River (08030205)	6.1%	5.9%	0.0001%
Moreland Creek-Turkey Creek (080302050306)	1.8%	1.5%	0.4%

[1]Based on NWI mapped cover
[2]Woody Wetland Cover combines forested and scrub-shrub wetland area

Studies have shown that large watersheds, such as the Yocona River and Yalobusha River sub-basins, should contain 3 to 7 percent total wetland cover to provide sufficient flood control and water quality benefits for the surrounding landscape (Mitsch and Gosselink 2000). This percentage does not distinguish between wetland habitat types. Regardless, the percent of forested wetland conversion proposed would not reduce the estimated existing forested wetland extent within either sub-basin. In addition, forested wetland conversion does not constitute wetland loss. The functions and values associated with a forest's water storage, uptake, assimilation, filtration, and transpiration of storm water runoff would be provided at the reduced level facilitated by lower stature vegetation. The proposed wetland impacts would be insignificant on a cumulative scale due to the avoidance and minimization measures in place, under the CWA and the directives of USEPA and USACE, which are designed to ensure no net loss of wetland resources. Similarly, future construction within the watershed would be subject to CWA, USEPA, USACE, and MDEQ regulations, such that any potential future impacts to wetlands would not result in a cumulative loss. Therefore, in accordance with the CWA no-net-loss of wetland resources mandate, no cumulative wetland impacts are anticipated as a result of the proposed Action Alternative.

In compliance with the CWA and EO 11990, TVA's siting procedure and alternative selection, as stated in Section 2.1, has identified no practicable alternative to the proposed Action Alternative and its associated wetland impacts. As a result of avoidance and minimization of mapped wetland resources, compliance with all federal and state wetland regulations, and the proposed BMPs in place during construction, maintenance, and operation, the project would have no significant adverse direct, indirect, or cumulative impacts to wetland areas or to the associated wetland functions and values provided within the general watersheds.

4.2.9 Aesthetics

Visual consequences were examined in terms of visual changes between the existing landscape and proposed actions, sensitivity of viewing points available to the general public, their viewing distances, and visibility of proposed changes.

Visual Resources

The visual attributes of existing scenery, along with the anticipated attributes resulting from the proposed action, are reviewed and classified in the visual analysis process. The classification criteria are adapted from a scenic management system developed by the USFS and integrated with planning methods used by TVA. The classifications are based

on methodology and descriptions from the USDA (1995) and TVA (2003). Sensitivity of viewing points available to the general public, their viewing distances, and visibility of proposed changes are also considered during the analysis. Scenic integrity indicates the degree of intactness or wholeness of the landscape character. These measures help identify changes in visual character based on commonly held perceptions of landscape beauty, and the aesthetic sense of place. The foreground, middle ground, and background viewing distance parameters were previously described in Section 3.9.1.

Transmission structures tend to be the most visible element of the electric transmission system. The addition of lines on or near existing structures or ROW increases compatibility with the landscape and minimizes impacts. The proposed TL would be visible to motorists on SR 328, SR 7, SR 315/Blackmur Drive, and U.S. Highway 32 at the locations where the line crosses the roads. Along most of the TL route, the view from local highways and roads would be limited by the natural density of the tree growth near the road alignments. The presence of existing TLs increases the visual compatibility for the construction of a new TL and prevents significant changes to the viewshed, particularly for Rocky Mount Church and Cemetery and Gray Rock Church, as an existing TL runs parallel to these facilities. Similarly, the proposed TL would largely avoid disruptions to the scenery and landscape for local residents and facilities by traveling through forested, undeveloped land for the majority of the project's length.

Operation, construction, and maintenance of the proposed TL would cause minor visual effects. There may be some minor cumulative visual discord during the construction period due to an increase in personnel and equipment and the use of laydown and materials storage areas. These minor visual obtrusions would be temporary until the ROW and laydown yards have been restored through the use of TVA standard BMPs. Therefore, any direct, indirect, or cumulative visual impacts anticipated as a result of implementing this project would be temporary and minor.

Noise and Odors

During construction of the proposed TL, equipment could generate noise above ambient levels. Because of the short construction period, noise-related effects are expected to be temporary and minor. For similar reasons, noise related to periodic TL maintenance is also expected to be insignificant. TLs may produce minor noise during operation under certain atmospheric conditions. Off the ROW, this noise is below the level that would interfere with speech.

4.2.10 Archaeological and Historic Resources

For NRHP-listed or eligible archaeological resources located in the APE, project effects could result from vegetation clearing, construction, maintenance, and operation of the proposed TL and substation expansion. These effects could include compaction from heavy equipment, the mixing of stratigraphic layers, displacement and removal of artifacts and features due to ground disturbance, and looting or vandalism stemming from the increased exposure of archaeological deposits due to vegetation clearing.

As a federal agency TVA is required to consult with the SHPO, federally-recognized Indian Tribes with an interest in the APE, and any other parties that may have a vested interest in a federal undertaking. TVA's efforts to identify historic properties in the undertaking's APE included six Phase I archaeological surveys, an archaeological reconnaissance survey, Phase II testing studies of three archaeological sites, and two surveys of historic architectural resources. With one exception, for each of the above-listed cultural resources

investigations, TVA completed consultation with the Mississippi SHPO and federally-recognized Indian Tribes (Appendix A) and took their comments into consideration. These consulting parties have agreed with TVA's determinations regarding the NRHP eligibility of all cultural resources identified in the APE and that the proposed undertaking would result in no effects on historic properties. Should any archaeological sites or human remains be inadvertently discovered during implementation of the undertaking TVA would again consult with the Mississippi SHPO and Indian Tribes and would take their comments into consideration.

With regard to the proposed spoil storage area adjacent to the Coffeeville Substation, TVA has initiated consultation with the Mississippi SHPO and federally-recognized Indian Tribes regarding the finding of "no historic properties;" comments are pending. TVA would not perform any activities within the proposed spoil storage area prior to receiving final concurrence from the Mississippi SHPO and federally-recognized Indian Tribes.

4.2.11 Recreation, Parks, and Natural Areas

The proposed TL would cross the Springdale Natural Area and WMA and would be immediately adjacent to Upper Sardis State WMA. A total of 0.3 miles of ROW would cross Springdale Natural Area and WMA. The majority of the ROW (2.5 acres) would transect an existing agricultural field and would not require any tree clearing. The proposed ROW would only cause minimal disturbances as TVA would use appropriate BMPs and only clear a small section, 0.3 acre, of currently forested habitat. Because Springdale Natural Area and WMA is exclusively managed for hunting, the scheduling of tree clearing would be arranged with the land manager to ensure minimal conflicts with hunting activities. The remainder of the natural areas are of sufficient distance (0.5 miles to 5 miles) from the project site that the proposed actions are not anticipated to impact these natural areas. Therefore, no significant direct or indirect impacts to natural areas would occur under the Action Alternative.

Implementation of the Action Alternative could cause some minor shifts in current hunting activity as well as other dispersed recreation activity that may currently occur in the vicinity of the project. However, the extent of these impacts should be minor and insignificant. The substation expansion site is small and would be immediately adjacent to the existing substation; no impacts on any dispersed recreation activities in the general area of the site would be expected.

4.2.12 Socioeconomics and Environmental Justice

Under the Action Alternative, TVA would purchase easements from private landowners to construct the proposed TL. Those easements would give TVA the right to locate, operate, and maintain the TL across the property owner's land (see Section 2.2.1.1). In certain cases, TVA may be required to acquire ownership in a property. In either case, current landowners would be compensated for the value of such rights or properties. Nonetheless, the direct local economic effect from the purchase of any additional property or ROW easements would be minor.

Virtually the entire ROW would cross forested lands; and developed areas have been avoided to the greatest extent possible. However, any effects to residential property values are expected to be minor.

Implementing the proposed Action Alternative would provide power for growing load and increase power reliability for an area of northern Mississippi served by TVEPA and

NEMEPA. Therefore, there could be long-term indirect economic benefits to the area. As shown in Table 3-6, Yalobusha County, which contains over half of the proposed TL route, has lower per capita income, lower median household income, and higher poverty levels than the state average. Block Group 1(Census Tract 9502) located in the city of Water Valley in Yalobusha County, also has a larger population of black or African American individuals than surrounding block groups and the state. Implementation of the Action Alternative, including the construction, operation and maintenance of the proposed TL and upgrades to existing substation, is not expected to disproportionately affect any economically disadvantaged or minority populations.

4.2.13 Post-construction Effects

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 TL generates an electric field that occupies the space between the conductors and other conducting objects such as the ground, TL 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 TL, and the distance from the TL.

The fields from a TL 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 TL 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 TL 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 TL 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 TLs, such as the proposed 161-kV TL, may produce an audible low-volume hissing or crackling noise (Appendix E). 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 TL, no longer interfere (JAMA 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 (WHO 2007a). Effects associated with ungrounded, metallic objects' static charge accumulation and with discharges in dairy facilities have been found when the connections from a distribution line meter have not been properly installed on the consumer's side of a distribution circuit.

There is some public concern as to the potential for adverse health effects that may be related to long-term exposure to EMF. A few studies of this topic have raised questions about cancer and reproductive effects on the basis of biological responses observed in cells or in 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., AMA 1994; National Research Council 1997; NIEHS 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 World Health Organization (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 (IARC 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 TLs. 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 (AMA 1994; DOE 1996; NIEHS 1998).

Although no federal standards exist for maximum EMF strengths for TLs, 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 TLs 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 TL 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 TL. The strength of the fields within and near the ROW varies with the electric load on the TL and with the terrain. Nevertheless, EMF strength attenuates rapidly with distance from the TL 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.

Lightning Strike Hazard

TVA TLs 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 TL, for at least the width of the ROW. NESC standards are strictly followed when installing, repairing, or upgrading TVA TLs or equipment. TL structures are well grounded, and the conductors are insulated from the structure. Therefore, touching a structure supporting a TL poses no inherent shock hazard.

Transmission Structure Stability

The structures that would be used on the proposed TL are similar to those shown in Section 2.2.1.4 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.

4.3 Long-term and Cumulative Impacts

The presence of the TL would present long-term visual effects to the mostly rural/undeveloped character of the local areas. However, because the route of the proposed TL would traverse mainly rural portions of Lafayette and Yalobusha counties with few residences, the TL would not be especially prominent in the local landscape. Likewise, the establishment of easements for the proposed ROW with local landowners would not

pose a long-term encumbrance on the affected properties. Various agricultural land uses could be practiced within the ROW, but any timber production within the ROW would be foregone for the life of the TL.

The increase in power supply is one factor in improving the overall infrastructure in the local area, which over time could attract future commercial and residential development, benefitting the local area in an economic capacity. However, the extent and degree of such development depends on a variety of factors and cannot be predicted. Therefore, residential and commercial growth in this predominantly rural area would be minor, long-term, and a cumulative consequence of the proposed transmission system improvements.

4.4 Unavoidable Adverse Environmental Impacts

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

- Clearing associated with construction of the proposed TL could result in a small amount of localized siltation; however, with BMPs any impact would be minor and temporary.
- Clearing and construction would result in the removal of trees, but due to the amount of acres of forested land in the surrounding area, the impact on forest resources is minimal.
- No incompatible, tall-growing trees would be permitted to grow within the TL ROW and only low-growing vegetation would be permitted to grow adjacent to the ROW. In areas where the ROW would traverse forested areas, this would cause a change in the visual character of the immediate area and would segment some forested areas.
- Clearing and construction would result in the disruption and/or loss of some plants and wildlife, and the loss of about 213 acres of forested habitat for the life of the TL.
- Any burning of cleared material would result in some short-term air pollution.
- ROW construction would involve tree clearing and conversion of 6.13 acres of wetlands containing woody vegetation (5.22 acres of forested wetland and 0.91 acre scrub-shrub wetland) to emergent, meadow-like wetland habitat.
- The proposed TL would result in minor long-term visual effects on the landscape in the immediate local area.

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

Land within the ROW of the proposed TL would be committed to use for electrical system needs for the foreseeable future. Some of the ROW would be converted from its current use as pasture, agricultural fields, and forest to use as an ROW (as described in Sections 1.1 and 2.2.1.1). The proposed ROW would support the 161-kV TL (see Figure 1-1), with use of existing access roads outside the ROW. Agricultural uses of the ROW could and would likely continue. However, routine vegetation management along the ROW would preclude forest management within or adjacent to (e.g., danger trees) the ROW for the operational life of the TL. These losses of long-term productivity with respect to timber production and as wildlife habitat are minor both locally and regionally.

4.6 Irreversible and Irretrievable Commitments of Resources

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

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

The ROW used for the TL 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 TL could continue.

CHAPTER 5

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CHAPTER 6

6.0 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 PEIS on the project web page.

6.1 Federal Agencies

U.S. Army Corps of Engineers

U.S. Fish and Wildlife Service

6.2 Federally-Recognized Tribes

Alabama-Coushatta Tribe of Texas

Chickasaw Nation

Choctaw Nation of Oklahoma

Jena Band of Choctaw Indians

Mississippi Band of Choctaw Indians

6.3 State Agencies

Mississippi Department of Environmental Quality

Mississippi Department of Wildlife, Fisheries and Parks

Mississippi State Historic Preservation Division

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CHAPTER 7

7.0 LITERATURE CITED

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Appendix A – Correspondence

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MISSISSIPPI DEPARTMENT of ARCHIVES AND HISTORY

MDAH

HISTORIC PRESERVATION DIVISION
P. O. BOX 571
Jackson, MS 39205-0571
Phone 601-576-6940 Fax 601-576-6955
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January 18, 2019

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

RE: Phase II Archaeological Evaluation, Site 22LA842, TVA Oxford - Coffeeville, (TVA)
MDAH Project Log #12-033-18, Report #18-0322, Lafayette County

Dear Mr. Jones:

We have reviewed the July, 2018, Phase II survey report, by Susan C. Andrews, Principal Investigator, with Wood E&I Environment & Infrastructure, Inc., received on December 11, 2018, for the above referenced undertaking, pursuant to our responsibilities under Section 106 of the National Historic Preservation Act and 36 CFR Part 800. After reviewing the information provided, we offer the following comments:

Phase II consisted of non-invasive geophysical survey, shovel testing, and test unit excavation of a late nineteenth through mid-twentieth century occupation. Two features (fence posts) were identified but are associated with a late twentieth-century use of the site area. Deposits were fairly shallow with no discernable evidence of structural or additional domestic cultural features.

Given this information, the site was recommended as ineligible for inclusion on the NRHP under Criterion A-D. MDAH concurs. As such, we have no reservations with the undertaking. However, MDAH still needs a final printed site card that details this revised information (PDF only is provided as Appendix A). We await submission of the final site card.

Please provide Ms. Andrews with a copy of this letter. If you need further information, please let me know.

Sincerely,

Hal Bell

Hal Bell
Review and Compliance Officer

FOR: Katie Blount
State Historic Preservation Officer

MISSISSIPPI DEPARTMENT of ARCHIVES AND HISTORY

MDAH

HISTORIC PRESERVATION DIVISION
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January 10, 2019

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

RE: Phase I Archaeological Survey for Two Laydown Yards, Oxford-Coffeeville Transmission Line, (TVA) MDAH Project Log #12-035-18, Report #18-0324, Lafayette and Yalobusha Counties

Dear Mr. Jones:

We have reviewed the November 13, 2018, survey report, by Susan C. Andrews, Principal Investigator, with Wood E&I Environment & Infrastructure, Inc., received on December 11, 2018, for the above referenced undertaking, pursuant to our responsibilities under Section 106 of the National Historic Preservation Act and 36 CFR Part 800. After reviewing the information provided, we do not have curriculum vitae information on file for the personnel involved with the survey. We will need to have this information submitted before we are able to complete our comments.

Please provide Ms. Andrews with a copy of this letter. If you need further information, please let me know.

Sincerely,

Hal Bell

Hal Bell
Review and Compliance Officer

FOR: Katie Blount
State Historic Preservation Officer

MISSISSIPPI DEPARTMENT of ARCHIVES AND HISTORY

MDA&H

HISTORIC PRESERVATION DIVISION
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December 6, 2018

Mr. Steve Cole
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, Tennessee 37902-1499

RE: A Phase I Archaeological Survey of Access Roads and Transmission Line Reroutes Associated with the Tennessee Valley Authority's Oxford-Coffeeville Transmission Line Project, (TVA) MDAH Project Log #11-046-18, Report #18-0305, Lafayette and Yalobusha Counties

Dear Mr. Cole:

We reviewed the July, 2018, cultural resources survey report by J. Rocco de Gregory, Principal Investigator, with Tennessee Valley Archaeological Research, received November 13, 2018, for the above referenced project in accordance with our responsibilities under Section 106 of the National Historic Preservation Act and 36 CFR Part 800. After review, we concur that sites 22LA879-882, 22YA967-975 are ineligible for listing in the National Register of Historic Places. However, it is our determination that the NRHP eligibility status of the two revisited sites, 22LA843 and 22YA938 is unknown, due to portions that extend outside of the APE. It is also our determination that no historic properties or resources eligible for listing in the NRHP are likely to be affected by the proposed project. As such, we have no reservations with the project.

There remains the possibility that unrecorded cultural resources may be encountered during the project. Should this occur, we would appreciate your contacting this office immediately in order that we may offer appropriate comments under 36 CFR 800.13.

Please provide a copy of this letter to Mr. de Gregory. If you have any questions, please do not hesitate to contact me.

Sincerely,

Hal Bell

Hal Bell
Review and Compliance Officer

FOR: Katie Blount
State Historic Preservation Officer

MISSISSIPPI DEPARTMENT of ARCHIVES AND HISTORY

MDAH

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November 20, 2018

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

RE: A Phase I Archaeological Survey of a Planned Laydown Yard, (TVA)
MDAH Project Log #11-034-18, Report #18-0302, Yalobusha County

Dear Mr. Jones:

We have reviewed the October, 2018, survey report, by J. Rocco de Gregory, Principal Investigator, with Tennessee Valley Archaeological Research, received on November 8, 2018, for the above referenced undertaking, pursuant to our responsibilities under Section 106 of the National Historic Preservation Act and 36 CFR Part 800. After reviewing the information provided, we concur that sites 22YA988 and 22YA989 are ineligible for listing in the National Register of Historic Places and that no cultural resources eligible for listing in the NRHP are likely to be affected. Therefore, we have no reservations with the project.

While we have no objection with the proposed undertaking, please be aware that according to the above referenced regulations appropriate tribal authorities must also be afforded the opportunity to comment if the project is a Federal undertaking. We will be happy to provide a list of *Native American Tribes With Cultural Interests in Mississippi* upon request.

There remains the possibility that unrecorded cultural resources may be encountered during the project. Should this occur, we would appreciate your contacting this office immediately in order that we may offer appropriate comments under 36 CFR 800.13.

Please provide Mr. de Gregory with a copy of this letter. If you need further information, please let me know.

Sincerely,

Hal Bell
Review and Compliance Officer

FOR: Katie Blount
State Historic Preservation Officer

MISSISSIPPI DEPARTMENT of ARCHIVES AND HISTORY

MDAH

HISTORIC PRESERVATION DIVISION
P. O. BOX 571
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Website: mdah.ms.gov

October 10, 2017

Ms. Marianne Shuler
Tennessee Valley Archaeological
400 West Summit Hill Drive
Knoxville, Tennessee 37902

RE: Phase I Archaeological Survey, TVA Oxford - Coffeeville New Transmission Line, (TVA)
MDAH Project Log #08-146-17, Report # 17-0272, Lafayette and Yalobusha Counties

Dear Ms. Shuler:

We have reviewed the revised July, 2017, survey report, by Dr. Henry McKelway, Principal Investigator, with Amec Foster Wheeler Environment & Infrastructure, Inc., received on September 28, 2017, for the above referenced undertaking, pursuant to our responsibilities under Section 106 of the National Historic Preservation Act and 36 CFR Part 800. After reviewing the information provided, we concur that sites 22LA841, 22LA844-845, 22YA936-943 and 22YA945 are ineligible for listing in the National Register of Historic Places. We also concur that sites 22LA840, 22LA842-843 and 22YA116 are potentially eligible for listing in the NRHP. Additionally, we concur site 22LA840 should be avoided or have additional archaeological and archival research, 22LA842 should be avoided or evaluated through Phase II excavations, 22LA843 should be avoided or undergo additional archaeological research and that the project will have No Adverse Effect to site 22YA116. Therefore, we have no reservations with the project.

There remains the possibility that unrecorded cultural resources may be encountered during the project. Should this occur, we would appreciate your contacting this office immediately in order that we may offer appropriate comments under 36 CFR 800.13.

If you need further information, please let me know.

Sincerely,

Hal Bell

Hal Bell
Review and Compliance Officer

FOR: Katie Blount
State Historic Preservation Officer

MISSISSIPPI DEPARTMENT of ARCHIVES AND HISTORY

MDAH

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P. O. BOX 571
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September 26, 2017

Ms. Marianne Shuler
Tennessee Valley Archaeological
400 West Summit Hill Drive
Knoxville, Tennessee 37902

RE: Phase I Cultural Resources Survey of Proposed Additional Guy Wire Anchors on Oxford-Coffeeville 161-KV Transmission Line Project, (TVA) MDAH Project Log #10-047-17, Report #17-0336, Lafayette and Yalobusha Counties

Dear Ms. Shuler:

We have reviewed the August, 2017, survey report, by J. Rocco De Gregory, Principal Investigator, with Tennessee Valley Archaeological Research, received on October 12, 2017, for the above referenced undertaking, pursuant to our responsibilities under Section 106 of the National Historic Preservation Act and 36 CFR Part 800. After reviewing the information provided, we concur that no cultural resources eligible for listing in the National Register of Historic Places are likely to be affected. Therefore, we have no reservations with the project.

There remains the possibility that unrecorded cultural resources may be encountered during the project. Should this occur, we would appreciate your contacting this office immediately in order that we may offer appropriate comments under 36 CFR 800.13.

If you need further information, please let me know.

Sincerely,

Hal Bell

Hal Bell
Review and Compliance Officer

FOR: Katie Blount
State Historic Preservation Officer

MISSISSIPPI DEPARTMENT *of* ARCHIVES AND HISTORY

MDAH

HISTORIC PRESERVATION
Jim Woodrick, director
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mdah.state.ms.us

Received 8/22/16

August 17, 2016

Mr. Clinton E. Jones, Senior Manager, Compliance
Mr. Richard Yarnell
Tennessee Valley Archaeological
400 West Summit Hill Drive
Knoxville TN 37902

RE: Phase I Cultural Resources Survey for Planned Expansion of the Coffeeville Substation, Tennessee Valley Authority, MDAH Project Log #07-136-16, Report #16-0263, Yalobusha County

Dear Mr. Jones and Mr. Yarnell:

We have reviewed the July 2016 cultural resources survey report by J. Rocco de Gregory, Principal Investigator, received on July 22, 2016, for the above referenced undertaking, pursuant to our responsibilities under Section 106 of the National Historic Preservation Act and 36 CFR Part 800. After reviewing the information provided, we concur that no archaeological resources eligible for listing in the National Register of Historic Places were identified within the project area of potential effects. We also concur that property IS-1 is ineligible for listing in the National Register of Historic Places, and that the project will have no effect on the Riddick house, resource #161-COF-5102. As such, we have no reservations with the undertaking.

There remains the possibility that unrecorded cultural resources may be encountered during the project. Should this occur, we would appreciate your contacting this office immediately in order that we may offer appropriate comments under 36 CFR 800.13.

Please provide a copy of this letter to Mr. de Gregory. If you need further information, please let me know.

Sincerely,

Greg Williamson
Review and Compliance Officer

FOR: Katie Blount
State Historic Preservation Officer

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Appendix B – Bat Strategy Project Screening Form

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Project Screening Form - TVA Bat Strategy *(05/08/2018)*

This form is to assist in determining alignment of proposed projects and any required measures to comply with TVA's ESA Section 7 programmatic consultation for routine actions and federally-listed bats[1]

Project Name: Oxford-Coffeeville 161-kV Transmission Line **Date:** 6/4/18
Contact(s): Todd Liskey - TPES; Ron Bond - PM **CEC#:** _____ **RLR#:** _____ **Project ID:** 29828

Project Location (City, County, State): Lafayette and Yalobusha Counties, MS

Project Description: TVA will build a new 29-mile TL from County Road 300 in Oxford to their existing Coffeeville 161-kV SS, using approx. 11.9 miles of existing 75-ft wide ROW and 17.1 miles of new 100-ft wide ROW. TVA will also purchase 2.12 acres at the Coffeeville SS for expansion and install a new breaker bay at their Oxford 161-kV Substation.

STEP 1) Select Appropriate TVA Action (or check here ☐ if none of the Actions below are applicable):

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

STEP 2) Select **all** activities from **Tables 1 and 2** (Column 1 only) included in proposed project. If you have an activity that is not listed below, describe here): _____

Table 1. Activities (CHECK ALL THAT APPLY) with No Effect on Federally Listed Bats. If none, check here: ☐

	#	ACTIVITY		#	ACTIVITY
☐	1	Loans and/or grant awards	☐	12	Sufferance agreement
■	2	Purchase of property	☐	13	Engineering or environmental planning or studies
☐	3	Purchase of equipment for industrial facilities	☐	14	Harbor limits
☐	4	Environmental education	☐	19	Site-specific enhancements in streams and reservoirs for aquatic animals
■	5	Transfer of ROW easement or ROW equipment	☐	20	Nesting platforms
☐	6	Property and/or equipment transfer	☐	41	Minor water-based structures
☐	7	Easement on TVA property	☐	42	Internal renovation or internal expansion of existing facility
☐	8	Sale of TVA property	☐	43	Replacement or removal of TL poles, or cutting of poles to 4-6 ft above ground
☐	9	Lease of TVA property	☐	44	Conductor and OHGW installation and replacement
☐	10	Deed modification of TVA rights or TVA property	☐	49	Non-navigable houseboats
☐	11	Abandonment of TVA retained rights			

Table 2. Activities (CHECK ALL THAT APPLY) and Associated Conservation Measures. If none, check here: ☐

	#	ACTIVITY	CONSERVATION MEASURES	TZ SME Review Needed
☐	15	Windshield or ground surveys for archaeological resources	☐ a. NV1 ☐ b. HP2	☐ b. HP1
■	16	Drilling	☐ a. NV1 ☐ f. SSPC1, SSPC2, SSPC3 ☐ g. L1, L2	☐ a NV3, NV4 / ☐ a1. NV2
■	17	Mechanical vegetation removal; does not include removal of trees or tree branches ≥ 3" in diameter.	■ a. NV1 ■ f. SSPC1, SSPC2, SSPC3, SSPC5	■ f. SSPC4, SSPC7
☐	18	Erosion control – minor	☐ a. NV1 ☐ f. SPCC1, SSPC2, SSPC3, SSPC5	None
■	21	Herbicide use	■ d. SSPC1, SSPC2, SSPC3, SSPC5	■ d. SSPC6, SSPC7
☐	22	Grubbing	☐ a. NV1 ☐ f. SSPC1, SSPC2, SSPC3, SSPC5	☐ f. SSPC4
■	23	Prescribed burns, burn piles, or	■ c. SHF1, SHF4, SHF5	■ c. SHF2, SHF3, SHF6, SHF7,

1

	#	ACTIVITY	CONSERVATION MEASURES	TZ SME Review Needed
		brush piles		SHF8, SHF9
□	24	Tree planting	□ a. NV1 □ f. SSCP1, SSPC2, SSPC3, SSPC5	None
■	25	Maintenance, improvement or construction of pedestrian or vehicular access corridors	■ a. NV1 ■ f. SSPC1, SSPC2, SSPC3, SSPC5	■ a1. NV2 ■ f. SSPC7
□	26	Maintenance or construction of access control measures	□ a. NV1 □ b. HP2 □ f. SSPC1, SSPC2, SSPC3,SSPC5 □ g. L1, L2	□ a NV3, NV4 / □ a1. NV2 □ b. HP1 □ f. SSPC7
□	27	Restoration of sites following human use and abuse	□ a. NV1 □ f. SSPC1, SSPC2, SSPC3	□ f. SSPC7
□	28	Removal of debris (e.g., dump sites, hazardous material, unauthorized structures)	□ a. NV1 □ f. SSPC1, SSPC2, SSPC3	□ f. SSPC7
□	29	Acquisition and use of fill/borrow material	□ a. NV1 □ f. SSPC1, SSPC2, SSPC3	□ f. SSPC7
□	30	Dredging and excavation; recessed harbor areas	□ a. NV1 □ f. SSPC2, SSPC3, SSPC5	None
■	31	Stream/wetland crossings	■ a. NV1 ■ f. SSPC1, SSPC2, SSPC3, SSPC5	■ f. SSPC7
□	32	Clean-up following storm damage	□ a. NV1 □ f. SSPC1, SSPC2, SSPC3	□ f. SSPC4, SSPC7
□	33	Removal of hazardous trees or tree branches	□ a. NV1 □ d. TR7, TR8 □ f. SSPC1, SSPC2, SSPC3, SSPC5	□ d. TR1, TR2, TR3, TR4, TR5, TR6, TR9, □ f. SSPC4, SSPC7
■	34	Mechanical vegetation removal, includes trees or tree branches three inches or greater in diameter	■ a. NV1 ■ d. TR7, TR8 ■ f. SSPC1, SSPC2, SSPC3, SSPC5	■ d. TR1, TR2, TR3, TR4, TR5, TR6, TR9, ■ f. SSPC4, SSPC7
■	35	Stabilization (major erosion control)	■ a. NV1 ■ f. SSPC1, SSPC2, SSPC3, SSPC5	■ f. SSPC4, SSPC7
■	36	Grading	■ a. NV1 ■ f. SSPC1, SSPC2, SSPC3, SSPC5 □ g. L1, L2	■ f. SSPC4, SSPC7
■	37	Installation of soil improvements	■ a. NV1 ■ f. SSPC1, SSPC2, SSPC3 □ g. L1, L2	□ a1. NV2 □ f. SSPC7
□	38	Drainage installations (including for ponds)	□ a. NV1 □ f. SSPC1, SSPC2, SSPC3 □ g. L1, L2	□ f. SSPC7
□	39	Berm development	□ a. NV1 □ f. SSPC1, SSPC2, SSPC3, □ g. L1, L2	None
□	40	Closed loop heat exchangers (heat pumps)	□ f. SSPC5	None
□	45	Stream monitoring equipment-placement, use	□ a. NV1	None
□	46	Floating boat slips within approved harbor limits	□ f. SSPC5	None
■	47	Conduit installation	■ a. NV1	□ a1. NV2
■	48	Laydown areas	■ a. NV1 ■ f. SSPC1, SSPC2, SSPC3, □ g. L1, L2	None
□	50	Minor land-based structures	□ a. NV1 □ f. SSPC1, SSPC2, SSPC3, SSPC5 □ g. L1, L2	None
□	51	Signage installation	□ a. NV1 □ f. SSPC1, SSPC2, SSPC3, SSPC5	None
□	52	Floating buildings	□ a. NV1 □ f. SSPC2, SSPC3,SSPC5 □ g. L1, L2	□ a1. NV2
□	53	Mooring buoys or posts	□ a. NV1	

2

	#	ACTIVITY	CONSERVATION MEASURES	TZ SME Review Needed
			□ f. SSPC2, SSPC3, SSPC5	None
□	54	Maintenance of water control structures (dewatering units, spillways, levees)	□ a. NV1 □ f. SSPC2, SSPC3, SSPC5	□ f. SSPC6, SSPC7
□	55	Solar panels	□ a. NV1 □ f. SSPC2, SSPC3, SSPC5	□ f. SSPC7
■	56	Culverts	■ a. NV1 ■ f. SSPC1, SSPC3, SSPC5	None
□	57	Water intake - non-industrial	□ a. NV1 □ f. SSPC3, SSPC5	None
□	58	Wastewater outfalls	□ a. NV1 □ f. SSPC2, SSPC3, SSPC5	None
□	59	Marine fueling facilities	□ a. NV1 □ f. SSPC2, SSPC3, SSPC5 □ g. L1, L2	None
□	60	Commercial water-use facilities (e.g., marinas)	□ a. NV1 □ f. SSPC2, SSPC5 □ g. L1, L2	None
□	61	Septic fields	□ a. NV1 □ f. SSPC1, SSPC2, SSPC3, SSPC5	None
□	62	Blasting	□ a. NV1 □ f. SSPC1, SSPC2, SSPC3, □ g. L1, L2	□ a NV3, NV4 / □ a1. NV2
■	63	Foundation installation	■ a. NV1 ■ f. SSPC1, SSPC2, SSPC3	□ a1. NV2
■	64	Installation of steel structure, overhead bus, equipment, etc.	■ a. NV1 ■ g. SSPC1, SSPC2, SSPC3	□ a1. NV2
■	65	Pole and/or tower installation and/or extension	■ a. NV1 ■ f. SSPC1, SSPC2, SSPC3	□ a1. NV2
□	66	Private, residential docks, piers, boathouses	□ a. NV1 □ f. SPCC5 □ g. L1, L2	None
□	67	Siting of temporary office trailers	□ a. NV1 □ f. SSPC1, SSPC2, SSPC3, SSPC5 □ g. L1, L2	None
□	68	Financing for speculative building construction	□ a. NV1 □ f. SSPC5	None
□	69	Renovation of existing structures	□ a. NV1 □ f. SSPC1, SSPC3, SSPC5 □ g. L1, L2	□ e. AR1, AR2, AR4, AR5
□	70	Lock maintenance and construction	□ a. NV1 □ f. SSPC2, SSPC3, SSPC5	□ a1. NV2
□	71	Concrete dam modification	□ a. NV1 □ f. SSPC2, SSPC3	□ a1. NV2
□	72	Ferry landings/service operations	□ a. NV1 □ f. SSPC5 □ g. L1, L2	None
□	73	Boat launching ramps	□ a. NV1 □ f. SSPC2, SSPC5	□ a1. NV2
□	74	Recreational vehicle campsites	□ a. NV1 □ g. SPCC5	None
□	75	Utility lines/light poles	□ a. NV1 □ f. SPCC5 □ g. L1, L2	None
□	76	Concrete sidewalk	□ a. NV1 □ f. SSPC2, SSPC3, SSPC5	None
□	77	Construction or expansion of land-based buildings	□ a. NV1 □ f. SSPC2, SSPC3, SSPC5 □ g. L1, L2	□ e. AR1, AR2, AR5
□	78	Wastewater treatment plants	□ a. NV1 □ f. SSPC2, SSPC5 □ g. L1, L2	□ a1. NV2
□	79	Swimming pools and associated	□ a. NV1	

3

	#	ACTIVITY	CONSERVATION MEASURES	TZ SME Review Needed
		equipment	□ f. SSPC5 □ g. L1, L2	None
□	80	Barge fleeting areas	□ a. NV1 □ f. SSPC2, SSPC3, SSPC5	□ a1. NV2
□	81	Water intakes - Industrial	□ a. NV1 □ f. SSPC2, SSPC3, SSPC5	None
□	82	Construction of dam/weirs/ Levees	□ a. NV1 □ f. SPCC2, SPCC3, SPCC5	□ a1. NV2
□	83	Submarine pipeline, directional boring operations	□ a. NV1 □ f. SSPC2, SSPC3, SSPC5	□ a1. NV2
□	84	On-site/off-site public utility relocation or construction or extension	□ a. NV1 □ f. SSPC1, SSPC3, SSPC5	None
□	85	Playground equipment - land-based	□ a. NV1 □ f. SSPC5	None
□	86	Landfill construction	□ a. NV1 □ f. SSPC2, SSPC3 □ g. L1, L2	□ a1. NV2
□	87	Aboveground storage tanks	□ a. NNV1 □ f. SSPC2, SSPC3, SSPC5	None
□	88	Underground storage tanks (USTs)	□ a. NV1 □ g. SSPC2, SSPC3, SSPC5	None
□	89	Structure demolition	□ f. SSPC1, SSPC2, SSPC3	□ e. AR1, AR2, AR4, AR5
□	90	Pond closure	□ a. NV1 □ f. SSPC2, SSPC3	None
□	91	Bridge replacement	□ a. NV1 □ f. SSPC3, SSPC5	□ a1. NV2 □ e. AR1, AR2, AR3, AR5,
□	92	Return of remains to former burial sites	□ a. NV1 □ b. HP2	□ b. HP1
□	93	Standard license	□ a. NV1 □ f. SSPC5	None
□	94	Special use license	□ a. NV1	None
□	95	Recreation license	□ a. NV1 □ f. SSPC5	None
□	96	Land use permit	□ a. NV1 □ f. SSPC5	None

STEP 3) Are all project activities limited to Table 1? If **YES**, **STOP HERE**. No Bat Strategy Conservation Measures required. Include this form in environmental documentation (e.g., attach to CEC) and send to batstrategy@tva.gov. If **NO**, proceed to Step 4.....□ **YES** ■ **NO**

STEP 4) Check ALL relevant characteristics below. If none apply, **STOP HERE** and check ☐. No Bat Strategy Conservation Measures required. Include form in environmental documentation and send to batstrategy@tva.gov

■ **a**. Project may occur outside, involves human presence, or use of equipment that **generates noise or vibration** (e.g., drilling, blasting, loud machinery).

□ **a1.** Project involves continuous noise (i.e., ≥ 24 hrs) that is >75 decibels measured on A scale (e.g., loud machinery).

□ **b**. Project may involve **human entry into/survey of a potential bat roost** (cave, bridge, other structure).

■ **c**. Project may involve **fire (e.g., prescribed fire, burn piles) or preparation of fire breaks** within 0.25 mi of trees, caves, or water sources. **If prescribed burn**, estimated acreage: _____

■ **d**. Project may involve **tree removal.**
Tree removal may need to occur **outside of winter**.....☑ **YES** ☐ **NO**
Tree removal will occur **only in winter**.....☐ **YES** ☑ **NO**
Estimated number of trees or acres to be removed: 212.6 ■ acres □ trees
If warranted, project has flexibility for bat surveys (May 15-Aug 15):.....□ **MAYBE** □ **YES** ■ **NO**

□ **e**. Project may involve **alteration or removal of bridges or other human structures**.

■ **f**. Project may involve land use activities involving **ground disturbance or use of chemicals or fuels** near water sources, wetlands, sinkholes, caves, or exposed limestone/karst.

□ g. Project may involve use of artifical lighting at night.

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STEP 5) *Please contact Holly LeGrand or other Bat Strategy support staff for assistance if needed.* For those Activities selected in Table 2: select all Conservation Measures with letters (e.g., a-g) that correspond to characteristics selected in Step 4. If this results in selection of Conservation Measures in the last column of Table 2, a review by a terrestrial zoologist is required. Based on selection of Conservation Measures, does project require review by a terrestrial zoologist? If **YES**, **STOP HERE** and submit form as part of environmental review request; if **NO**, skip to **STEP 16**..... ■ **YES** □ **NO**

Terrestrial Zoologist SME Verification (Steps 6-11 will be completed by a terrestrial zoologist if warranted):

STEP 6) Project is within range of: ☐ Gray bat ☐ VA Big-eared bat ☐ Indiana bat ☑ Northern long-eared bat

STEP 7a) Project includes the following:

- □ Removal/burning of suitable trees within 0.5 mile (0.8 km) of P1-P2 Indiana bat hibernacula or 0.25 mile (0.4 km) of P3-P4 Indiana bat hibernacula or any northern long-eared bat hibernacula.
- □ Removal/burning of suitable trees within 10 miles of documented Indiana bat hibernacula or within 5 miles of northern long-eared bat hibernacula.
- ■ Removal/burning of suitable trees greater than 10 miles from documented Indiana bat hibernacula or greater than 5 miles from documented northern long-eared bat hibernacula.
- □ Removal/burning of trees within 150 feet of a documented Indiana bat or northern long-eared bat maternity roost tree.
- □ Removal/burning of suitable trees within 2.5 miles of Indiana bat roost trees or within 5 miles of Indiana bat capture sites.
- □ Removal/burning of suitable trees greater than 2.5 miles from Indiana bat roost trees or greater than 5 miles from Indiana bat capture sites.
- □ Removal/burning of documented Indiana bat or northern long-eared bat roost tree, if still suitable.

STEP 7b) Amount of SUITABLE tree/acreage removal or burned (may be different than total amount of removal): 75.9 ■ acres □ trees

STEP 8) Select anticipated date range of burning/tree removal in table below:

STATE	SWARMING	WINTER	NON-WINTER	PUP
GA, KY, TN	□ Oct 15 - Nov 14	□ Nov 15 - Mar 31	□ Apr 1 - May 31, Aug 1- Oct 14	□ Jun 1 - Jul 31
VA	□ Sep 16 - Nov 15	□ Nov 16 - Apr 14	□ Apr 15 - Sep 15	□ Jun 1 - Jul 31
AL	□ Oct 15 - Nov 14	□ Nov 15 - Mar 15	□ Mar 16 - May 31, Aug 1 - Oct 14	□ Jun 1 - Jul 31
NC	□ Oct 15 - Nov 14	□ Nov 15 - Apr 15	□ Apr 16 - May 31, Aug 1 - Oct 14	□ Jun 1 - Jul 31
MS	■ Oct 1 - Nov 14	■ Nov 15 - Apr 14	■ Apr 15 - Sep 30	□ Jun 1 - Jul 31

STEP 9) Presence/absence surveys (visual, mist net, acoustic) were/will be conducted: □ **YES** □ **NO** ■ **TBD**

STEP 10) Result of presence/absence surveys (if conducted), on _____ (date): □ **NEGATIVE** □ **POSITIVE** ■ **N/A** *NOTES*: _____

STEP 11) □ Conservation measures have been verified (and modified, if necessary) in Table 2. *NOTES*:

Bat Strategy Compliance Verification (Steps 12-15 will be completed by SME/Bat Strategy Support staff):

STEP 12) Project ■ **WILL** □ **WILL NOT** require use of Incidental Take in the amount of 75.9 ■ acres or □ trees, proposed to be used during the ■ **WINTER** ■ **VOLANT** □ **NON-VOLANT** bat season (or □ **N/A**).

STEP 13) Available Incidental Take as of 6/18/2018 for Construction of new TL Assets (Action):

TVA Action	Total 20-year acreage	Winter Burning/Removal	Volant Season Burning/Removal	Non-Volant Season Burning/Removal
8	11900	7139.17	2378.77	2268

STEP 14) Amount contributed to TVA's Bat Conservation Fund upon activity completion: $0 or □ **N/A**

STEP 15) Project Effects Determinations: ***Gray Bat***:☐NE ☐NLAA ☑N/A; ***Virginia Big-eared Bat***:☐NE ☐NLAA ☑N/A ***Northern Long-eared Bat***: ☐NE ☐NLAA ☑LAA ☐N/A; ***Indiana Bat***: ☐NE ☐NLAA ☐LAA ☑N/A

NOTES: Only in the range of NLEB. No known hibernacula nearby. suitable bat trees removed for construction of new TL

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TVA's ESA Section 7 Bat Strategy Conservation Measures Required for:

STEP 16) Based on completion of Step 5, select the appropriate Conservation Measures listed in the table below (this will be completed/verified by a Terrestrial Zoologist if a Terrestrial Zoologist review is required) and review the following bullets. Save this form in project environmental documentation AND send a copy of form to batstrategy@tva.gov. Submission of this form is an indication that the Project Lead Ron Bond - PM (name) is (or will be made) aware of the requirements below.

- Implementation of conservation measures identified below is required to comply with TVA's programmatic Endangered Species Act bat consultation.
- Confirmation of completion (e.g., report from contractor, time stamped photos pre and post completion) for Conservation Measures below with an * (as well as any additional confirmation noted here by Terrestrial Zoologist: Elizabeth Hamrick) will be provided to TVA's Bat Strategy Compliance Officer (batstrategy@tva.gov) following completion of activit (ies).
- TVA may conduct post-project monitoring to determine if conservation measures were effective in minimizing or avoiding impacts to federally listed bats.

STEP 17) For projects that require use of Take and/or contribution to TVA's Bat Conservation Fund, please acknowledge the following statement:

■ Project Lead/Contact acknowledges that proposed project will result in use of 75.9 ■ acres/□ trees in Incidental Take and will require $0 contribution to TVA's Conservation Fund upon completion of activity.

	Conservation Measure Acronym	Conservation Measure Description
☑	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.
☐	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.
☐	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.
☐	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.
☐	HP1	Site-specific cases in which potential impact of human presence is heightened (e.g., conducting environmental or cultural surveys within a roost site) will be closely coordinated with staff bat biologists to avoid or minimize impacts below any potential adverse effect. Any take from these activities would be covered by TVA's Section 10 permit.
☐	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.
☑	SHF1	Fire breaks will be used to define and limit burn scope.
☑	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.
☑	SHF3	Acreage will be divided into smaller units to keep amount of smoke at any one

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		time or location to a minimum and reduce risk for smoke to enter caves.
☑	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.
☑	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.
☐	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.
☐	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.
☐	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.
☐	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).
☐	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.
☐	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).
☐	TR3*	Removal of suitable summer roosting habitat within documented bat habitat (i.e., within 10 miles of documented Indiana bat hibernacula, within five miles of documented northern long-eared bat hibernacula, within 2.5 miles of documented Indiana bat summer roost trees, within five miles of Indiana bat capture sites, within one mile of documented northern long-eared bat summer roost trees, within three 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.
☑	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.
☐	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).
☐	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).
☐	TR7	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.
☐	TR8	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.
☐	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 continuing to carry out TVA's broad mission and responsibilities.
☐	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: ○ 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. ○ 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. ○ Features with high-medium likelihood of harboring bats but cannot be checked visually include soffits, cavity walls, space between roof covering and roof lining. ○ 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: ▪ Location in relatively warm areas

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		▪ 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 ○ 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). ○ Bat surveys usually are NOT needed in the following circumstances: ▪ 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.
☐	AR2	Additional bat P/A surveys (e.g., emergence counts) conducted if warranted (i.e., when AR1 indicates that bats may be present).
☐	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.
☐	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).
☐	AR5	If evidence of bat use warrants seasonal modification or removal, TVA will carry out or recommend (i.e., to applicants) seasonal modification or removal. Risk to human safety, however, should take priority. For project-specific cases in which project is unable to accommodate seasonal modification or removal, and federally listed bat species are present, TVA will carry out or recommend consultation with the USFWS to determine the best approach in the context of the project-specific circumstance. This may include establishment of artificial roosts before demolition of structures with bats present.
☑	SSPC1	**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: ○ BMPs to 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: ▪ 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

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		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 and after significant rain. ▪ Re-vegetate and mulch disturbed areas as soon as practical. ○ Application of herbicide is in compliance with USEPA, state water quality standards, and state permits. Areas in which covered species are known to occur on existing transmission line ROW are depicted on referenced, applicable spreadsheets and include guidelines to follow for impact minimization or avoidance. During pre-job briefings, the ROW Forester will review location of resources with contractors and provide guidelines and expectations from TVA's BMP Manual (Appendix O). Herbicides labeled for aquatic use are utilized in and around wetlands, streams, and SMZs. Unless specifically labeled for aquatic use, measures are taken to keep herbicides from reaching streams whether by direct application or through runoff or flooding by surface water. Hand application of certain herbicides labeled for use within SMZs is used only selectively. ○ Specific guidelines regarding sensitive resources and buffer zones: ▪ 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, and unique and important habitat (e.g., protective buffers around caves, restricted herbicide use, seasonal clearing of suitable habitat).
☑	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.
☐	SSPC3	**Power Plant actions and activities** will continue to implement standard environmental practices. These include: ○ Best Management Practices (BMPs) in accordance with regulations:

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		▪ 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 ▪ 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 ▪ Minimize storm water contact with disturbed soils at the 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 (>1 acre) ○ 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
☑	SSPC4	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.
☐	SSPC5	**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.
☑	SSPC6	Herbicide use will be avoided within 200 ft of portals associated with caves, cave collapse areas, mines and sinkholes that 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 any label requirements.
☐	SSPC7	Clearing of vegetation within a 200-ft radius of documented caves will be limited to that conducted by 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.
☐	L1	Direct temporary lighting away from suitable habitat during the active season.
☐	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).

[1]Bats 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).

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Appendix C – Stream Crossings along the Proposed Transmission Line Right-of-Way

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Stream Crossings Along the Proposed Oxford–Coffeeville 161-kV Transmission Line Right-of-Way and Access Roads in Lafayette and Yalobusha Counties, Mississippi

Stream ID	Stream Type	Streamside Management Zone Category	Stream Name	Field Notes
001	Other	Category A 50ft	NA	Small pond.
002	Other	Category A 50ft	NA	Pond.
003	Intermittent	Category A 50ft	Unnamed tributary to Yocona River.	Small 1ft wide x 1ft deep channel with clay/ silt substrate that flows out of a wetland.
004	Other	Category A 50ft	NA	Pond.
005	Other	Category A 50ft	NA	Pond.
006	Other	Category A 50ft	NA	Pond.
007	Other	Category A 50ft	NA	Pond
008	Perennial	Category A 50ft	Unnamed tributary to Taylor Creek	Approximately 20ft wide x 10ft deep channel with silt/ sand substrate.
009	Perennial	Category A 50ft	Taylor Creek	Approximately 20ft wide x 10ft deep channel with silt/ sand substrate.
010	Perennial	Category A 50ft	Taylor Creek	Approximately 20ft wide x 10ft deep channel with silt/ sand substrate.
011	Perennial	Category A 50ft	Yocona River	Very large channelized stream.
012	Perennial	Category A 50ft	Unnamed tributary to Yocona River	8ft wide x 10ft deep channel with evidence of past channelization. Fish observed.
013	Perennial	Category A 50ft	Tidwell Creek ?	6ft wide x 2ft deep channel with mucky silt substrate. Fish and frogs observed. Drains wetland.
014	Intermittent	Category A 50ft	Unnamed tributary to Yocona River	5ft wide x 2ft deep channel with sand/ silt substrate.
015	Intermittent	Category A 50ft	Unnamed tributary to Yocona River	2ft wide x 2ft deep channel with sand substrate.
016	Intermittent	Category A 50ft	Unnamed tributary to Yocona River	2ft wide x 2ft deep channel with sand substrate.
017	Other	Category A 50ft	NA	Pond

Stream ID	Stream Type	Streamside Management Zone Category	Stream Name	Field Notes
018	Perennial	Category A 50ft	Goodwin Creek	3ft wide x 1ft deep channel. Spring/ seep along left descending bank.
019	Other	Category A 50ft	NA	Pond.
020	Other	Category A 50ft	NA	Pond.
021	Intermittent	Category A 50ft	Unnamed tributary to Witson Creek	Small channel with silt substrate. Macroinvertebrates observed.
022	Intermittent	Category A 50ft	Unnamed tributary to Town Creek	2ft wide x 2ft deep channel.
023	Intermittent	Category A 50ft	Unnamed tributary to Town Creek	4ft wide x 4ft deep channel with sand/ silt substrate.
024	Intermittent	Category A 50ft	Unnamed tributary to Otoucalofa Creek	Small 2ft wide x 2ft deep channel with gravel substrate.
025	Perennial	Category A 50ft	Otoucalofa Creek	Approximately 100ft wide channel.
026	Perennial	Category A 50ft	Unnamed tributary to Otoucalofa Creek	Channel turns into wetland area in field. Culvert present at road. Fish observed.
027	Other	Category A 50ft	NA	Pond.
028	Perennial	Category A 50ft	Unnamed tributary to Otoucalofa Creek	15ft wide x 10ft deep channel with sandy substrate. Beaver dam present.
029	Other	Category A 50ft	NA	Pond.
030	Intermittent	Category A 50ft	L. Johnson Creek	10ft wide x 8ft deep channel.
031	Perennial	Category A 50ft	Unnamed tributary to L. Johnson Creek	6ft wide x 6ft deep channel. Water was too turbid to determine substrate.
032	Intermittent	Category A 50ft	Unnamed tributary to L. Johnson Creek	Deep channel with silt/ clay/ sand substrate.
033	Intermittent	Category A 50ft	Unnamed tributary, possibly goes subterranean	8ft wide x 2ft deep channel with mud substrate and leaf litter, eroded banks.
034	Other	Category A 50ft	NA	Pond.

Stream ID	Stream Type	Streamside Management Zone Category	Stream Name	Field Notes
035	Perennial	Category A 50ft	Unnamed tributary to Moreland Creek	Spring fed 2ft wide x 1ft deep channel.
036	Intermittent	Category A 50ft	Unnamed tributary to Moreland Creek	Small 1ft wide x 1-2ft deep channel with silt/ clay substrate.
037	Intermittent	Category A 50ft	Unnamed tributary to Moreland Creek	Small 3ft wide x 3ft deep channel with sand substrate.
038	Other	BMPs	NA	Large seep area.
039	Other	Category A 50ft	NA	Pond.
040	Perennial	Category A 50ft	Unnamed tributary to Moreland Creek	10ft wide x 10ft deep channel with sand/gravel/ clay substrate.
041	Intermittent	Category A 50ft	Unnamed tributary to Moreland Creek	2ft wide x 1ft deep channel with clay/ silt.
042	Intermittent	Category A 50ft	Unnamed tributary to Turkey Creek	1ft wide x 1ft deep channel with clay/ gravel substrate.
043	Perennial	Category A 50ft	Unnamed tributary to Turkey Creek	20ft wide x 3ft deep channel with sandy substrate.
044	Perennial	Category A 50ft	Unnamed tributary to Turkey Creek	15ft wide x 2ft deep channel with sandy/ woody debris substrate.
045	Perennial	Category A 50ft	Unnamed tributary to Turkey Creek	12ft wide x 2ft deep channel with sand/ gravel substrate with riffle/ pool structure.
046	Intermittent	Category A 50ft	Unnamed tributary to Turkey Creek	6ft wide x 10ft deep channel.
047	Intermittent	Category A 50ft	Unnamed tributary to Turkey Creek	10ft wide x 10ft deep channel.
asc03	Perennial	Category A 50ft	Unnamed Tributary to Yocona River	Large culvert present at access road crossing. Deep channel about 30ft wide with sand substrate.
asc04	Perennial	Category A 50ft	Unknown	2ft wide x 2ft deep channel with sand/ gravel substrate runs along access. Multiple fish observed.

Stream crossings along the proposed Coffeeville Substation Expansion

Stream ID	Stream Type	Streamside Management Zone Category	Stream Name	Field Notes
001	Intermittent	Category A 50 ft	unnamed tributary to Turkey Creek	Dry bed with wet pools. Stream widens out and becomes a large pool at the road. 3'w 4'd. Aquatic Insects observed. T-Dec form attached.

Appendix D – Detailed Wetland Descriptions

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Wetlands Within the Proposed Oxford - Coffeeville 161-kV Transmission Line ROW and Access Roads

Emergent wetland area within the ROW totaled 4.95 acre across 25 delineated wetland areas. Emergent wetlands are generally devoid of woody vegetation with predominant cover by non-woody species across areas periodically saturated and/or inundated. Often emergent wetlands are found where land-use practices deter growth of woody species or saturation and/or inundation of the area is at a frequency which precludes woody vegetation establishment and growth. This was evident within the existing utility line ROW corridor where a portion of the Preferred Alternative corridor was sited. Recent herbicide application and other forms of vegetation maintenance within the existing ROW have resulted in the emergent wetland habitat type found in W002, W003, W004, W005, W006, W007, W020a, W021, W022, W023a, W026, W027a, W028a, W029a, W030a, W031a, and W032a Other forms of emergent wetland habitat consisted of wetland drainage swales through agriculture fields or pasture land in W001, W011, W013, W019; farmed wetland in W009; fallow saturated depressions adjacent to agricultural fields in W010 and W012; shoreline fringe in W025; or a previously established access route through W001-AR27. All of these wetland areas contain indicators of wetland hydrology influencing soil physiology such that coloration indicative of wetland conditions was evident in the soil profile. Typical wetland grasses, rushes, and forbs dominated these habitats. This included broomsedge, bushy bluestem, buttercups, goldenrods, bulrushes, flat nutsedges, and pathrushes. Condition and functional capacity of these wetlands ranged from low to superior in quality, largely due to or dependent on size, landscape position, hydrologic influence, and degree of impacts evident (e.g. grazing, farming, woody vegetation removal, soil compaction, mowing, etc.) (Table 1).

Table 1 Acreage of Low, Moderate, and High Quality Emergent Wetlands by Watershed within the proposed Transmission Line Construction Footprint (access and ROW).

Sub-Watershed (12-HUC)	NWI Mapped Emergent Wetland Acres in Sub-Watershed	Emergent Wetland Acreage on ROW			
		Low Quality	Moderate Quality	Superior Quality	TOTAL
Murray Creek - Yocona River (080302030107)	10	0	0.07	0	**0.07**
Taylor Creek-Yocona River (080302030301)	100	0.07	2.46	0	**2.53**
Johnson Creek - Otoucalofa Creek (080302030203)	130	0	0	0.04	**0.04**
Moreland Creek - Turkey Creek (080302050306)	5	0.50	1.81	0	**2.31**
TOTAL	**245**	**0.57**	**4.17**	**0.04**	**4.95**

Woody wetlands in general have deeper root systems and contain greater biomass (quantity of living matter) per acre than do emergent wetlands, which do not grow as tall. As a result, forested and scrub-shrub wetland vegetation tend to provide higher levels of wetland functions, such as sediment retention, carbon storage, and pollutant retention and transformation (detoxification), all of which support better water quality (Ainslie et al. 1999; Scott et al. 1990; Wilder and Roberts 2002). Scrub-shrub wetland area consisted of wetlands dominated by woody vegetation generally less than 15-feet-tall and 3-inches in diameter (Cowardin et al.

1979). This habitat type can be representative of young saplings in early successional forest (scrubby) or woody species developing to a natural peak height of relatively low stature (shrubby). Scrub-shrub wetland habitat within the proposed ROW totaled 0.91 acre across W017, W030b, W031b, and W032b. All scrub-shrub wetland habitat exhibited wetland hydrology indicators and hydric soil coloration within the soil profile. Hydrophytic saplings, such as black willow, sweetgum, and loblolly pine comprised the dominant species within this wetland type. Moderate condition and functional capacity were exhibited by all scrub-shrub wetlands, due to size, landscape position, hydrologic influence, and degree of impacts evident (woody vegetation removal, age of stand, human disturbance, floodplain setting, etc.) (Table 2).

Table 2 Acreage of Low, Moderate, and High Quality Scrub-shrub Wetlands by Watershed within the proposed Transmission Line ROW.

Sub-Watershed (12-HUC)	NWI Mapped Scrub-shrub Wetland Acres in Sub-Watershed	Scrub-shrub Wetland Acreage on ROW			
		Low Quality	Moderate Quality	Superior Quality	TOTAL
Murray Creek - Yocona River (080302030107)	70	0	0	0	**0**
Taylor Creek-Yocona River (080302030301)	330	0	0	0	**0**
Johnson Creek - Otoucalofa Creek (080302030203)	170	0	0.38	0	**0.38**
Moreland Creek - Turkey Creek (080302050306)	50	0	0.53	0	**0.53**
TOTAL	**620**	**0**	**0.53**	**0**	**0.91**

Forested wetlands were identified across 12 delineated wetland habitats within the ROW. Wetland hydrology indicators, such as inundation, saturated soils, sparsely vegetated concave surfaces, thin muck surface, and drift deposits were exhibited across the forested wetland areas. Likewise, this hydrology influenced the soil profile, and hydric soil coloration was evident. Hydrophytic forested vegetation was dominated by red maple, sweetgum, river birch, or sycamore. All forested wetlands features exhibited hydrologic indicators which have resulted in hydric soil coloration. Forested hydrophytic vegetation across these communities was dominated by black willow, American elm, box elder, sweetgum, cherry-bark oak, red maple, or willow oak. Due to landscape position, buffer composition, hydrologic influence, disturbance history, and habitat features, the forested wetlands within the ROW varied in quality and associated value provided to the surrounding watershed. Of the 5.22 acres of forested wetland within the ROW, 3.45 acres were superior quality, providing high functional value. The remaining 1.77 acres were of moderate quality and functional capacity (Table 3).

Table 3 Acreage of Low, Moderate, and High Quality Forested Wetlands by Watershed within the proposed Transmission Line ROW.

Sub-Watershed (12-HUC)	NWI Mapped Forested Wetland Acres in Sub-Watershed	Forested Wetland Acreage on ROW			
		Low Quality	Moderate Quality	Superior Quality	TOTAL
Murray Creek - Yocona River (080302030107)	230	0	0	0	**0**
Taylor Creek-Yocona River (080302030301)	1,470	0	0.95	0.13	**1.08**
Johnson Creek - Otoucalofa Creek (080302030203)	500	0	0	3.32	**3.32**
Moreland Creek - Turkey Creek (080302050306)	225	0	0.82	0	**0.82**
TOTAL	**2,425**	**0**	**1.77**	**3.45**	**5.22**

The Taylor Creek-Yocona River sub-watershed contains an estimated 1,900 wetland acres, of which approximately 1,470 acres total are mapped on the NWI as forested. This watershed contains forested wetlands W007, W008, W014, W015, and W016 and no scrub-shrub wetlands within the Preferred Alternative ROW corridor. W007 and W008 are located in the Taylor Creek active floodplain and exhibit second growth forest. W014 comprises the a riparian flat of an unnamed tributary to the Yocany River, where the presence of mucky soil and obligate plant species indicate regularly saturated soils throughout the year. W015 exhibited 0.13 acre of second growth forest with considerable groundwater seepage at the confluence of two drainage flats tributary to Goodwin Creek. W015 provides superior functional capacity to the surrounding watershed due to the relative lack of disturbance and strong hydrologic influence. W016 comprised the headwater reaches of a separate headwater drainage feature tributary to Goodwin Creek. W007, W008, W014, and W016 exhibited moderate wetland condition, function, and associated provision of wetland value to the surrounding watershed.

The Johnson Creek-Otoucalofa Creek sub-watershed contains approximately 500 mapped forested wetland acres and 170 mapped scrub-shrub wetland acres, according to the NWI. The Preferred Alternative crosses one scrub-shrub wetland, W017, and one forested wetland, W018, within this watershed. W017 consists of 0.38 acre moderate quality wetland within the proposed ROW. This wetland appeared to be a clearcut cypress slough, where regrowth of vegetation has yielded a scrub-shrub community at this point in time. W018 consists of 3.32 acres within the proposed ROW and is located within a large floodplain flat tributary to Otoucalofa Creek. W018 contains mature trees, a dense herbaceous layer with obligate wetland species, and a thin mucky soil layer. Due to its landscape position, hydrologic influence, and lack of disturbance, this wetland exhibits superior condition and associated provision of superior function and value to the surrounding landscape.

The Moreland Creek-Turkey Creek sub-watershed contains 280 acres total of mapped wetland area on the NWI. The majority, 225 acres, is mapped as forested wetland, and 50 acres is mapped as shrub-shrub wetland. The proposed ROW corridor within this sub-watershed contains a total of 0.53 acre of scrub-shrub wetland across W030b, W031b, and W032b, which are located adjacent to the maintained ROW, within a stand of planted pines. Vegetation in these wetlands is periodically cleared due to land management activities; therefore, their current

stature consists of scrub-shrub habitat. These scrub-shrub wetlands exhibited moderate provision of wetland functions and values. A total of 0.82 acre of forested wetlands was identified across W020b, W023b, W024, W027b, W028b, and W029b, all exhibiting moderate wetland functions and values. W020b, W023b, W028b, and W029b. W024 comprises a small 0.02 acre forested hillside seep within this watershed. All other forested wetlands in this sub-watershed are located adjacent to emergent wetland habitat in the existing utility line ROW paralleling the proposed new TVA ROW.

Appendix E – Noise During Transmission Line Construction and Operation

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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 (USEPA) and the Department of Housing and Urban Development (HUD) have established noise guidelines. USEPA guidelines are based on an equivalent day/night average sound level (DNL), which is a 24-hour average sound level with 10 dB added to hours between 10 p.m. and 7 a.m., since people are more sensitive to nighttime noise. USEPA recommends a guideline of DNL less than 55 dBA to protect the health and well-being of the public with an adequate margin of safety. HUD guidelines use an upper limit DNL of 65 dBA for acceptable residential development and an upper limit DNL of 75 dBA for acceptable commercial development. TVA generally uses the USEPA guideline of 55 dBA DNL at the nearest residence and 65 dBA at the property line in industrial areas to assess the noise impact of a project. In addition, TVA 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 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 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. Typical construction activities for a TL are described in Section 2.2. Maximum noise levels generated by the various pieces of construction equipment typically range from about 70 to 85 dBA at 50 feet (Bolt et al. 1971). An exception would be the use of

track drills for building roads and installing foundations in rocky areas; track drills have a typical maximum noise level of 98 dBA at 50 feet. Use of track drills is not expected to be widespread.

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

Construction activities would be limited to daylight hours. Because of the sequence of construction activities, construction noise at a given point along the TL 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 TLs, 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, nonrainy conditions, such as heavy fog, the resulting small increase in the background noise levels is not expected to result in annoyance to adjacent residents.

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

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