Document Type: EA-Administrative Record
Index Field: Environmental Document Transmitted Public/Agencies
Project Name: Union-Tupelo 161-kV Transmission Line
Project Number: 2012-38

ENVIRONMENTAL ASSESSMENT

UNION-TUPELO NO. 3 161-KV TRANSMISSION LINE

Lee and Union Counties, Mississippi

Prepared by:
TENNESSEE VALLEY AUTHORITY
Chattanooga, Tennessee

October 2014

Direct Comments to:

Anita E. Masters
NEPA Program and Valley Projects
Tennessee Valley Authority
1101 Market Street
Chattanooga, Tennessee 37402
Phone: 423-751-8697
E-mail: aemasters@tva.gov

This page intentionally left blank

Table of Contents

List of Appendices

List of Tables

List of Figures

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 effects
BMP(s)	Best management practice(s) or accepted construction practice(s) designed to reduce environmental effects
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
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
EMF	Electromagnetic field
endangered species	A species in danger of extinction throughout all or a significant part of its range
EO	Executive Order
ESA	Endangered Species Act
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.
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.
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
MDEQ	Mississippi Department of Environmental Quality
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
NLEB	Northern long-eared bat

NPS	National Park Service
NRHP	National Register of Historic Places
outage	An interruption of the electric power supply to a user
riparian	Related to or located on the banks of a river or stream
ROW	Right-of-way, a corridor containing a transmission line
runoff	That portion of total precipitation that eventually enters a stream or river
SHPO	State Historic Preservation Officer
SMZ	Streamside management zone
structure	A pole or tower that supports a transmission line
substation	A facility connected to a transmission line used to reduce voltage so that electric power may be delivered to a local power company 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
threatened species	A species likely to become endangered within the foreseeable future
TVA	Tennessee Valley Authority
TVAR	Tennessee Valley Archaeological Research
TVARAM	TVA Rapid Assessment Method, a version of the Ohio Rapid Assessment Method for categorizing wetlands, designed specifically for the TVA region
US	United States
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
WHO	World Health Organization
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
wet weather conveyance	A stream or waterway that contains running water only after a precipitation event and that does not typically support aquatic life

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 system in Lee and Union counties and surrounding areas of Mississippi by constructing, operating, and maintaining approximately 16 miles of new 161-kilovolt (kV) transmission line, as shown in Figure 1-1. This line would complete a third 161-kV power supply between the Union 500-kV Substation and the Tupelo 161-kV Substation.

As proposed, the transmission line would connect TVA's Union 500-kV Substation (just north of Sherman) to a tap point (existing Structure 62 in the Tupelo-Turner Park 161-kV Transmission Line) outside the Turner Park 161-kV Substation. This substation is located north of Tupelo in the Turner Park Industrial Park. Beginning at the tap point (Structure 62), the existing 6.6-mile Tupelo-Turner Park 161-kV Transmission Line would complete the approximately 22.6 mile connection between the Union 500-kV Substation and the Tupelo 161-kV Substation (i.e., the Union-Tupelo No. 3 161-kV Transmission Line).

Along the proposed 16-mile section of transmission line, approximately 10.5 miles would parallel TVA's existing Browns Ferry-Union 500-kV Transmission Line. Although a 100-foot wide ROW would be needed for the entire line, a combination of existing and new ROW would be used. Approximately 6.5 miles would be entirely on existing ROW, about 4 miles would require an additional 72.5 feet of new ROW (using 27.5 feet of existing ROW), and roughly 5.5 miles would be constructed on entirely new ROW. Thus, the proposed transmission line would occupy approximately 102 acres of new ROW and 92 acres of existing ROW. In anticipation of possible future system needs, double-circuit, two-pole structures would be utilized during construction of the proposed transmission line.

Additionally, TVA would install a new breaker and bay at the Union 500-kV Substation, and a new transformer at the Tupelo 161-kV Substation. The TVA map board displays would be updated to reflect the new facilities. The proposed actions would be completed by June 2016 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 provided by the North American Electric Reliability Corporation (NERC). The standards state that the TVA transmission system must be able to survive single-failure events while continuing to serve customer loads with adequate voltage and no overloaded facilities while maintaining adequate line clearances as required by the National Electric Safety Code.

Currently, two 161-kV transmission lines serve TVA's Tupelo 161-kV Substation from its Union 500-kV Substation. The Union-Tupelo No. 1 161-kV Transmission Line has multiple delivery point connections (substations) along its path. The Union-Tupelo No. 2 161-kV Transmission Line has no delivery point connections and serves as a backup to the Union-Tupelo No. 1 line. The reliability of the Union-Tupelo No.1 Transmission Line is considered at risk due to the total load (i.e., power demand), as well as the number of delivery points on this transmission line. The loss of any section of this line during heavy electrical usage could result in an overloading of the Union-Tupelo No. 2 Transmission Line.

Additionally, the electric loads for the Turner Park and Barnes Crossing 161-kV substations are presently supplied radially (i.e., by a single source) out of the Tupelo 161-kV Substation. These loads are mostly comprised of industrial customers in Tombigbee Electric Power Association's (TEPA) territory. When either the Turner Park to Barnes Crossing or the Barnes Crossing to Tupelo sections of the Turner Park-Tupelo 161-kV Transmission Line are lost, there is no backup power supply available for these loads. Therefore, if an inadvertent outage occurs on either of these line sections, no electricity can be provided to these customers until the cause is determined and repairs are made.

In addition to the contingency issues described above, TVA is also engaged in the Clean Air Initiative which has involved studying TVA's long-term power system needs as well as the future mix of power generation options. Several of TVA's existing coal fired generation being retired under this initiative. The loss of generation at TVA's Colbert Fossil Plant near Muscle Shoals, Alabama is expected to worsen the overloading conditions in the Tupelo area. This further drives the urgency of the recommended improvements for the Lee and Union counties and surrounding areas of Mississippi.

Unless action is taken, the increasing power loads caused by commercial and residential growth in the area, as well as the loss of generation at the Colbert Fossil Plant, would result in overloaded transformers and other electrical equipment damage or failure. Overloading of a transmission line can cause alternating heating and cooling of the conductor material, which weakens the transmission line over time. Overloading can also cause a transmission line to sag in excess of design criteria, resulting in inadequate clearance between the transmission line and the ground. If a transformer and/or transmission line fails, the result is a power outage.

To ensure that the Mississippi areas of Lee and Union counties are supplied with a continuous, reliable source of electric power, TVA needs to provide additional electric service to the Tupelo area. The proposed new transmission project would provide a third connection between the Union 500-kV and Tupelo 161-kV substations.

Additionally, TVA needs to plan for reasonably foreseeable load growth in the area. The proposed project would meet these needs by:

- Relieving electrical load on the Union-Tupelo No. 1 and Union-Tupelo No. 2 transmission lines;
- Preventing the Union-Tupelo No. 2 line from becoming overloaded during times of heavy power use;
- Serving the Turner Park and Barnes Crossing substation loads from either the Union 500-kV or Tupelo 161-kV substations;
- Supporting TVA's Clean Air Initiative; and
- Allowing TVA to meet the reliability criteria provided by the NERC.

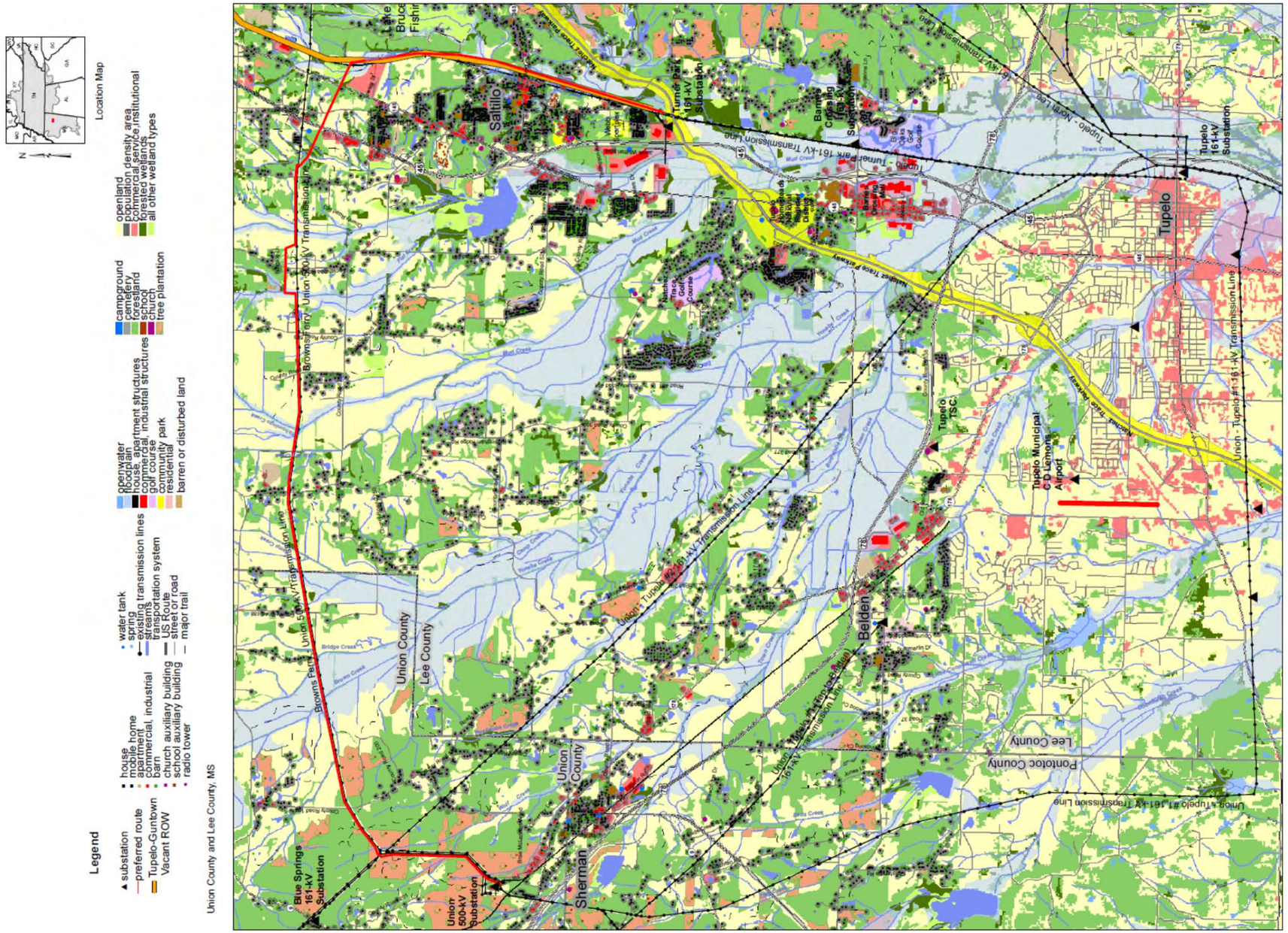

Figure 1-1. Proposed Transmission Line Route, Lee and Union Counties Mississippi

This page intentionally left blank

1.3 Decisions to be Made

The primary decision before TVA is whether to provide additional electric service to the existing power supply system in Lee and Union counties in Mississippi. If the proposed transmission line is to be built, other secondary decisions are involved. These include the considerations listed below. A detailed description of the alternatives is provided in Section 2.1.

- Timing of the proposed improvements;
- Most suitable routes for the proposed transmission line; and
- Determination of any necessary mitigation and/or monitoring to meet TVA standards and to minimize the potential for damage to environmental resources.

1.4 Other Pertinent Environmental Reviews or Documentation

In 2011, TVA completed the *Integrated Resource Plan: TVA's Environmental & Energy Future* (TVA 2011a). This plan determines how TVA will meet the electric power demands of its customers over the next 20 years while fulfilling TVA's mission of providing low-cost, reliable power, environmental stewardship, and economic development. TVA released the accompanying Environmental Impact Statement for TVA's Integrated Resource Plan: *TVA's Environmental & Energy Future in March 2011* (TVA 2011b).

1.5 Scoping Process and Public Involvement

TVA contacted the following federal and state agencies, as well as federally recognized Native American tribes, concerning the proposed project.

- The Chickasaw Nation
- Choctaw Nation of Oklahoma
- Jena Band of Choctaw Indians
- Mississippi Band of Choctaw Indians
- National Park Service (NPS)
- Mississippi Department of Environmental Quality (MDEQ)
- Mississippi Department of Transportation
- Mississippi Department of Archives and History
- United States Army Corps of Engineers (USACE)
- United States Fish and Wildlife Service (USFWS)

This proposal was reviewed to ensure conformity with Executive Order (EO) 11988 (Floodplain Management), EO 11990 (Protection of Wetlands), the Farmland Protection Policy Act, the National Historic Preservation Act, the Endangered Species Act (ESA), Section 404 of the Clean Water Act (CWA), and EO 12372 (Intergovernmental Review). Correspondence received from agencies related to this review and coordination is included in Appendix A.

TVA developed a public communication plan that included a website with information about the project, a map of the alternative routes, and feedback mechanisms. The 421 property owners who could potentially be affected by any of the route alternatives or had property near the route alternatives, along with 11 public officials, were invited to a project open house. TVA used local news outlets and notices placed in the local newspapers to notify other interested members of the public of the open house. TVA held the open house, which was attended by 105 people, on September 13, 2012, at the BanCorp South Conference Center in Tupelo, Mississippi.

At the open house, TVA presented a network of seven alternative transmission line routes, comprised of 15 different line segments, to the public for comment (see Figure 1-2). The alternative transmission line segments are described in Section 2.3.5.1. The primary concerns expressed by the public included the following issues:

- The effect on residential development in the area
- The effect on property values
- The potential impacts to existing farmland

Other written input included a formal resolution from the City of Saltillo, Mississippi as well as letters from TEPA, and the Mayor of Tupelo. These comments related directly to future land use and development along with local power system needs in the future.

A 30-day public review and comment period was held following the open house, where TVA accepted public comments on the alternative transmission line routes and other issues. A toll-free phone number and facsimile number were made available to facilitate comments. During the comment period, several landowners contacted TVA to express their concerns, most of which were similar to those voiced at the open house.

At the conclusion of the comment period, TVA made minor adjustments to some of the proposed transmission line route segments in response to the comments received. TVA then performed analysis of the adjusted alternatives to determine a preferred route. TVA announced the preferred route to the public in March 2013. Letters were sent to affected property owners and information was provided to the public through TVA's Web site.

As a result of information obtained following this announcement from both public and agency comments as well as field surveys, TVA made adjustments to the preferred transmission line route (Figure 1-1). These adjustments are described in Section 2.3.8 and are listed in Table 2-3.

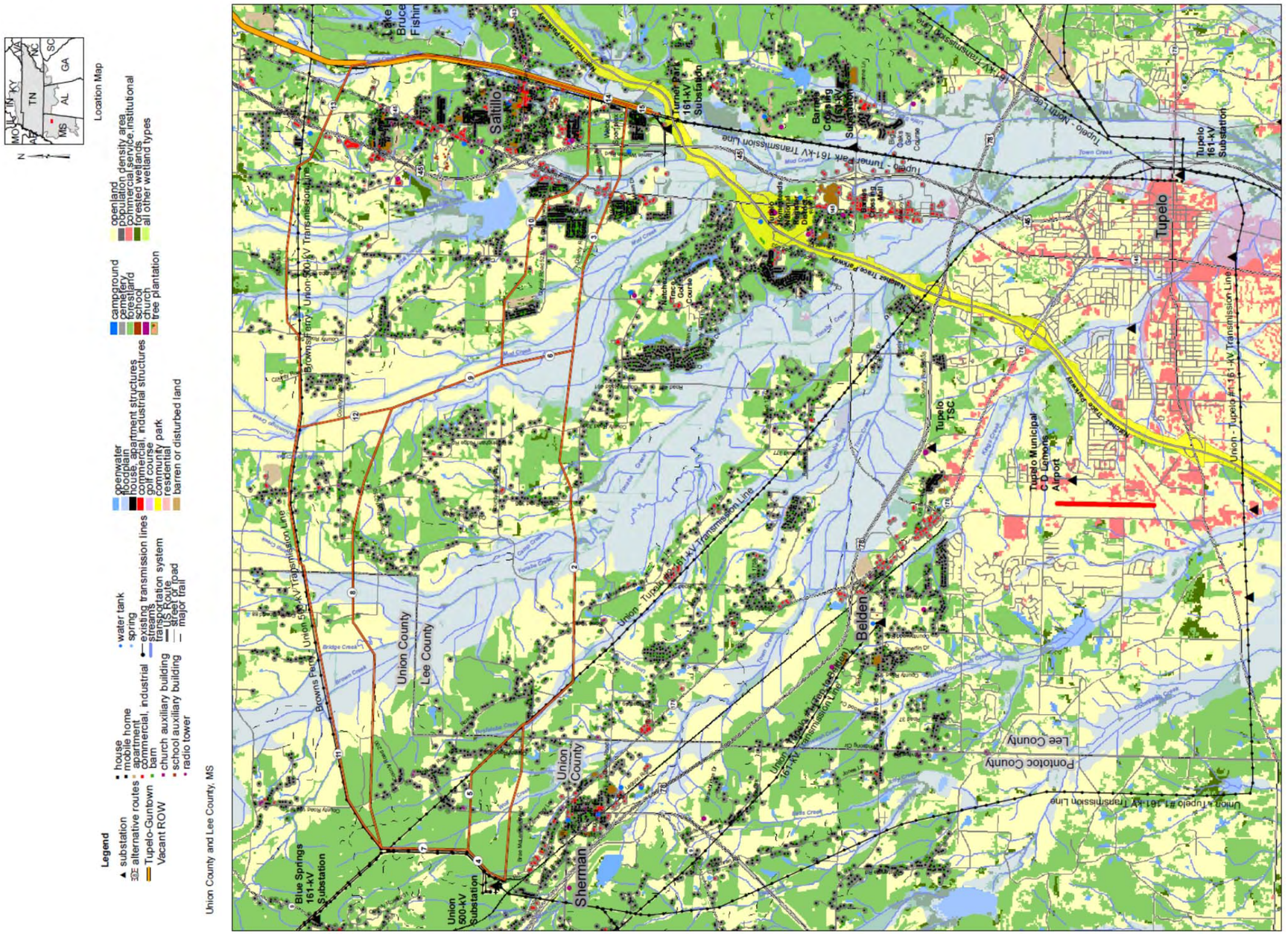

Figure 1-2. Alternative Route Segments for the Proposed Union-Tupelo No. 3 161-kV Transmission Line Route in Lee and Union Counties, Mississippi

This page intentionally left blank

1.6 Issues to be Addressed

TVA identified resources that could potentially be affected by the construction, operation, and maintenance of the proposed project through an early internal scoping process (see Section 2.3). Potential impacts to the following environmental resources are addressed in this environmental assessment (EA).

- Water quality for both surface water 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
- Recreation, parks, and managed areas
- Land use and prime farmland
- Socioeconomics and environmental justice

Potential effects related to air quality and to hazardous and nonhazardous wastes were considered. However, because of the nature of the action, any potential effects to these resources would be minor and insignificant. Thus, potential effects to these resources were not analyzed in detail.

1.7 Necessary Federal Permits or Licenses

A permit would be required from the state of Mississippi for the discharge of construction site storm water associated with the construction of the transmission line. TVA would prepare the required erosion and sedimentation control plans and coordinate them with the appropriate state and local authorities. A permit may also be required for burning trees and other combustible materials removed during construction. A Section 404 permit would be obtained from the USACE if construction activities would result in the discharge of dredge or fill into waters of the United States.

This page intentionally left blank

CHAPTER 2

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

As described in Chapter 1, TVA proposes to construct, operate, and maintain approximately 16 miles of new 161-kV transmission line from the Union 500-kV Substation to a tap point outside the Turner Park 161-kV Substation. Beginning at the tap point, the remaining 6.6-miles of the existing Tupelo-Turner Park 161-kV Transmission Line would complete the approximately 22.6 mile long connection between the Union 500-kV Substation and the Tupelo 161-kV Substation (i.e., the Union-Tupelo No. 3 161-kV Transmission Line). Additionally, TVA would install a new breaker and a bay at its Union 500-kV Substation as well as a new transformer at its Tupelo 161-kV Substation. The TVA map board displays would be updated to reflect the new transmission assets.

This chapter contains six major sections that provide the following information:

1. A description of alternatives;
2. A description of the construction, operation, and maintenance of the proposed transmission line;
3. An explanation of the transmission line siting process;
4. A comparison of the alternative transmission line routes;
5. A comparison of anticipated environmental impacts of the proposed alternatives;
6. The identification of the Preferred Alternative.

2.1 Alternatives

Two alternatives (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 construction, operation, and maintenance of the proposed transmission assets.

2.1.1 No Action Alternative – Do Not Construct Additional Transmission Facilities

Under the No Action Alternative, TVA would not construct the proposed project. As a result, the TVA power system in Lee and Union counties and surrounding areas of Mississippi would continue to operate under the current conditions, increasing the risk for substation and transmission line overloading, loss of service, and occurrence of violations of NERC reliability criteria. TVA's ability to provide a strong, reliable source of power for continued economic health and residential and commercial growth in the area would be jeopardized.

Because of TVA's obligation to serve this area and the need to continue 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 – Construct, Operate, and Maintain 161-kV Transmission Assets

Under the Action Alternative, TVA would construct, operate, and maintain a 161-kV transmission line between the Union 500-kV Substation and a tap point outside the Turner Park 161-kV Substation. From the tap point, the remaining 6.6 miles of the existing Tupelo-Turner Park 161-kV Transmission Line would complete the connection between the Union 500-kV Substation and the Tupelo 161-kV Substation (Figure 1-1). In anticipation of possible future system needs, double-circuit structures would be utilized for the construction of the proposed Union-Tupelo No. 3 161-kV Transmission Line.

The proposed transmission line would utilize double-steel poles on a 100-foot-wide ROW. Approximately 10.5 miles would parallel TVA's existing Browns Ferry-Union 500-kV Transmission Line. The first 6.5 miles of this section would be on existing ROW, and the remaining 4 miles of the 10.5-mile section would require an additional 72.5 feet of new ROW. The remaining 5.5 miles would be constructed on entirely new ROW.

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

To facilitate the operation of the new transmission line, TVA would install, operate, and maintain a new breaker and bay at the Union 500-kV Substation, and a new transformer at the Tupelo 161-kV Substation. The TVA map board displays would be updated to reflect the new facilities.

Additional information detailing the implementation of the Action Alternative, as well as how the most suitable transmission line route was determined is provided in the following 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 it was determined that these other alternatives would not meet project needs. These alternatives, which were considered but not selected for further consideration, are described briefly below.

2.1.3.1 Rebuild Union-Tupelo No. 2 161-kV Transmission Line

Under this alternative, TVA would rebuild the existing Union-Tupelo No. 2 161-kV Transmission Line. In order to accommodate the larger conductor size, all of the existing structures would need to be replaced. Switches and other terminal equipment would be required at the Tupelo 161-kV Substation.

Implementation of this alternative would address the overloading concerns with the Union-Tupelo No. 2 Transmission Line. However, the action proposed under this alternative would not add to the robustness of the TVA transmission system in the area to the degree that the construction of a new transmission line would. Further, the Barnes Crossing and Turner Park 161-kV substation loads are fed radially from the Tupelo 161-kV Substation, and implementing this alternative would not improve the reliability for these loads as well as the Action Alternative would. Finally, undertaking this alternative would not address the anticipated future load growth in the area. For these reasons, this alternative was eliminated from further consideration.

2.1.3.2 Construct Bankhead 161-kV Switching Station and Transmission Line from Bankhead to Tupelo

Under this alternative, TVA would build a new four-breaker Bankhead 161-kV Switching Station and approximately 16 miles of new 161-kV transmission line between the new switching station and the Tupelo 161-kV Substation.

Adoption of this alternative would address the overloading concerns with the Union-Tupelo No. 2 Transmission Line. However, implementing this option would not resolve reliability issues with the electrical loads at the Barnes Crossing and Tupelo substations, nor would it meet the future load growth mentioned in the previous section. Additionally, implementing this alternative would be considerably more expensive than the Action Alternative. For these reasons, 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 transmission line and associated assets. The easement would require maintenance to avoid the risk of fires and other accidents. The ROW provides a safety margin between the high-voltage conductors and surrounding structures and vegetation. For the proposed project, a combination of new and existing TVA ROW would be utilized for the proposed transmission line.

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

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

TVA ROW Clearing Specifications, *Environmental Quality Protection Specifications for Transmission Line Construction*, *Transmission Construction Guidelines Near Streams* (Appendices B, C, and D), and *Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities* (Muncy 2012) would provide guidance for clearing and construction activities. 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 Clean Air Act, project activities would be in conformity with the requirements under the State Implementation Plan for attaining air quality standards.

Following clearing and construction, vegetative cover on the ROW would be restored to its condition prior to construction, to the extent practicable, utilizing appropriate seed mixtures as described in Muncy (2012) or working with property owners with crop land to ensure restoration supports or minimizes impacts to production. Erosion controls would remain in place until the vegetation communities become fully established. Streamside areas would be re-vegetated as described in Appendices B, C, and D, and in Muncy (2012). Failure to maintain adequate clearance can result in dangerous situations. Native vegetation or other plants with favorable growth patterns (slow growth and low mature heights) would be maintained within the ROW following construction.

2.2.1.2 Access Road Identification

Access roads would be needed to allow vehicular access to each structure and other points along the ROW. Typically, new permanent or temporary access roads used for transmission lines are located on the ROW wherever possible, and they are designed to avoid severe slope conditions and to minimize stream crossings. Access roads are typically about 20 feet wide and are surfaced with dirt, mulch, or gravel.

Culverts and other drainage devices, fences, and gates would be installed as necessary. Culverts installed in any permanent streams would likely be removed following construction. However, if circumstances require leaving such culverts in the stream, TVA would secure all appropriate permits. At crossings of wet-weather conveyances (i.e., streams that run only following a rainfall), culverts would be left or removed, depending on any permit conditions that might apply. Additional applicable ROW clearing and environmental quality protection specifications are listed in Appendices B and C.

2.2.1.3 Construction Assembly/Laydown Area Selection

A construction assembly area (or “laydown” area) would be required for worker assembly, vehicle parking, and material storage. This area may be on existing substation property or may be leased from a private landowner for the duration of the construction period. The property is typically leased by TVA about one month before construction begins. Properties such as existing parking lots or areas used previously as car lots are ideal laydown areas because site preparation is minimal. Selection criteria used for locating potential laydown areas include an area typically 5 acres in size; relatively flat; well drained; previously cleared; preferably graveled and fenced; preferably wide access points with appropriate culverts; sufficiently distant from streams, wetlands, or sensitive environmental features; and located adjacent to an existing paved road near the transmission line. TVA initially attempts to use or lease properties that require no site preparation. However, at times, the property may require some minor grading and installation of drainage structures such as culverts. Likewise, the area may require graveling and fencing. Trailers used for material storage and office space would be parked on the site. Following completion of construction

activities, all trailers, unused materials, and construction debris would be removed from the site. Removal of TVA-installed fencing and site restoration would be performed by TVA at the discretion of the landowner.

2.2.1.4 Structures and Conductors

The transmission structure is the most visible element of the electric transmission system. Its function is to keep an adequate distance between the high-voltage conductors and the surrounding area. The proposed transmission line would utilize mostly double steel-pole structures similar to those shown in Figure 2-1. Structure heights vary according to the terrain and would range between 50 and 130 feet. Most of the structures would be between 90 and 100 feet tall.

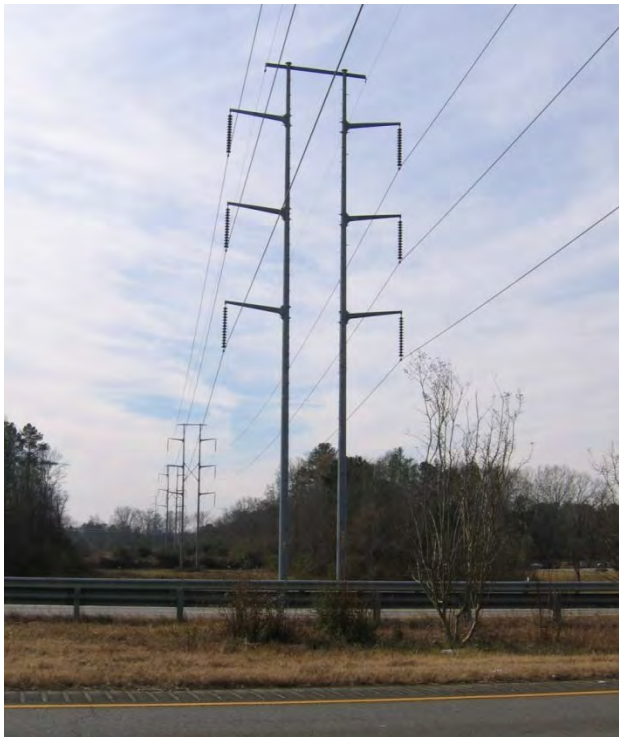

Figure 2-1. Example of Double Steel-Pole 161-kV Transmission Structures

Three conductors are required to make up a single-circuit in alternating-current transmission lines. For a 161-kV transmission line, each single-cable conductor is attached to insulators suspended from the structure cross arms. A smaller overhead ground wire or wires are attached to the top of the structures. This ground wire may contain fiber optic communication cables. The proposed transmission line would be constructed with double-circuit structures.

Poles at angles (angle points) in the transmission line may require supporting screw, rock, or log-anchored guys. Some angle structures may be self-supporting poles. 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 2 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.

Two switches would be installed outside of the Turner Park 161-kV Substation to facilitate the transmission line connection between Union and Tupelo. A switch structure would be placed at either side of existing Structure 62 in the Tupelo-Turner Park Transmission Line. These structures, similar to that shown in Figure 2-2, would be about 35 feet in height.

Figure 2-2. Example of a 161-kV Transmission Line Switch Structure

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

2.2.1.5 Conductor and Ground Wire Installation

Reels of conductor and ground wire would be delivered to various staging areas along the ROW, and temporary clearance poles would be installed at road crossings to reduce interference with traffic. A rope would be pulled from structure to structure. It would be connected to the conductor and ground wire and used to pull them down the line through pulleys suspended from the insulators. A bulldozer and specialized tensioning equipment would be used to pull conductors and ground wires to the proper tension. Crews would then clamp the wires to the insulators and remove the pulleys.

2.2.2 Operation and Maintenance

2.2.2.1 Inspection

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

2.2.2.2 Vegetation Management

Management of vegetation along the ROW is necessary to ensure access to structures and to maintain an adequate distance between transmission line conductors and vegetation. National Electric Safety Code requirements require a minimum vegetation clearance of 24 feet for a 161-kV transmission line. Vegetation management along the ROW would consist of two different activities: felling of danger trees adjacent to the cleared ROW (as described in Section 2.2.1.1), and vegetation control within the cleared ROW. These activities occur on approximately 3- to 5-year cycles.

Management of vegetation within the cleared ROW would include an integrated vegetation management approach designed to encourage the low-growing plant species and discourage tall-growing plant species. A vegetation re-clearing plan would be developed for each transmission line connection, based on the results of the periodic inspections described above. The two principal management techniques are mechanical mowing (using tractor-mounted rotary mowers) and herbicide application. Herbicides are normally applied in areas where heavy growth of woody vegetation is occurring on the ROW and mechanical mowing is not practical. Herbicides would be selectively applied from the ground with backpack sprayers or vehicle-mounted sprayers. In rare cases, helicopters could be used.

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

2.2.2.3 Structure Replacement

Other than vegetation management, only minor maintenance work is generally required. The transmission line structures and other components 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, and the replacement structure would be inserted into the same hole or an adjacent hole. Access to the structures would be via existing roads. Replacement of structures may require leveling the area surrounding the replaced structures, but additional area disturbance would be minor compared to the initial installation of the structure.

2.3 Siting Process

The process of siting the proposed transmission line followed the basic steps used by TVA to determine a transmission line route. These include the following steps.

- Define the study area.
- Collect data to minimize potential impacts to cultural and natural features.
- Generate general route segments that produce potential routes.
- Gather public input.
- Refine general route segments.
- Incorporate public input into the final selection of the transmission line route.

2.3.1 Definition of the Study Area

The study area was chosen to meet three basic objectives:

- Provide necessary transmission line access to the Union 500-kV Substation;
- Allow a large area for multiple candidate corridors to be identified in multiple alignments; and
- Allow for the possible co-location of a transmission line on existing utility corridors to the maximum extent possible.

The western project boundary was set by the location of the Union 500-kV Substation. The transmission lines leading out of the Union 500-kV Substation to the north also further establish the westernmost boundary of the study area. In addition, the existing Union-Tupelo No. 2 Transmission Line is located such that route alternatives located south of the No. 2 line would be impractical. The northern boundary of the study area is roughly determined by the existing Browns Ferry-Union 500-kV Transmission Line. The eastern boundary was set by the existing vacant transmission line route that was previously occupied by the Tupelo-Guntown Transmission Line. The southernmost boundary was determined primarily by two factors: the tap point at the Turner Park 161-kV Substation and the Natchez Trace Parkway.

2.3.2 Characterization of the Study Area

2.3.2.1 Natural and Cultural Features

The proposed project is located in the southeastern corner of Union County and much of central Lee County, Mississippi. Tupelo, the county seat of Lee County, is the main metropolitan center for the area.

The study area is part of the Blackland Prairie Level IV ecoregion. This area has a mix of flat and gently rolling terrain that is mostly cleared. Remaining forestland is a combination of commercial timber (pine plantations) and low-lying timber land likely to be floodplain or forested wetland. There are churches and cemeteries within the study area.

2.3.2.2 Land Use

The agricultural farmland is a mix of both commercial farming (corn, soybeans, and cotton) and pasture used for cattle. The residential homes are built up around the main road systems. The City of Tupelo is located in the southern portion of the study area and is a blend of residential and commercial development with some industrial. Also in the extreme southwest portion of the study area is the Sherman community with the Toyota assembly facility located just off the southwestern edge.

2.3.2.3 Transportation

The majority of the transportation features within the study area are secondary roads. United States Highway (US) 45 (a four-lane thoroughfare) and State Route (SR) 145 (the designation of the old US 45 that the state continues to maintain) run in a general north-south direction in the eastern portion of the study area. Avoidance of the Natchez Trace Parkway was a major consideration in project planning.

Two rail lines, the KCS (Kansas City Southern) and the BNSF (Burlington Northern and Santa Fe) intersect in Tupelo. The KCS line runs north to south, while the BNSF connects Birmingham and Memphis.

2.3.3 Data Collection

TVA first collected geographic data, such as topography, land use, transportation, environmental features, and cultural resources for the study areas. Information sources used in the substation siting study included design drawings for area transmission lines, data collected into a geographic information system (GIS), including United States Geological Survey digital line graphs, and Lee and Union County tax maps. Various proprietary data maintained by TVA in a corporate geo-referenced database, including Heritage file data on sensitive plants and animals, as well as on archaeological and historical resources, were also used.

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

Review from aerial photographs, tax maps, and other sources included line length of proposed transmission line connections, amount of existing ROW, road/highway crossings, construction access, amount of ROW needed, forest clearing, wetlands, sensitive stream and/or stream crossings, number of parcel/property tracts, development (both commercial and residential), historical areas and structures, archaeological, and recreational areas. The aerial photography, GIS-based map, and other maps and drawings were supplemented by reconnaissance throughout the study area by TVA.

2.3.4 Establishment and Application of Siting Criteria

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

Each of the transmission line route options was evaluated according to criteria related to engineering, environmental, land use, and cultural concerns. Specific criteria 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 transmission line. For example, a greater number of streams crossed, a longer transmission line route length, or a greater number of historic resources affected would produce a higher (worse) score.

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

- **Environmental Criteria** include the presence of wetlands or rare and endangered species and/or their habitat. Other factors include stream crossings or paralleling streams and aquatic features crossing or adjacent to the site.

- **Land Use Compatibility Criteria** consist of the number of individual property tracts required for the project, current land use practice of the tract(s), number of houses on or near the site, and the level of visual impact to surrounding area homes and the traveling public.

- **Cultural Criteria** include 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 then added to develop overall scores of each alternative route by engineering, environmental, land use, cultural, and overall total. For each of these categories, a ranking of each alternative route was calculated based on the relationship between the various routes' scores.

These rankings made it possible to recognize which routes would have the lowest and the highest impacts on engineering, environmental, land use, and cultural 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 transmission line route segments that would best meet the project needs while avoiding or reducing conflict with constraints (including sensitive environmental resources). Additional potential segments were identified by using known opportunities (such as existing utility corridors and existing ROW).

The straight-line distance between the identified TVA sources (Union 500-kV Substation and a structure in the existing Tupelo-Turner Park 161-kV Transmission Line, outside the Turner Park 161-kV Substation) is about 10 miles. The short distance, along with the presence of several existing transmission line ROWs in the area, several large floodplains, and developed residential and commercial areas limited the number of practicable alternative corridors that could be identified and studied for the project.

Fifteen route segments (see Figure 1-2) were developed using the identified terminating points (TVA substations) and the GIS-based land use/land cover model. Aerial photography and other data layers, such as property boundaries, digital elevation model results (which were used to identify steepness and terrain characteristics), and known transportation corridors were then evaluated and incorporated to identify opportunities for development of the various segments.

The identified route segments consisted of the following three categories.

- Segments parallel to existing TVA transmission lines on existing ROW;
- Segments parallel to existing TVA transmission lines that would require additional new ROW; and
- Segments located on new ROW.

2.3.5.1 Development of Potential Route Segments

Segment 1 (see Figure 1-2) originates at the Union 500-kV Substation and proceeds east approximately 10,500 feet crossing mostly forested areas, as well as Wolf Creek, before reaching the Union-Tupelo No. 2 161-kV Transmission Line and terminating into Segments 2 and 5. Segment 1 is approximately 2 miles long and is located on new ROW.

Segment 2 begins the end of Segments 1 and 5 and proceeds southeast, parallel to the Union-Tupelo No. 2 161-kV Transmission Line for approximately 4,400 feet, crossing Busfaloba Creek. Segment 2 then turns due east, crossing Mount Vernon Road, Yonaba Creek, Camp Creek, Birmingham Ridge Road, and Mud Creek before terminating into Segments 3 and 6. Segment 2 is approximately 5.2 miles long, with 0.9 mile parallel to existing ROW and 4.3 miles on new ROW.

Segment 3 begins at the end of Segment 2, crossing several tributaries of Mud Creek, McComb Avenue, and Industrial Park Road before terminating into Segments 14 and 15. Segment 3 is approximately 3.1 miles long and is located on new ROW.

Segment 4 begins at the Union 500-kV Substation and heads north, parallel to TVA's Browns Ferry-Union 500-kV Transmission Line. Segments 7 and 11 combine with Segment 4 to parallel this existing transmission line for approximately 7.4 miles.

Segment 5 begins at the end of Segment 4. This segment heads east for about 1 mile through forested land before reaching the Union-Tupelo No. 2 161-kV Transmission Line. Segment 5 then turns southeast, parallel to the existing TVA transmission line for approximately 1 mile before terminating at Segments 1 and 2. Segment 5 is approximately 2 miles long with 1 mile parallel to existing ROW and 1 mile on new ROW.

Segments 6, 9, and 12 connect the northern route corridor with the southern route corridor. Segment 6 provides a path between two route segments, 3 and 9. Segment 6 is approximately 1 mile in length and runs roughly parallel to Mud Creek, maintaining an acceptable distance from the edge of the creek bank. Segment 12 connects the northern-most route with a central route. Segment 12 is approximately 1 mile in length, and crosses mostly open land along with CR 25 and Little Dry Creek.

Segment 8 begins at the end of Segment 7, near the intersection of the Browns Ferry-Union 500-kV Transmission Line and the Union-Tupelo No. 2 161-kV Transmission Line. This segment heads east for approximately 2.1 miles, crossing Brown Creek and Bridge Creek, then turning slightly northeast crossing Camp Creek. Segment 8 continues east, then slightly southeast crossing Birmingham Ridge Road before terminating into Segments 9 and 12. Segment 8 is approximately 5.1 miles long and is located on new ROW.

Segment 10 begins at the end of Segment 9 and heads in a southeasterly direction crossing tributaries of Mud Creek and Industrial Park Road before terminating into Segments 13 and 14. Segment 10 is approximately 3.7 miles long and is on new ROW.

Segment 13 begins at the end of Segment 11, and continues parallel to the Browns Ferry-Union 500-kV Transmission Line for approximately 1.3 miles. Segment 13 then turns northeast, and then east for approximately 2.2 miles, before crossing the Browns-Ferry Union 500-kV Transmission Line. The route continues southeast for approximately 1.5 miles, crossing a railroad track and Sand Creek. Segment 13 then roughly follows the old Tupelo-Guntown Transmission Line ROW on the east side of the railroad tracks until terminating at the end of Segments 10 and 14. Segment 13 is approximately 8 miles long with 1.3 miles parallel to existing ROW and 6.7 miles on new ROW.

Segment 14 begins at the terminus end of Segments 10 and 13 and heads south for approximately 0.5 mile, following the old Tupelo-Guntown Transmission Line ROW, before terminating at Segment 3 and 15. This segment is approximately 0.5 mile long and is located on new ROW.

Segment 15 begins at the end of Segment 3 and 14. This segment heads south for about 0.5 mile before terminating at an existing structure in TVA's existing Tupelo-Turner Park 161-kV Transmission Line. As mentioned previously, this connection would effectively create the new Union-Tupelo No. 3 161-kV Transmission Line. Segment 15 is approximately 0.5 mile long and is situated on new ROW.

2.3.5.2 Potential Transmission Line Corridors

Seven alternative transmission line routes, consisting of a combination of these 15 constituent segments (see Figure 1-2 and Table 2-1) were then developed. These routes were evaluated as described below.

Table 2-1. Alternative Route Corridors and Constituent Segments

Alternative Route	Constituent Segments
1	1, 2, 3, 15
2	2, 3, 4, 5, 15
3	3, 4, 6, 7, 8, 9, 15
4	4, 7, 8, 9, 10, 14, 15
5	3, 4, 6, 7, 9, 11, 12, 15
6	4, 7, 9, 10, 11, 12, 14, 15
7	4, 7, 11, 13, 14, 15

2.3.6 Route Identification and Evaluation

Each of the seven alternative routes offered different opportunities and constraints. Several opportunities were provided for portions of the proposed transmission line to either use existing ROW or parallel existing ROW, thus reducing the overall new ROW required. Segments 4, 7, and 11 are parallel to TVA's Browns Ferry-Union 500-kV Transmission Line, and portions of Segments 2 and 5 are parallel to TVA's Union-Tupelo No. 2 161-kV Transmission Line. Additional opportunities include characteristics such as open undeveloped land and areas less suitable for development (commercial or residential).

Major constraints included sensitive environmental areas and land use conflicts. Several large floodplains within the study area restrict to a moderate degree the number of practical route alternatives. Due to the necessary east-west orientation of any of the transmission line route alternatives, the number of locations available for local road crossings was also a

constraint. Roads tend to be oriented north-south in the project area due to the north-south orientation of creeks and floodplains. The existing development occurring along the roads in the project area effectively restricted the selection for new transmission line crossings. Other land uses are varied, and do not offer specific limitations to route alternatives other than retaining the need to balance these uses with all those under consideration.

A major consideration for tying into the existing transmission line north of the Turner Park 161-kV Substation was the desire to eliminate any adverse visual impact to the existing transmission line that crosses the Natchez Trace Parkway or the need for an additional line crossing. Further, the existing Turner Park 161-kV Substation is located north of and adjacent to Natchez Trace boundary, and there are no changes proposed to it.

The assessment of the opportunities and constraints for these alternative routes are summarized below by engineering, environmental, land use, and cultural criteria.

Engineering

Engineering considerations for the Union-Tupelo No. 3 161-kV Transmission Line were numerous. Every route presented various issues with structure placement, stream crossings, existing facilities, large floodplain areas, road crossings, and existing development. However, terrain was not a significant issue. Primarily the engineering considerations were typical and did not present unusual challenges for a project of this size. All route alternatives presented a number of engineering factors to consider. Route 7 followed existing transmission line ROWs resulting in a line approximately 4 miles longer.

Environmental

All of the alternative routes considered cross several small streams, none of which are sensitive streams. Wetlands are sparse and intermittent and did not represent a major hurdle for the segments. However, large floodplain areas along the central and southern route segments affected the ranked ratings for those segments. Forested wetlands exist on every route option, but utilizing Route 7 would prevent creating newly fragmented forested areas since it would widen an existing easement rather than creating all new cleared areas.

Land Use

Common land uses in the area north of Tupelo include agriculture, pasture, cropland, and residential development. There are multiple county roads running north-south and east-west as is typical of an area with sectionalized parcels. Access to these areas would be a combination of many rural road crossings along with traversing the transmission line easement. Land use impacts resulting from the placement of the new transmission line adjacent to the existing lines is expected to be nearly non-existent.

Cultural

Cultural resources include features such as archaeological sites, cemeteries, historical sites, historic structures, churches, and recreational areas. Due to the routes being mostly on undeveloped pasture and cropland, no cultural constraints were identified along the proposed alternative segments. The land use/land cover analysis revealed only two archaeological sites in the vicinity of any of the alternative route segments.

The scores ranking the alternative routes ranged from 47.67 for Alternative Route 7 (i.e., the route that ranked best) to 79.50 for Alternative Route 4 (the route ranked worst). Results of the ranking are shown as Table 2-2.

Table 2-2. Alternative Route Rankings

Route Rank	Total Score Based on Criteria Analysis	Alternative Route	Constituent Segments
1	47.67	7	4, 7, 11, 13, 14, 15
2	50.86	5	3, 4, 6, 7, 9, 11, 12, 15
3	62.41	6	4, 7, 9, 10, 11, 12, 14, 15
4	68.38	3	3, 4, 6, 7, 8, 9, 15
5	69.90	1	1, 2, 3, 15
6	70.45	2	2, 3, 4, 5, 15
7	79.50	4	4, 7, 8, 9, 10, 14, 15

2.3.7 Identification of a Preferred Transmission Line Route

Based on analysis of the potential routes, TVA announced a preferred route for the Action Alternative in March 2013 (see Figure 1-1). TVA chose Alternative Route 7, consisting of Segments 4, 7, 11, 13, 14 and 15 as the preferred route for the proposed project.

Alternative Route 7 had the best overall score and also scored favorably in the land use and engineering categories. The primary contributing factors to the environmental score are the extensive use of co-location of lines, fewer overall stream crossings, and less forested clearing required than the routes requiring all-new ROW easements. Route 7 scored favorably in the land use category because this route reduced the impacts on future development by keeping the new line adjacent to existing transmission facilities. The use of Route 7 would enhance the capability of the power supply system to meet future needs in Union and Lee counties and surrounding areas of Mississippi. For these reasons, Route 7 was selected as the preferred transmission line route for the Action Alternative.

2.3.8 Explanation of Changes Along the Proposed Transmission Line Route

The preferred route was modified in a few locations from the original alignment as presented at the open house. These changes are reflected in Figure 1-1. A list of these modifications and explanations are provided below in Table 2-3.

Table 2-3. Modification to the Proposed Transmission Line Route

Location	Adjustment	Explanation of Adjustment
Intersection of Segments 7 and 11	Slight modification where the segment crosses under several existing TVA transmission lines.	Design change to provide proper electrical clearance from existing Union-Tupelo No. 2 161-kV Transmission Line.
Segment 11	This segment was shifted south to parallel the Browns Ferry-Union 500-kV Transmission Line at a point where the route originally veered away from the existing line. The segment now heads north on the eastern edge of the property line.	Property owner request to accommodate future plans.
Segment 11	Slight modification where the segment crosses under the Browns Ferry-Union 500-kV Transmission Line.	Design change to provide proper electrical clearance from existing transmission line.

Location	Adjustment	Explanation of Adjustment
Segment 15	Slight modification where the segment runs adjacent to the Saltillo Wastewater Treatment Plant.	Requested by Saltillo Wastewater Treatment Plant to accommodate future expansion of the facility.

2.4 Comparison of Environmental Effects by Alternative

A summary of the anticipated potential effects of implementing the No Action and the Action Alternative is provided in Table 2-4.

Table 2-4. 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.	No significant effects to groundwater quality or quantity are anticipated. No cumulative effects to groundwater are expected.
Surface Water	No changes in local surface water quality are anticipated.	Any effects to local surface waters would be minor. No cumulative effects to surface water quality are anticipated.
Aquatic Ecology	Aquatic life in local streams would not be affected.	With the implementation of protective measures, effects to aquatic life in local surface waters are expected to be minor.
Vegetation	Local vegetation would not be affected.	The proposed ROW would occupy approximately 194 acres, much of which is open land. Approximately 73 acres of forested areas would be cleared. Construction would have short-term effects on native flora and would disturb less than 1 acre of degraded prairie habitat. The project would have minor effects to the extent or abundance of invasive plants in the area.
Wildlife	Local wildlife would not be affected.	Wildlife inhabiting onsite forest, early successional, and edge habitats would be temporarily displaced to adjacent local habitats. Effects to populations of animals common to the area are expected to be minor.
Endangered and Threatened Species	No effects to endangered or threatened species or any designated critical habitats are anticipated.	No effects to any listed aquatic species or plants are anticipated. Approximately 13.45 acres of potentially suitable roosting habitat for the Indiana and/or northern long-eared bat would be removed between December 1 and March 15.
Floodplains	Local floodplain functions would not be affected.	Portions of the proposed transmission line and access roads would be situated in floodplains, but would not affect any floodplains or their functions.

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.	TVA would span 16.58 acres of wetland, requiring the conversion of 9.25 acres of moderate-quality forested wetlands to scrub/shrub or emergent wetlands within the ROW. TVA would mitigate the effects of the loss of trees within these 9.25 acres by purchasing wetland mitigation credits.
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. Noises and odors from construction activities would be temporary and minor.
Archaeological and Historic Resources	No effects to archaeological or historic resources are anticipated.	No effects to archaeological or historic resources are anticipated with the use of best management practices (BMPs).
Recreation, Parks, and Natural Areas	No changes in local recreation opportunities or natural areas are expected.	No local managed areas would be affected. No loss of local formal or informal recreational opportunities is expected.
Land use and Prime Farmlands	No land use changes would occur. No changes in local prime farmland are expected.	Construction and operation of the proposed transmission line would not prevent the continued or future use of agricultural practices on land within the ROW.
Socioeconomics and Environmental Justice	Over time, the lack of reliable power service could have adverse economic effects that could negatively affect all populations in the region.	Continued reliability of service would benefit the area and help maintain economic stability and growth in the area. Any adverse social, economic or environmental justice effects would be minor and would diminish over time.

2.5 Identification of Mitigation Measures

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

- To minimize the introduction and spread of invasive species in the ROW, access roads and adjacent areas consistent with EO 13112 (Invasive Species), TVA would follow standard operating procedures for re-vegetating with noninvasive plant species as defined in Muncy (2012).

- Wet-weather conveyances that could be affected by the proposed construction or maintenance would be protected by implementing standard BMPs as identified in Muncy (2012).

- TVA would utilize BMPs, as described by Muncy (2012), to minimize erosion during construction, operation, and maintenance activities.

- The environmental quality protection specifications as described in Appendices B, C, D, E, and F of this document would be implemented during project activities for the proposed transmission line and existing substations.

- In areas requiring chemical herbicide treatments, only USEPA-registered herbicides would be used in accordance with BMPs and label directions designed in part to restrict applications near receiving waters and to prevent unacceptable aquatic and groundwater impacts.

- To prevent impacts to the eastern purple coneflower, the area containing this listed plant would be avoided during construction.

- The ROW would be re-vegetated where natural vegetation would be removed.

- Any road improvements would be done in such a manner that upstream flood elevations would not be increased.

The following non-routine measures would be applied to reduce the potential for adverse environmental effects.

- TVA would selectively remove trees that could provide suitable Indiana and/or northern long-eared bat habitat between December 1 and March 15 (i.e., when this habitat is unoccupied because the bats are hibernating elsewhere).

- To compensate for the conversion of 9.25 acres of forested wetlands to herbaceous/shrub/scrub wetlands, TVA would mitigate the loss of trees by purchasing wetland mitigation credits prior to construction of the proposed transmission line.

- To avoid potential adverse effects to archaeological sites 22UN747, 22UN752, 22LE1074, and 22LE1075, work in the vicinity of these four sites would be performed using BMPs (i.e. wetland mats) within the sites' boundaries.

2.6 The Preferred Alternative

The Action Alternative (Construct, Operate, and Maintain 161-kV Transmission Line Assets) is TVA's Preferred Alternative for this proposed project. TVA's preferred transmission line route for the Action Alternative is Alternative Route Option 7. This route would utilize Alternative Route Segments 4, 7, 11, 13, 14 and 15 (Figure 1-2). This transmission line route would be approximately 16 miles in length and would occupy approximately 194 acres of both new and existing ROW. Approximately 73 acres of forest would be cleared for the new transmission line. The new transmission line as proposed would connect to the existing 6.6-mile long Tupelo-Turner Park 161-kV Transmission Line, completing an electrical connection to the Tupelo 161-kV Substation, and thus providing a third power source between the Union 500-kV Substation and the Tupelo 161-kV Substation, i.e., the Union-Tupelo No. 3 161-kV Transmission Line.

This page intentionally left blank

CHAPTER 3

3.0 AFFECTED ENVIRONMENT

The existing condition of environmental resources that could be affected by the proposed actions is described in this chapter. The descriptions below of the potentially affected environment are based on field surveys conducted in August 2013 and in April and May 2014, 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 scope of the environmental review included portions of Lee and Union Counties in Mississippi. The proposed 16 miles of transmission line would require a cleared 100-foot-wide ROW and would occupy approximately 102 acres of new ROW and 92 acres of existing ROW. Thus, the "project area," as used below, refers primarily to that area within the corridor of the proposed and existing ROWs and access roads, unless otherwise stated. The analysis of potential effects to endangered and threatened species and their habitats included records of occurrence within a 3-mile radius for terrestrial animals, a 5-mile radius for plants, and a 10-mile radius for aquatic animals. The analysis area for aquatic resources included the project area and its local watershed. The area of potential effect (APE) with respect to archaeological resources included the proposed 16-mile section of ROW between the Union 500-kV Substation and the tap point outside of the Turner Park 161-kV Substation. The APE for architectural resources covered all areas within a 0.5-mile radius from the proposed transmission line ROW, as well as any areas where the project would alter existing topography or vegetation in view of a historic resource.

Potential effects related to air quality, hazardous and nonhazardous wastes were considered. Potential effects on these resources were found to be minimal or absent, because of the nature of the action. The current conditions of other resources that could be affected by the proposed project construction, operation, and maintenance are described in this chapter.

3.1 Groundwater and Geology

The project is located in the Coastal Plain Physiographic Province and is underlain by the Black Warrior River aquifer[1] and a confining unit[2]. 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).

[1] An *aquifer* is an underground layer of material that contains groundwater and is capable of yielding water.
[2] A *confining unit* is a relatively impermeable layer of underground material that tends to isolate or "confine" the groundwater in the aquifer beneath it.

Most of the area in the vicinity of the proposed project is directly underlain by a confining unit known as the Selma Group. The Eutaw-McShan aquifer lies beneath the Selma Group and consists of interbedded sands, silts, and clays. The Tuscaloosa Aquifer System lies below the Eutaw-McShan aquifer and is comprised of four hydraulically connected regional aquifers, i.e., 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 area (MDEQ 2013).

Groundwater is abundant throughout Mississippi. In the vicinity of the proposed project, public and private wells pump water from several aquifers. Public water systems typically acquire water from deeper aquifers, while private wells are usually cased in shallow aquifers. Contamination of groundwater can occur when contaminants such as pesticides and fertilizers from agricultural 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 Lee and Union counties (USEPA 2013). Several Source Water Protection Areas for a public supply well are located within the proposed ROW (MDEQ 2013).

3.2 Surface Water

Precipitation in the vicinity of the proposed project averages about 56 inches per year. Typically, the wettest month is March, with an average of 6.1 inches of precipitation, and the driest month is August with 3.0 inches. The median annual air temperature is 62 degrees Fahrenheit, and the temperature ranges from a monthly average of 39 degrees Fahrenheit in January to 81 degrees Fahrenheit in July. Local stream flow varies with rainfall and averages about 20 inches of runoff per year or approximately 1.5 cubic feet per second per square mile of drainage area.

The local area drains southeast to the Tombigbee River, i.e., Aberdeen Lake on the Tennessee-Tombigbee Waterway. Primary drainages include Town Creek, Yonaba Creek, and Mud Creek. Main tributaries to Yonaba Creek are Camp Creek, Brown Creek, and Mud Creek. Tishomingo Creek, Flat Creek, Euclautubba Creek, and Sand Creek are tributaries that drain to Mud Creek.

The federal 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 U.S. Environmental Protection Agency. The term “303(d) list” refers to the list of impaired and threatened streams and water bodies identified by the state. Aberdeen Lake (downstream of Town Creek) is classified by the MDEQ for recreation. The remaining streams are classified for fish and wildlife. Sand Creek is on the state 303(d) list as impaired (i.e., not fully supporting its designated uses) due biological impairment.

3.3 Aquatic Ecology

The proposed transmission line is located within drainages of the Sand Creek-Town Creek watershed. Streams encountered within the proposed ROW were low-gradient and ranged from intermittent to perennial, and sand and clay were the dominant substrate. These types of streams are typical of the Southeastern Plains ecoregion (Chapman et al. 2004). Overall, 76 watercourses, including 20 perennial, 14 intermittent, seven ponds and 35 wet-weather conveyances occur along the proposed transmission line route and access roads.

Because transmission line construction and maintenance activities can affect riparian conditions and in-stream habitat, TVA evaluated the condition of both of these at each stream crossing along the proposed ROW route and along access roads. Riparian condition along the proposed ROW was evaluated during an August 2013 field survey using a TVA habitat assessment form. Proposed access roads were surveyed in May 2014. One additional perennial stream (Brock Creek) was documented adjacent to an access road. A listing of stream and pond crossings in the proposed ROW, excluding wet weather conveyances is provided in Appendix G. Additional information regarding watercourses in the vicinity of the project can be found in Section 3.2.

The following three classes were used to indicate the current condition of streamside vegetation along the route of the proposed transmission line, as defined below, and listed in Table 3-1.

- 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.

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

Table 3-1. Riparian Condition of Streams Located Within the Proposed Transmission Line ROW and Access Roads

Riparian Condition	Number of Perennial Streams	Number of Intermittent Streams	Total
Forested	9	7	16
Partially forested	9	4	13
Non-forested	1	3	4
Total	**19**	**14**	**33**

Based on these evaluations and other considerations (such as State 303(d) listing and presence of endangered or threatened aquatic species), TVA assigns appropriate SMZs and BMPs to reduce the potential for impacts to water quality and in-stream habitat for aquatic organisms.

3.4 Vegetation

Most of the proposed transmission line project would be located in the Blackland Prairie Level IV ecoregion, and a portion would lie in the Flatwoods/Blackland Prairie Margins Level IV ecoregion. This area is underlain by distinctive chalk, marl, and calcareous clays that give rise to unique prairie-like plant communities that are found primarily in parts of Alabama and Mississippi (Barone 2005; Chapman et al. 2004). In areas with deeper soils and less frequent disturbance, deciduous and mixed evergreen-deciduous forests are common components of the natural vegetation of the region. However, much of the natural vegetation of the Blackland Prairie ecoregion has been converted to row crop agriculture and pasture, leaving only small remnants of the natural plant communities that once dominated the landscape.

Vegetation in the proposed transmission line ROW and associated access roads is characterized by two main types, i.e., open land with mainly herbaceous cover, which comprises about 60 percent of the area, and forest, which covers the remaining 40 percent.

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. Cultivated agricultural fields, heavily manipulated pastures, or disturbed sites in various stages of residential or industrial development account for the vast majority herbaceous vegetation in the proposed ROW. Most of these areas are dominated by plants indicative of early successional habitats including many non-native species. Common species in the most disturbed areas include the row crops, cotton and soybeans, along with Bermuda grass, Brazilian vervain, clovers, dallisgrass, English plantain, Johnson grass, sicklepod, and tall fescue. (Although common names are used throughout this document, scientific names are provided in Appendix H for the reader's convenience.) Several acres of the proposed ROW, particularly where it is co-located with the Browns Ferry-Union 500-kV Transmission Line, are dominated by native forbs that require open habitat. Common species include anise-scented goldenrod, beaksedge, eastern gamagrass, hairy sunflower, rosinweed sunflower, whorled rosinweed, and yellow fringed orchid. In addition, the Mississippi state-listed eastern purple coneflower was observed in this habitat type.

Less than one percent of the herbaceous vegetation in the proposed ROW (less than 1 acre) is comprised of Blackland Prairie remnants, and these areas have been fragmented by previous disturbance. These areas are devoid of tree cover and are easily recognized by outcrops of white chalk and the distinctive vegetation found there. Native herbaceous species observed in this habitat include false aloe, Illinois bundleflower, little bluestem, pale spike lobelia, pasture heliotrope, prairie rosinweed, purple prairie clover, roundseed St. Johnswort, and white prairie clover. Despite the presence of many native species, both of the small prairie patches observed in the proposed ROW had a significant cover of non-native plants. The most common weeds in the prairie remnants include Queen Anne's lace, *sericea lespedeza*, silktree, and white sweet clover.

Forest occurring in the proposed ROW is comprised of three main subtypes, i.e., deciduous forest, mixed evergreen-deciduous forest, and evergreen forest. Deciduous forest, which is characterized by trees with overlapping crowns where deciduous species account for more than 75 percent of the canopy cover, is the most prevalent forest subtype in the proposed ROW and accounts for over 65 percent of the total forest cover. Deciduous forests are dominated by a variety of tree species including cherrybark oak, Durand oak, osage orange, pignut hickory, river birch, shagbark hickory, red maple, sugarberry, sweetgum, tulip poplar, black walnut, water oak, white oak, winged elm, and willow oak. The overstory

of some young, wet deciduous forests is dominated by early successional species like black willow, boxelder, and green ash. Most deciduous forests in the project area have trees that average between 12 and 20 inches diameter at breast height. The state-listed shrub, American bladdernut, was found in two small areas along the proposed ROW in this forest type.

Evergreen forest and mixed evergreen-deciduous forest account for the remaining 35 percent of forest cover. The most common evergreen tree species is loblolly pine, which is the dominant evergreen tree species in the project area. Some of the evergreen and mixed evergreen-deciduous forests are similar to deciduous forest in structure and species composition, but have a larger proportion of loblolly pine in the overstory. However, many of these stands are also young dense stands of loblolly pine that are regularly logged or that have established on land that has been cleared in the recent past. Eastern red cedars dominate the evergreen and mixed evergreen-deciduous forest in two small areas, both of which are adjacent to Blackland Prairie fragments. Some eastern red cedars in these areas have multiple stems, asymmetrical canopy, twisted trunks, and are growing on very drought prone sites underlain by chalk. Although these characteristics suggest that individual trees may be well over 100 years old (Leverett 1996), the sites where these trees occur are small (less than 2 acres) and fragmented by residential and agricultural development.

EO 13112 (Invasive Species) 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 et al. 2010). No federal-noxious weeds were observed, but multiple weed species were seen in the project area. During field surveys, invasive plants were prevalent in both forest and herbaceous vegetation types, but areas of herbaceous vegetation generally contained both greater numbers and cover of non-native, invasive plant species. This likely reflects the greater frequency and magnitude of disturbance present in areas of herbaceous vegetation. Disturbances associated with agriculture, grazing, and mowing prevent tree species from becoming established, and can encourage the invasion and establishment of weedy plants.

3.5 Wildlife

Habitat assessments for terrestrial animal species were conducted on August 6 and 7, 2013, for the 16-mile section of proposed ROW. Similar assessments for the associated access roads were performed on April 17, 2014. The proposed ROW contains several different habitat types and would occupy approximately 194 acres. The project area and surrounding landscape consist of a variety of forested habitat, early successional (pasture and agricultural) fields and industrial or residential parcels. Approximately 73 acres of forest would be cleared within the proposed ROW. An additional 0.05 acres of forest may need to be cleared along one access road. The remaining access roads would be located on existing roads, existing ROW or proposed ROW and would not require any tree clearing.

The westernmost section of the proposed ROW (beginning at the Union 500-kV Substation and extending to County Road (CR) 194) includes a mature white oak stand slightly west of CR 194, dense scrub-shrub habitat, pine re-growth, herbaceous grassland adjacent to a pine plantation, and mixed coniferous hardwood forest with a loblolly pine canopy and a mixed oak-hickory understory. The 8-mile segment of the proposed route between CR 194 and CR 683 crosses several agricultural fields and pastures separated by edge rows of mature trees and snags, and forest fragments. Forest fragments vary in type and include a

young, dense mixed pine-hardwood forest with several shagbark hickories along the outer edge, and a mature, mixed hardwood-cedar forest with several snags, hickories and white oaks. Twenty-one access roads are associated with this section. One access road would require the clearing of 112 feet of eastern red cedar, pine, and American sycamore forest around a wetland. Ten access roads are either on existing farm roads or would follow the proposed ROW though agricultural fields. Four access roads would follow the proposed ROW through agricultural fields as well as lowland deciduous forest and riparian areas. Three access roads would follow the existing ROW crossing one intermittent stream and three wetlands. Three access roads would be existing paved roads that have been extended to the proposed ROW.

The segment of proposed ROW between CR 683 and SR 145 would run through a mature hardwood forest with a very dense understory. American sycamore, southern red oak, sweetgum, and water oak dominate the canopy, while beauty-berry, persimmon, and winged elm comprise most of the midstory. The transmission line would cross an agricultural field near US 45. Adjacent to the highway are mature upland and bottomland hardwood forests, the latter of which also provide forested wetland habitat. The upland forest has a dense understory, while the bottomland hardwood forest is relatively open. The bottomland hardwood forest transitions to an extremely dense edge of bamboo and eastern red cedar that opens into a scrub-shrub area adjacent to a created pond. The proposed route would cross an existing ROW into a mature forest dominated by shagbark hickory with a very open midstory and understory. Other species include persimmon and white oak. There are no additional access roads identified for this section. Access to structures would be accomplished via the proposed ROW.

The four-mile segment of ROW between SR 145 and the Turner Park 161-kV Substation is as a mixture of lowland deciduous forest, agricultural fields and riparian forest. The forested land in this section of development is comprised of heavily vegetated, dense secondary growth with a closed canopy and appears to be subject to temporary seasonal flooding. Tree species include black walnut, river birch, sweetgum, and willow oak. Twelve watercourses (SMZs 001 through 012), as described in Appendix G, would be crossed by the proposed line in these four miles. Nine access roads are associated with this section of proposed ROW. Three of these would follow the proposed ROW through riparian forest, along the edges of agricultural fields or are existing paved roads. Five access roads would be located on farm roads or existing paved roads. The last of these access roads would follow the proposed ROW through deciduous forest.

Each of these varying community types described above and in Section 3.4 offers suitable habitat for species common to the region. Bottomland hardwood and riparian forested areas provide habitat to a variety of common, migrant and breeding birds such as the Acadian flycatcher, American redstart, barred owl, black and white warbler, blue grosbeak, broad winged and red-shouldered hawks, eastern wood-pewee, hairy woodpeckers, hooded warblers, pileated woodpeckers, red-bellied and red-headed woodpeckers, and yellow-throated warblers. In addition to providing suitable areas for birds, this habitat meets the needs of a variety of mammalian, amphibian and reptilian species. Typical mammals in this habitat include American beaver, cotton, golden and North American deer mice, eastern spotted skunk, long-tailed weasel, raccoon, southeastern shrew and Virginia opossum. Amphibian and reptilian species include those that utilize burrowing crayfish holes such as crayfish frog, mud salamander, and queen snake, as well as eastern spadefoot toad, Fowler’s toad, Mississippi ringneck snake, northern and southern cricket frogs, ribbon snake, rough green snake, spiny softshell turtle, and water snake.

Mixed pine-hardwood forests provide suitable habitat for birds such as the chipping sparrow, fox sparrow, northern cardinal, northern parula, ruby- and golden-crowned kinglet, scarlet and summer tanager, and the pine and the worm-eating warblers. Mammals typically found here include the eastern chipmunk, eastern gray squirrel, gray fox, nine-banded armadillo, southern short-tailed shrew, white-footed mouse, white-tailed deer, and the woodland vole. Common reptiles and amphibians found in this habitat include the corn snake, eastern box turtle, narrowmouth toad (especially where creek beds are present), and the mole and scarlet kingsnakes.

Pastures and agricultural fields offer habitat for various bird species such as the brown-headed cowbird, brown thrasher, common grackle, common yellowthroat, dickcissel, eastern kingbird, eastern meadowlark, field sparrow, grasshopper sparrow, house finch, house sparrow, and prairie warbler among others. Typical mammalian species commonly present in this habitat include eastern cottontail, eastern harvest mouse, eastern woodrat, hispid cotton rat, red fox and striped skunk. Amphibians and reptiles may also utilize this habitat type, especially where farm ponds are present. Species likely present include chorus frog, pickerel frog, eastern milk snake, eastern slender glass lizard, gray rat snake and smooth earth snake.

The open woodland areas with suitable forest structure and tree characteristics provide potential foraging and roosting habitat for a number of bats including the big brown, eastern red, evening, hoary, little brown, tricolored, Rafinesque's big eared, Seminole, and silver-haired bats. No caves were observed during field review, and none have any been reported from within three miles of the proposed ROW. No karst habitat, which typically provides suitable habitat for these bat species, exists in the local area.

There are no known wading bird colonies or other unique habitats reported from the vicinity of the proposed project. No wading bird colonies or other unique habitats were identified 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 critical habitats.

The State of Mississippi provides legal protection for species considered threatened, endangered, or deemed in need of management within the state other than those federally listed under the ESA. The legal listing is handled by the Mississippi Commission on Wildlife, Fisheries, and Parks. However, the Mississippi Natural Heritage Program and TVA both maintain databases of aquatic animal species that are considered threatened, endangered, special concern, or tracked in Mississippi. A listing of federally and state-listed endangered and threatened species that occur near the proposed transmission line route is provided as Table 3-2.

Table 3-2. Federally and State-Listed Species Known to Occur in the Vicinity of the Proposed Transmission Line Right-of-Way and/or Access Roads

Common Name	Scientific Name	Federal Status[1]	State Status[1]	State Rank[2]
Insects				
Mitchell's satyr butterfly[3]	*Neonympha mitchellii mitchellii*	END	END	S1
Fishes				
Spotfin shiner[4]	*Cyprinella spiloptera*		TRKD	S2
Steelcolor shiner[4]	*Cyprinella whipplei*		TRKD	S3
Crustaceans				
Tombigbee riverlet crayfish[5]	*Hobbseus petilus*		TRKD	S2
Mussels				
Rayed creekshell[4]	*Anodontoides radiatus*		TRKD	S2
Rough fatmucket[5]	*Lampsilis straminea straminea*		TRKD	S2
Plants				
American bladdernut[6]	*Staphylea trifolia*		SLNS	S3
American ginseng[7]	*Panax quinquefolius*		SLNS	S3
Butternut[7]	*Juglans cinerea*		SLNS	S2
Eastern purple coneflower[6]	*Echinacea purpurea*		SLNS	S3S4
Large yellow lady's slipper[7]	*Cypripedium parviflorum* var. *pubescens*		SLNS	S2S3
Price's potato bean[8]	*Apios priceana*	THR	SLNS	S1S2
Birds				
Bachman's sparrow	*Peucaea aestivalis*		TRKD	S3
Mammals				
Indiana bat[9]	*Myotis sodalis*	END	END	S1
Northern long-eared bat[3,10]	*Myotis septentrionalis*	PE		

Source: TVA Natural Heritage Database
[1] Status Codes: END = Endangered; SLNS = listed by the state, but not assigned a status; THR = Threatened; TRKD = Tracked by state natural heritage program (no legal status).
[2] State Ranks: S1 = Critically Imperiled; S2 = Imperiled; S3 = Vulnerable; S#S# = Denotes a range of ranks because the exact rarity of the element is uncertain (e.g., S1S2)
[3] This species has not been documented in Union or Lee County, but is thought by USFWS to have the potential to occur in Mississippi.
[4] Species is known to occur in Lee or Union County, but more than 10 miles from the proposed ROW.
[5] Species is known to occur within ten miles of the proposed ROW.
[6] Species was observed within the proposed ROW.
[7] Species is known to occur within 5 miles of the proposed ROW
[8] Price's potato bean is known to occur within Lee and Union County, but not within 5 miles from the proposed ROW.
[9] The Indiana bat has not been documented to occur within 3 miles of the proposed ROW.
[10] Federally listed as proposed endangered.

3.6.1 Aquatic Animals

Two aquatic species (the rough fatmucket mussel and the Tombigbee riverlet crayfish) that are tracked by the state, but have no legal status are known to occur within a ten-mile radius of the proposed transmission line (Table 3-2). Additionally, three aquatic species that are tracked by the state, but have no legal status are known to occur in Lee and Union Counties, but greater than a 10-mile radius to the proposed transmission line route (Table 3-2). These three species are the spotfin shiner, the steelcolor shiner, and the rayed creekshell mussel.

3.6.2 Plants

No federally listed plant species are known to occur within 5 miles of the proposed transmission line route. However, five state-listed plants (i.e., American bladdernut, American ginseng, butternut, eastern purple coneflower, and large yellow lady's slipper) occur within a five-mile vicinity of the proposed transmission line route (Table 3-2). Price's potato bean, which is federally listed as threatened, is known to occur in Lee and Union counties. Field surveys conducted in August 2013 did not identify Price's potato-bean within the proposed ROW corridor or associated access roads, although one small section of mesic forest adjacent to a remnant chalk prairie was potential habitat for this plant. No designated critical habitat for plant species occurs within the proposed ROW or associated access roads. American bladdernut and the eastern purple coneflower were observed during field surveys of the proposed ROW.

American bladdernut was observed in two separate areas along the eastern section of the proposed transmission line route within the riparian zone of Sand Creek. The number of individual plants was difficult to determine, because the species spreads clonally from underground stems, but both occurrences were small and did not cover more than a few hundred square feet combined.

Six individual plants of the eastern purple coneflower were found in one small section of the proposed ROW adjacent to the existing Browns Ferry-Union 500-kV Transmission Line. All of these were situated in the open ROW and not in the adjacent forest.

3.6.3 Terrestrial Animals

No federally protected or federally listed terrestrial animal species have been documented in Union or Lee Counties, Mississippi. One state-listed terrestrial animal species (Bachman's sparrow) has been documented within three miles of the proposed transmission line route. The Indiana bat has been reported in northern Mississippi, and the northern long-eared bat (NLEB) is thought by USFWS to have the potential to occur in Mississippi. The USFWS has determined that some parts of Mississippi may provide suitable summer roosting habitat for these species, therefore potential effects to both bat species were evaluated. In addition, Mitchell's satyr butterfly records exist in northeastern Mississippi in the counties adjacent to Lee and Union Counties. There is a potential for unknown populations of this species to exist further west. Thus, potential effects to this species were evaluated at the recommendation of USFWS.

Mitchell's satyr butterfly is restricted to calcareous sedge wetland habitat, dispersing only to visit other patches within large wetland complexes. It feeds on sedges themselves, but is not known to visit the flowers. Shade is thought to be an important component of suitable habitat for this species. Thus, forested wetlands or wetlands near canopy cover are more suitable than open wetlands. Small, disjointed populations of this species exist in the Midwestern United States, Virginia, and Mississippi. Occurrences of this species exist in surrounding counties, including Prentiss and Itawamba. Threats to Mitchell's satyr include removal of suitable habitat and pesticides. Suitable habitats exist for this species both in forested wetland areas with sedge presence occurring along the proposed ROW and on one of the access roads (see Section 3.8).

The Indiana bat is known from northern Mississippi. The range of this species is thought to extend further south and may reach central Mississippi. Thus, habitat for Indiana bat was assessed. Indiana bats hibernate in caves and utilize the areas around them for swarming (mating) in the fall and staging in the spring prior to migration back to summer habitat.

During summer, Indiana bats roost under the exfoliating bark of dead snags and living trees such as shagbark hickory and white oak. Summer maternity colonies congregate under exfoliating bark and contain both adult females and their young. These roosts are extremely vulnerable to disturbance, as the young cannot yet fly. Adult Indiana bats are known to change roost trees frequently throughout the season, yet still maintain site fidelity, returning to the same summer roosting areas in subsequent years (Dickenson 2001).

Foraging habitat for this species exists over bodies of water and along the tops of trees such as along a forest edge or tree line. No records of Indiana bat exist within Union or Lee Counties, Mississippi. The nearest known extant[3] records of Indiana bat hibernacula[4] are in Lawrence County, Alabama approximately 73.4 and 77.1 miles away. There is also a historical Indiana bat hibernacula record from an abandoned chalk mine in Tishomingo County, Mississippi, approximately 45.7 miles from the proposed project. This mine has since collapsed and is no longer suitable habitat for Indiana bat. The nearest known summer roosting Indiana bat record is from Holly Springs National Forest in Benton County, Mississippi. Indiana bats were tracked to maternity roosting trees here in April 2013. This roosting site is approximately 35 miles from the proposed project.

The NLEB was proposed for listing as federally endangered in October 2013 by the USFWS. In winter, this species roosts in caves or cave-like structures, while summer roosts are typically in cave-like structures as well as live and dead trees with exfoliating bark and crevices. NLEB tend to forage within the midstory and canopy of upland forests on hillsides and ridges (USFWS 2014). No records of the NLEB exist within Union or Lee counties. The nearest known record of an NLEB hibernaculum is from 1990 in a cave in Franklin County, Alabama, approximately 40 miles from the proposed project. The nearest known NLEB summer record is from a TVA mist netting event in Franklin County, Alabama, approximately 58 miles from the project area, over Devil's Den Holly Creek. Additionally, a historical record of this species exists from the same abandoned chalk mine mentioned above.

Multiple areas with suitable summer roosting and foraging habitat for Indiana bat and NLEB were identified during field visits. Eight sections of suitable summer roosting forest containing shagbark hickories, white oaks, and snags were identified along the proposed ROW. These areas of suitable summer roosting habitat are generally concentrated in the northern-most middle section of the proposed ROW. Foraging habitat for these species exist over all forested areas, inundated wetlands, farm ponds, streams, and numerous tree lined fence rows found along the proposed route. No caves exist within three miles of the project area and none were identified during field visits.

Ideal habitat for the Bachman's sparrow consists of mature, dry, open pine or oak woodlots with an understory layer of thick grasses and an open midstory (NatureServe 2013). Nests are built on the ground under cover of low shrubs or tufts of grass in these areas. One historical record of this species exists 0.7 miles from the proposed project. Suitable habitat does not exist for this species in the proposed ROW or access roads.

[3] "Extant" expresses both existing and validity of the record. Although a species may have previously been found to exist in a location, the validity of whether the species still occurs there is in question.
[4] *Hibernacula* (singular is hibernaculum) are places, such as caves, that bats regularly use as hibernation sites.

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.

The proposed transmission line would cross several floodplains. As can be seen in Figure 1-1, the proposed line would parallel the Browns Ferry-Union 500-kV Transmission Line at existing floodplain crossings on Brown Creek, Camp Creek, and Tishomingo Creek. The ROW for the proposed transmission line would also cross two narrow floodplains on Flat Creek and Euclautubba Creek. As the proposed route turns southward, several floodplain areas along Sand Creek, east of Saltillo, would be crossed by the proposed ROW.

Based on Flood Insurance Rate Maps of Lee and Union counties, Mississippi, all of three access roads are located within 100-year floodplains. Similarly, portions of 15 access roads are located within 100-year floodplains.

3.8 Wetlands

Wetlands are those areas inundated by surface water or groundwater such that vegetation adapted to saturated soil conditions is prevalent. Examples include swamps, marshes, bogs, and wet meadows. Wetland fringe areas also are found along the edges of most watercourses and impounded waters (both natural and man-made). Field surveys were conducted in August 2013 and April 2014 to delineate wetland areas within the proposed transmission line corridor and associated access roads.

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; USACE 2014; U.S. Department of Defense and USEPA 2003). Broader definitions of wetlands, such as those used by the USFWS (Cowardin et al. 1979) and the TVA Environmental Review Procedures definition (TVA 1983), were also considered in this review. Using a TVA-developed modification of the Ohio Rapid Assessment Method (Mack 2001) specific to the TVA region (i.e., the TVA Rapid Assessment Method or “TVARAM“) was used to categorize wetlands by their functions, sensitivity to disturbance, rarity, and ability to be replaced.

TVARAM scores are used to classify wetlands into three categories. Category 1 wetlands are considered “limited quality waters.” They represent degraded aquatic resources having limited potential for restoration with such low functionality that lower standards for avoidance, minimization, and mitigation can be applied. Category 2 includes wetlands of moderate quality and wetlands that are degraded but have reasonable potential for restoration. Avoidance and minimization are the preferred mitigation measures for Category 2 wetlands. Category 3 generally includes wetlands of very high quality or of regional/statewide concern, such as wetlands that provide habitat for threatened or endangered species.

The proposed transmission line ROW traverses a landscape dominated by pastureland, early successional and second growth forest, and crosses several streams and their associated floodplain wetlands. Much of this line would be built on existing ROW and would parallel an existing transmission line. Twenty-seven wetland areas that would be crossed by the proposed transmission line or associated access roads were delineated and are listed in Table 3-3.

Table 3-3. Wetlands Located Within the Proposed Transmission Line ROW and Associated Access Roads

Wetland Identifier	Type[1]	Acreage in ROW	Forested Wetland Acreage in ROW	TVARAM Category (score)
W001 A&B	PFO1E	2.54	2.54	2 (46)
W002	PFO1E	1.28	1.28	2 (38.5)
W002a-AR29	PFO1E	Traversed	0.0	2 (38.5)
W002b-AR29	PSS1E	Adjacent	0.0	2 (38.5)
W003	PEM/PFO1E	0.03	0.01	2 (32)
W004	PEM/PFO1E	0.24	0.20	2 (40)
W005	PFO1E	0.96	0.96	2 (37)
W006	PFO1E	0.08	0.08	2 (53)
W007	PSS1E	3.36	0.0	2 (33)
W008	PFO1E	0.10	0.10	2 (39)
W009	PEM1E	0.07	0.0	1 (29)
W010	PFO1E	0.54	0.54	2 (57)
W011	PFO1E	0.45	0.45	2 (46)
W012	PFO1E	0.24	0.19	2 (45)
W012a-AR21	PEM/PSS/PFO1E	Traversed	0.0	1 (23)
W013	PFO1E	0.72	0.72	2 (58)
W014	PEM1E	1.20	0.0	1 (23)
W014a-AR18	PEM/PSS1E	Traversed	0.0	1 (23)
W015	PEM/PFO1E	0.83	0.45	2 (47)
W016	PEM1E	0.03	0.0	1 (19)
W017	PEM/PUBHx	0.16	0.0	2 (33)
W017a-AR13	PFO1E	Adjacent	0.0	2 (33)
W017b-AR13	PEM/PUBHx	Adjacent	0.0	2 (33)
W018	PEM/PSS/PFO1E	0.94	0.50	2 (41)
W019	PEM1E	0.14	0.0	1 (18)
W020	PFO1E	1.78	1.23	2 (33)
W021	PSS1E	0.40	0.0	2 (39)
W021-AR8	PSS1E	Adjacent	0.0	2 (39)
W022	PEM1E	0.03	0.0	1 (15)
W023	PSS1E	0.19	0.0	2 (31)
W023-AR5	PSS1E	Traversed	0.0	2 (31)
W024	PSS1E	0.10	0.0	2 (33)
W024-AR5	PSS1E	Traversed	0.0	2 (33)
W025	PSS1E	0.17	0.0	2 (30)
W025-AR5	PSS1E	Traversed	0.0	2 (30)
	Total Acres	**16.58**	**9.25**	

[1]Classification codes as defined in Cowardin et al. (1979): PEM1 = palustrine emergent, persistent vegetation; PFO1 = palustrine forested, broadleaf deciduous vegetation; PSS1 = palustrine, scrub-shrub, broadleaf deciduous; PFO6 = palustrine, forested, dead; PUB = palustrine, unconsolidated bottom; suffix “E” = seasonally flooded/saturated; suffix “H” = permanently flooded; suffix “x” = excavated.

Wetland 001 A&B (listed as W001 A&B in Table 3-3) is a young forested wetland divided east/west by an upland access road located running north/south within the proposed ROW. The total wetland area within the ROW is 2.54 acres, located within the Sand Creek floodplain. W001 A&B exhibits hydric soils and is connected hydrologically to Sand Creek. W001 A&B is dominated by black willow, green ash, and sweetgum.

W002 is a young forested wetland, comprising 1.28 acres within the ROW north of Old Saltillo Road. This wetland exhibits hydric soils and hydrologic connectivity to Sand Creek. Dominant hydrophytic vegetation includes sweetgum, American buckwheat vine, and red maple. This wetland extends west of the ROW and was recorded as W002a-AR. An access road is located at the western extent of W002, where it meets W002a-AR off the ROW. W002a-AR29 contains a more mature forested wetland habitat, with dominant species consisting of willow oak and water oak. Similarly, W002b-AR29 is a pocket wetland adjacent to an access road. This wetland depression exhibits similar wetland characteristics as W002 and W002b-AR, but in a scrub-shrub habitat. Dominant wetland vegetation for this floodplain depression includes boxelder, red maple, and sweetgum saplings. This wetland is located within the floodplain and drains into Sand Creek.

W003 consists of a wide drain connected to Sand Creek. This drain contains 0.02 acre of emergent wetland and 0.01 acre of forested wetland within the ROW. W003 exhibits hydric soils and hydrologic connectivity to Sand Creek. Dominant hydrophytic vegetation consists of box elder, false nettle, red maple, and spiderwort.

W004 is a small (approximately 0.24 acre total) emergent/forested wetland with 0.04 acre of emergent wetland located within an existing ROW. Approximately 0.20 acre of forested wetland is adjacent to the emergent wetland. W004 exhibits hydric soils and is connected hydrologically to an unnamed tributary of Mud Creek. W004 is dominated by false nutsedge, green ash, knotweeds, and river birch.

Wetland 005 is a 0.96-acre forested wetland located entirely within the proposed ROW. W005 exhibits hydric soils and is connected hydrologically to Mud Creek. Dominant vegetation includes American sycamore, false nutsedge, green ash, and pathrush.

Wetland 006 is a 0.08-acre forested wetland entirely located within the proposed ROW. W006 exhibits hydric soils and is connected hydrologically to Mud Creek. Dominant vegetation includes lizard's tail, river birch, and water oak.

W007 is part of a floodplain scrub/shrub wetland system adjacent to an unnamed tributary of Mud Creek with 3.36 acres located within the proposed ROW. W007 exhibits hydric soils and is dominated by boneset, false nutsedge, green ash, pathrush, and river birch.

Wetland 008 consists of 0.1 acre of forested wetland habitat within the ROW. W008 forms at the headwaters of a wide drain west of SR 145. W008 exhibits hydric soils, drainage patterns and other hydrologic indicators, and intermittent connectivity to Sand Creek via unnamed tributaries. Dominant hydrophytic vegetation consists of American sycamore, green ash, Nepalese browntop, and sweetgum.

Wetland 009 is an emergent wetland forming at the junction of pastureland and forest within a small depression. This wetland drains ephemerally to Sand Creek and contains hydric soils, but its only source of hydrologic input is precipitation. W009 is dominated by hydrophytic vegetation which includes field crown grass, giant ironweed, and tall fescue.

W010 consists of 0.54 acre of forested wetland within the ROW. W010 is located between two defined channels and contains braided channels throughout. This wetland area exhibits hydric soils and hydrologic connectivity to Euclautubba Creek. Dominant hydrophytic vegetation includes America elm, American sycamore, green ash, red maple, and white grass.

W011 contains 0.45 acre of forested wetland within the ROW. W011 and W010 are separated by a small knoll. W011 is bound to the east by this hillside, to the west by a man-made berm, and located to the north is a small man-made but naturalized pond. W011 exhibits hydric soils and is hydrologically connected to Euclautubba Creek. Dominant hydrophytic vegetation consists of green ash, red maple, and white grass.

Wetland 012 is a 0.19-acre forested wetland located within the proposed ROW. W012 exhibits hydric soils and is adjacent to a farm pond. This wetland is hydrologically connected to an unnamed tributary of Euclautubba Creek. W012 is dominated by black willow, a hydrophytic plant species.

Wetland W012a-AR21 is a 0.04-acre emergent/scrub-shrub/forested wetland traversed by an access road. This wetland appears isolated, receiving hydrology via precipitation within a flat bench topography. The bench was likely created as a result of an old woods road traversing the wetland, which has sustained an emergent wetland habitat. W012a-AR21 contained hydric soils, standing water at the time of the site visit, and is dominated by hydrophytic vegetation including giant plume grass, sweetgum, and willow oak.

Wetland 013 is a 0.72-acre forested wetland located within the proposed ROW. W013 exhibits hydric soils and is connected hydrologically to an unnamed tributary of Flat Creek. Dominant vegetation includes black willow, pathrush, and river birch.

W014 is an emergent wetland, with 1.20 acres of wetland located within the proposed ROW. W014 exhibits hydric soils and is hydrologically connected to an unnamed tributary of Flat Creek. Dominant vegetation includes boneset, panic grass, pathrush, and sedges. This wetland area extends south of the ROW onto an access road. The entire wetland area mapped as both W014 and W014-AR18 totals 2.64 acres of emergent and scrub-shrub habitat within or adjacent to the ROW and/or traversed by an access road.

W015 consists of 0.83 acre of wetland located within the proposed ROW. Approximately 0.45 acre of forested wetland is adjacent to the emergent wetland. W015 exhibits hydric soils and is hydrologically connected to an unnamed tributary of Mud Creek. Dominant vegetation includes black willow, boneset, sedges, false nutsedge, pathrush, and seedbox.

Wetland 016 is an emergent wetland, with 0.03 acre located within the ROW. This wetland is comprised of an old road bed that receives water from pond overflow or dam leakage. Therefore, it functions as a slope wetland and maintains ephemeral hydrologic connectivity to Camp Creek. W016 exhibits hydric soils and dominant hydrophytic vegetation that includes giant ironweed and Nepalese browntop grass.

W017 is an emergent fringe wetland located along the shoreline of a large pond/lake where it intersects the ROW. W017 exhibits hydric soils and hydrologic connectivity to Camp Creek via overflow from the pond. W017 is dominated by hydrophytic vegetation that includes meadow beauty and soft pathrush. W017 extends north of the ROW adjacent to an access road (recorded as W017a-AR13 and W017b-AR13).

W018 consists of 0.94 acre within the ROW, of which 0.5 acre is forested. The remaining 0.44 acre is located within the existing parallel ROW of the Browns Ferry-Union 500-kV Transmission Line and maintained for line clearance as emergent and scrub-shrub wetland habitat. W018 is located within the floodplain of Camp Creek, establishing hydrology and

hydrologic connectivity. W018 exhibits hydric soils and dominant hydrophytic vegetation consists of Cherokee sedge, green ash, soft pathrush, and sugarberry.

Wetland 019 consists of the immediate floodplain area adjacent to a channelized drain within an upland agricultural field. W019 contains 0.14 acre of emergent wetland within the ROW, exhibits hydric soils, and receives water from the drainage system which connects with Camp Creek. W019 is dominated by hydrophytic vegetation that includes American buckwheat vine and hemp vine.

W020 is a 1.78-acre emergent/forested wetland located within the proposed ROW. W020 is mapped on the National Wetland Inventory as a forested wetland that is temporarily flooded. Approximately 1.23 acres of forested wetland are adjacent to the emergent wetland. W020 exhibits hydric soils and is hydrologically connected to an unnamed tributary of Yonaba Creek. Dominant vegetation includes eastern cottonwood, false nutsedge, meadow beauty, pathrush, and wool grass.

Wetland 021 is located within the proposed ROW and contains 0.40 acre of scrub-shrub wetland habitat. W021 appears to have formed in an old ox-bow type landform adjacent to Bridge Creek. W021 exhibited standing water, hydric soils, and hydrologic connectivity to Bridge Creek. Dominant hydrophytic vegetation consisted of American potato bean, black willow, and red maple saplings. This wetland extends south of the ROW adjacent to an access road and was recorded as W021-AR8.

Wetland 022 is an isolated depression consisting of 0.03 acre of emergent wetland within the ROW. W022 receives precipitation for hydrology, but holds water against a man-made berm at the edge of an agricultural field. W022 exhibits hydric soils, and the dominant hydrophytic vegetation consists of cattails and seedbox.

W023 is an emergent wetland, with 0.19 acre of wetland located within the proposed ROW. W023 exhibits hydric soils and is hydrologically connected to an unnamed tributary of Wolf Creek. Dominant vegetation includes deer-tongued grass, green ash, Maryland meadow beauty, and pathrush. W023 extends east of the ROW and would be crossed by an access road and was mapped as W023-AR5

W024 is an emergent wetland, with 0.10 acre of wetland located within the proposed ROW. W024 exhibits hydric soils and is hydrologically connected to an unnamed tributary of Wolf Creek. Dominant vegetation includes deer-tongued grass, green ash, Maryland meadow beauty, and pathrush. W024 extends east of the ROW to be traversed by an access road and was mapped as W024-AR5.

Wetland 025 is a 0.17-acre emergent wetland located within the proposed ROW. W025 exhibits hydric soils and is hydrologically connected to an unnamed tributary of Wolf Creek. Dominant vegetation includes green ash, Maryland meadow beauty, and pathrush. W025 extends east of the ROW, would be traversed by an access road (mapped as W025-AR5).

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, middleground, and background distances. In the foreground, an area within 0.5 mile of the observer, details of objects are easily distinguished in the landscape. In the middleground, normally between a mile and four miles from the 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 discernible 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 proposed transmission line would be approximately 16 miles in length and would utilize a combination of new and existing ROW. The line would traverse a variety of Mississippi countryside, including farmlands and some commercial and residential areas. Topography ranges from steep at Line Road and farther northeast near Birmingham Ridge Road. The remainder of the route is mainly flat to gently sloping. The line route would cross both heavily wooded and open crop and grass land. The proposed line would be visible from various county roads along the route. The proposed route would cross US 45 north of Saltillo and would be visible to motorists on that highway. Additionally, the switch structures near the Turner Park 161-kV Substation would be visible from the Natchez Trace Parkway (see Sections 3.10 and 3.11).

3.9.2 Noise

There are no single, major sources of noise along the proposed transmission line route. However, some traffic noise is generated along US 78, which is near the Union 500-kV Substation, and along US 45 and SR 145 near Saltillo. Additionally, the proposed transmission line route would parallel the existing KCS railway tracks for approximately 4.5 miles between the Turner Park 161-kV Substation northward beyond Saltillo. This rail line generates noise; however, local residents have become acclimated to this recurring noise.

3.9.3 Odors

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

3.10 Archaeological and Historic Resources

Federal agencies are required by Section 106 of the National Historic Preservation Act and by the National Environmental Policy Act (NEPA) to consider the possible effects of their undertakings on historic properties. The term "historic property" includes any historic or prehistoric site, district, building, structure or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP). "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:

- Initiation (defining the undertaking and the APE and identifying the parties to be consulted in the process);
- Identification of historic properties within the APE;
- Assessment of effects to historic properties; and

- Resolution of adverse effects by avoidance, minimization, or mitigation. During the Section 106 process, the agency must consult with the appropriate State Historic Preservation Officer (SHPO), federally-recognized Native American tribes that have an interest in the undertaking, and any other party with a vested interest in the undertaking.

A project may have effects on a historic property that are not adverse if those effects do not diminish the qualities of the property that identify it as eligible for listing on the NRHP. However, if the agency determines (in consultation) that the undertaking's effect on a historic property within the APE would diminish any of the qualities that make the property eligible for the NRHP, the effect would be considered adverse. Examples of adverse effects include ground disturbing activity in an archaeological site or erecting structures within the viewshed of a historic building in such a way as to diminish the building's historic setting.

For the proposed undertaking, the APE for archaeological resources consists of the 100-foot-wide, 16-mile long new transmission line ROW and the associated access roads. Access roads would be approximately 20-foot-wide, and would total approximately 3.75 miles in length. The APE for historic architectural resources consists of the area within a 0.5-mile radius of the centerline of the proposed new transmission line, as well as any areas where the project would alter topography or vegetation in view of a historic resource. Because the undertaking would require no physical work within the 6.6-mile existing Tupelo-Turner Park 161-kV Transmission Line (that segment between the tap point outside the Turner Park Substation and the Tupelo 161-kV Substation), TVA considers the project to have no potential to affect historic properties in that section of the proposed transmission line.

TVA contracted with Tennessee Valley Archaeological Research (TVAR) to conduct a Phase I cultural resources survey of the proposed transmission line ROW portion of the APE. Background research conducted prior to the fieldwork revealed that one archaeological site (22LE843) has been recorded previously within the archaeological APE. TVAR reinvestigated this site and recommended that it is ineligible for listing in the NRHP. In addition, a second previously-recorded site (22LE544) is adjacent to the APE. No evidence was seen of 22LE544 within the APE. Nine archaeological sites were recorded within the APE during the survey. TVAR recommended that four of these sites (22UN747, 22UN752, 22LE1074, and 22LE1075) are potentially eligible for listing in the NRHP based on research potential. The remaining five newly-recorded sites (22UN748, 22UN749, 22UN750, 22UN751, and 22LE1073) are recommended ineligible for listing in the NRHP.

TVAR's phase I historic architectural survey noted 17 previously-recorded above ground resources within the architectural APE. One of these, the Barlow Burrow House, is listed on the NRHP. The Barlow Burrow House is located approximately 0.17 mile west of the proposed transmission line centerline at 157 Second Street in North Saltillo. Of the remaining 16 previously-recorded architectural resources, TVAR's architectural survey found that 10 are located outside the visual line of sight to the project area; five are recommended not eligible for the NRHP; and one has been destroyed since its initial recordation. The TVAR survey identified seven previously unrecorded architectural resources. These were identified as HS-1 through HS-7. TVA recommends all seven of these resources ineligible for listing in the NRHP. The TVAR survey also noted that a portion of the town of Saltillo and a segment of the Natchez Trace Parkway fall within the viewshed of the proposed new transmission line. TVAR recommended that Saltillo is

ineligible for listing in the NRHP and noted that the town does not include any architectural properties that appear to be eligible for listing in the NRHP individually. TVAR also recommended that the segment of the Natchez Trace Parkway within the architectural APE is ineligible for inclusion on the NRHP.

TVA agreed with the findings and recommendations of TVAR's survey. The Mississippi SHPO agreed with most of TVA's eligibility determinations. The SHPO agreed (by letter dated July 14, 2014) that archaeological sites 22LE1074, 22LD1075, 22UN747, and 22UN752 are potentially eligible for listing in the NRHP, that sites 22LE101 and 22LE544 are not in the APE, and that the remainder of the identified sites are ineligible (Appendix A). The SHPO agreed that newly recorded architectural resources HS-1 through HS-7 and previously recorded resources 081-SLT-0006 (house) and 081-SLT-0011 (office) are ineligible for listing in the NRHP. The SHPO did not agree that architectural resources 081-SLT-0004 (Presbyterian Church), 081-SLT-0005 (Methodist Church), and 081-SLT-0015 (bridge) are ineligible. Regarding Downtown Saltillo, the SHPO did not agree with TVA's finding that there are no eligible historic properties in the district. The SHPO disagreed with TVA's finding that the portion of the Natchez Trace Parkway within the APE is ineligible for the NRHP, but deferred final comment until the National Park Service (NPS) has commented. TVA consulted with the NPS, which initially requested additional information about TVA's proposed actions and suggested that the undertaking may possibly result in a cumulative adverse effect to the Natchez Trace Parkway (Appendix A). TVA supplied the requested information, but the NPS declined to offer an opinion on the undertaking's effects on the NPS within the time prescribed by the Advisory Council on Historic Preservation's regulations implementing Section 106 of the NHPA. The SHPO agreed that the Barlow Burrow House (081-SLT-0001) is eligible for listing in the NRHP.

The Choctaw Nation of Oklahoma responded to TVA's initiation of consultation by requesting a copy of the Mississippi SHPO response regarding the project. TVA forwarded that response to the Choctaw Nation of Oklahoma and did not receive any other tribal comments.

TVA also contracted with TVAR to conduct a Phase I cultural resources survey of the access road portion of the APE. The survey resulted in the expansion of the site boundaries of four archaeological sites (22UN747, 22UN752, 22LE1074, and 22LE1075) that were identified in the Phase I survey of the transmission line ROW. All four sites continue to be recommended by TVAR as potentially eligible for listing in the NRHP. TVA agrees with this determination.

In sum, based on agreement between TVA and the Mississippi SHPO, there are no archaeological properties listed in the NRHP within the APE. Four archaeological sites (22UN747, 22UN752, 22LE1074, and 22LE1075) that may be eligible for listing in the NRHP are located in the APE. There are two NRHP-listed historic architectural properties (the Natchez Trace Parkway and the Barlow-Burrow House) within the APE.

3.11 Recreation, Parks, and Natural Areas

This section describes recreational and natural areas that are within, immediately adjacent to, or within 3 miles of the proposed project. Natural areas include ecologically significant sites; federal, state, or local park lands; national or state forests; wilderness areas; scenic areas; wildlife management areas; recreational areas; greenways; trails; Nationwide Rivers Inventory streams; and Wild and Scenic Rivers.

The Campgrounds at Barnes Crossing is a commercial campground located about a mile south of the intersection of US 45 and the Natchez Trace Parkway. This facility offers full services for recreational vehicles.

Lake Lamar Bruce, a 300-acre public fishing lake operated by the Mississippi Department of Wildlife, Fisheries, and Parks, is located northeast of Saltillo, approximately 0.25 mile east of the route of the proposed transmission line. The lake, along with camping facilities, is currently closed for renovation.

The W. K. Webb Sportplex is located approximately 1,700 feet west of the proposed transmission line route south of Saltillo. This complex features four lighted baseball/softball ball fields and four lighted soccer fields. The facility is operated by the Saltillo Parks and Recreation Department.

The Elvis Presley Birthplace is an official Mississippi landmark and part of a 15-acre park that also contains the Elvis Presley Memorial Museum. This park is located approximately 1 mile east of the Tupelo 161-kV Substation and over 5 miles south of where project-related construction would occur.

The boundary of the area managed by the NPS that includes the Natchez Trace Parkway is adjacent to the Turner Park 161-kV Substation. The proposed transmission line would connect to a tap point in the Tupelo-Turner Park 161-kV Transmission Line located outside this substation. The Natchez Trace Parkway is administered by the NPS and includes lands designated to commemorate the Old Natchez Trace, an important historical route of travel and trade from Nashville, Tennessee to Natchez, Mississippi that crosses portions of Tennessee, Alabama, and Mississippi. The Parkway includes a paved two-lane road that provides visitors with an opportunity to travel this route and visit sites with exceptional scenic, natural, and cultural significance within the corridor of the Parkway. The structure near the Turner Park 161-kV Substation in the Tupelo-Turner Park 161-kV Transmission Line that would be the connection point for the proposed line is located approximately 900 feet north of the roadway of the Natchez Trace Parkway. The Parkway is designated as an All-American Road under the National Scenic Byways program administered by the Federal Highway Administration, a designation reserved for National Scenic Byways meeting multiple criteria for recognition.

The Natchez Trace National Scenic Trail consists of five segments of hiking and horseback trails that generally follow the Natchez Tract Parkway. Most sections of the trail follow the Parkway two-lane roadway, while other sections allow hikers to walk along the remains of the Old Natchez Trace or through natural and scenic areas, and culturally significant sites alongside the route of the Parkway. The 6-mile Blackland Prairie Trail segment follows the Parkway from mile marker 260 to 266. That portion of the Trail between milepost 265.5 and 264.8 was closed in February 2013 for road construction for a period of 2 years. The Tupelo-Turner Park 161-kV Transmission Line crosses the Natchez Trace Parkway north of Tupelo at milepost 268, approximately 2 miles from the northern end of the Trail.

3.12 Land Use and Prime Farmland

The proposed transmission line would occupy approximately 102 acres of new ROW and 92 acres of existing ROW. Much of the proposed route would cross open lands that would require minimal clearing for the ROW. Thus, approximately 73 acres of forested areas would be cleared for the new transmission line. As stated in Section 3.4, predominant land uses along the proposed route include forest (approximately 40 percent) and open areas

(60 percent), including agricultural lands. East of Saltillo, the proposed route would be within a quarter mile of residential areas. Otherwise, the proposed route was configured to generally avoid commercial development and residential areas.

Prime farmland is defined by the U.S. Department of Agriculture as land that has the best combination of chemical and physical characteristics for producing food, feed, forage, fiber, and oilseed crops. To be considered prime farmland it cannot be urban, built-up or covered by water. Concern regarding the conversion of prime farmland to urban or industrial use prompted the creation of the 1981 Farmland Protection Policy Act. This act requires federal agencies to evaluate impacts to farmland prior to permanently converting the land to non-agricultural use.

Generally, the soils in the area of the proposed transmission line are relatively fertile and are composed primarily of silty loams and sandy loams. Agricultural related erosion on slopes greater that 10 to 12 percent has caused localized degradation of soil productivity. Thus, the better soils, including those considered prime farmlands and farmlands of statewide significance tend to be located on relatively flat sites such as broad creek bottoms. An analysis of Natural Resources Conservation Service (2014) data indicated that the proposed transmission line would cross several wide creek bottoms containing soils considered prime farmlands. Virtually all of these areas lie along the path of the existing Brown's Ferry-Union 500-kV Transmission Line.

3.13 Socioeconomics and Environmental Justice

The proposed project is located in Lee and Union Counties, Mississippi. The population of Lee County is much larger than that of Union County, due to the presence of the city of Tupelo, which has a population of approximately 35,500. As shown in Table 3-4, the percentage of minority black or African American population in both counties is less than the state as a whole, while the percent white is higher than that of the state. Economic conditions in Lee County are slightly better than those at the state level. However, per capita and household incomes in Union County are less than those reported for the state.

Table 3-4. Socioeconomic and Demographic Conditions in Lee and Union Counties, Mississippi

Demographic Characteristic	Lee County	Union County	Mississippi
Estimated 2012 population	85,042	27,414	2,984,926
Black or African American	28.2%	14.9%	37.4%
Hispanic or Latino	2.4%	4.5%	2.9%
White (excluding Hispanic or Latino)	67.7%	79.4%	57.6%
Per capita income (2008-2012)	$22,119	$19,514	$20,670
Median household income (2008-2012)	$41,242	$36,582	$38,882
Below poverty level (2008-2012)	18.3%	24.5%	22.3%

Source: U.S. Census Bureau (2014)

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 findings are documented in this chapter. The potential effects are presented by resource in the same order as in Chapter 3.

As stated in Section 2.1.1, under the No Action Alternative, TVA would not construct the proposed project. In the event that TVA chooses to adopt the No Action Alternative, the transmission system in the local area would continue experience heavy electrical demand. As stated in Section 1.2, the loss of either of the Union-Tupelo No.1 or No. 2 Transmission Lines during high demand periods could cause overloading of the remaining line. This could result in the loss of power to the Tupelo 161-kV Substation which serves a large area of homes and businesses. Because the proposed construction, operation, and maintenance of the proposed transmission line and installation, operation, and maintenance on substation equipment would not occur under the No Action Alternative, no direct effects to those environmental resources listed in Chapter 3 are anticipated. Over time changes to various current conditions could occur. However, these changes are not expected to be the result of implementing the No Action Alternative.

4.1 Groundwater and Geology

As stated in Section 3.1, contamination of groundwater can occur when contaminants such as pesticides and fertilizers seep into the aquifer. Routine vegetation management on the proposed transmission line would involve the use of herbicides to control vegetation. Improper use of such chemicals can potentially affect groundwater.

4.1.1 No Action Alternative

Under the No Action Alternative, the project would not be built, and construction activities that could have possible impacts on groundwater resources or local geological characteristics would not occur. Thus, no effects to groundwater resources or the local geological character are expected from adopting the No Action Alternative.

4.1.2 Action Alternative

Part of the proposed ROW is located within State Designated Source Water Protection Areas for public water supply. A majority of the local area is underlain by the Selma Group, which acts as a confining unit by separating the surface area from the aquifers below. This confining unit would provide adequate protection from potential groundwater contamination.

Additionally, under the Action Alternative, standard BMPs as described in Muncy (2012) would be used to avoid contamination of local groundwater supplies. Transfer of sediments to groundwater would be avoided by using the BMPs during construction activities. As a standard practice, USEPA-registered herbicides would be used in accordance with label directions in areas requiring chemical treatment for controlling vegetation in the ROW (see Section 2.5). With the implementation of these practices, the potential for impacts on groundwater resulting from the construction, operation, and maintenance of the proposed transmission line would be minor. Similarly, no changes in geological characteristics, such as the creation of sinkholes, are anticipated under the Action Alternative. No cumulative impacts are anticipated.

4.2 Surface Water

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

4.2.1 No Action Alternative

Under the No Action Alternative, the construction activities and operation and maintenance of the proposed transmission line that could affect local surface water quality would not occur. Thus, adoption of the No Acton Alternative is not expected to have any effects on the quality or quantity of local surface water.

4.2.2 Action Alternative

TVA routinely includes precautions in the design, construction, and maintenance of its transmission line projects to minimize potential impacts to surface waters. Permanent stream crossings that could not be avoided would be designed so as 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 Muncy (2012). ROW vegetation maintenance would employ manual and low impact methods wherever possible. In areas requiring chemical treatment, only USEPA-registered herbicides would be used in accordance with label directions designed in part to restrict applications in the vicinity of receiving waters and to prevent unacceptable aquatic impacts. With the proper implementation of these controls, construction and operation of the proposed transmission line is expected to result in only minor, temporary impacts to surface waters. No cumulative impacts to surface water quality are anticipated under the Action Alternative.

4.3 Aquatic Ecology

Aquatic life could be potentially affected either directly or indirectly by the construction and operation of the proposed transmission line. Potential direct effects include the alteration of habitat conditions within the stream. Potential indirect effects may result from the modification of the riparian zone or from storm water runoff resulting from construction and maintenance activities along the transmission line corridor and access roads.

Potential effects from 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 effects resulting from construction and maintenance could include alteration of stream banks and stream bottoms by heavy equipment and the introduction of herbicide runoff into streams. Siltation has a detrimental effect on many aquatic animals adapted to riverine environments. Turbidity caused by suspended sediment can negatively impact spawning and feeding success of many fish and mussel species.

4.3.1 No Action Alternative

Under the No Action Alternative, the proposed transmission line would not be built. Thus, no changes to the current conditions of aquatic resources within these areas would result from TVA's actions.

4.3.2 Action Alternative

Watercourses that convey only surface water during storm events (such as wet-weather conveyances) and that could be affected by construction of the proposed transmission line and access roads would be protected by the implementation of standard BMPs as identified in Muncy (2012). These BMPs are designed in part to minimize disturbance of riparian areas and subsequent erosion and sedimentation that can be carried to streams. TVA also provides additional categories of protection to watercourses based on the variety of species and habitats that exist in the streams, as well as the state and federal requirements to avoid harming certain species (Appendix D). The width of the SMZs is determined by the type of watercourse, primary use of the water resource, topography, or other physical barriers (Muncy 2012).

The watercourses identified in Appendix G that could be affected by construction and maintenance of the proposed transmission line would be protected by Standard Stream Protection (Category A) SMZ as defined in Appendix D and Muncy (2012). This standard (basic) level of protection for streams and the habitats around them is designed to minimize the amount and length of disturbance to local water bodies.

Because appropriate BMPs and SMZs would be implemented during construction, operation, and maintenance of the proposed transmission line and associated access roads, any direct, indirect, or cumulative impacts to aquatic animals resulting from the proposed action would be minor.

4.4 Vegetation

4.4.1 No Action Alternative

Adoption of the No Action Alternative would not affect plant life directly because no project-related work would occur. Changes to local plant communities resulting from natural ecological processes and human-related disturbance would continue to occur, but these changes would not result from the proposed project. All invasive species found in the project area are common throughout the region, and implementation of the No Action Alternative would not change this situation.

4.4.2 Action Alternative

Adoption of the Action Alternative would have minor effects to the terrestrial ecology of the region. Converting forest land to managed ROW and access roads for construction and maintenance of the proposed transmission line would be long term in duration, but losses of forest productivity at the local scale would be minor. Adoption of this alternative would require clearing of approximately 73 acres of forest. However, these forested communities are common and well represented throughout the region. As of 2012, there were over 1.2 million acres of forested land in Lee, Union and the surrounding Mississippi counties (U.S. Forest Service 2013). Cumulatively, project-related effects to forest resources would be minor when compared to the total amount of forested land occurring in the region.

Within the project area, all herbaceous plant communities with a large component of native species occur in areas where the proposed ROW would be co-located with the existing Browns Ferry-Union 500-kV Transmission Line. This indicates that transmission line operation and maintenance does not exclude the establishment of native flora. Construction of the proposed transmission line would negatively impact these areas in the short-term, but most sites would likely recover to pre-project conditions within a few years.

Currently, the Blackland Prairie remnants located within and adjacent to the proposed ROW are of poor quality due to their large component of non-native plants, and to the overall fragmentation of the community. Short-term the implementation of the Action Alternative would result in the disturbance of less than 1 acre of degraded prairie habitat during construction of the transmission line ROW. Long-term this area would be maintained as herbaceous/shrub-scrub for the duration of the line. The species indicative of this rare habitat are likely to persist on and adjacent to the ROW after construction. Considering the very small amount of prairie habitat that would be affected, its current condition, and the fact that most of the indicative plant species would persist on the site, implementation of the Action Alternative would impact Blackland Prairie in Mississippi to a minor extent.

The entire project area has a large component of invasive terrestrial plants, and adoption of the Action Alternative would have a minor effect on the extent or abundance of these species at the county, regional, or state level. The use of TVA standard operating procedures for re-vegetating disturbed areas with noninvasive species (Muncy 2012) would serve to minimize the potential introduction and spread of invasive species.

4.5 Wildlife

4.5.1 No Action Alternative

Under the No Action Alternative, TVA would not construct the proposed transmission line, and various wildlife habitats along the route of the proposed ROW would likely remain in their current state. Forested areas would continue moving through successional growth stages, and agricultural areas would continue to be used to produce crops or forage. Thus, implementation of the No Action Alternative would not impact local wildlife or their habitats.

4.5.2 Action Alternative

Under the Action Alternative, TVA would construct or improve access roads, clear a new 100-foot ROW, place structures, install conductors for the proposed transmission line, and finally operate and maintain a 161-kV transmission line. In many areas, the transmission line would span agricultural and developed areas. Thus, in these areas, there would be direct effects to wildlife habitat only at the points where structures are to be placed. Ground disturbance would occur in these locations as well as at access roads that need to be constructed or improved. Any wildlife currently using these areas (primarily common, habituated species) may be displaced by increased levels of disturbance during construction, but they would likely return upon completion of construction.

Although much of the proposed transmission line route passes through agricultural lands or developed areas, approximately 73 acres of forest would be removed and permanently maintained as early successional habitat. ROW clearing and installation of structures in these forested areas would displace any wildlife in the area. It may cause direct impacts to some breeding adults or young juveniles that are unable to leave these areas if construction activities occur during breeding/nesting seasons for local species. However, such actions are not likely to affect populations of species common to the area, as similar forested habitat exists in surrounding landscapes.

Approximately 2.5 acres of riparian forest as well as several riparian corridors would be affected by the proposed actions. Hardwood bottomland forests offer breeding habitat for several migrating songbirds that have high site fidelity, such as the Acadian flycatcher and northern parula. Surveys for amphibians in wetland and riparian habitat located within the proposed ROW found a healthy population of narrowmouth toad utilizing Wolf Creek.

Individual American toad, cricket frogs, Fowler's toads, gray and green tree frogs, and spiny softshell turtle were also encountered during field surveys. Removal of this habitat would displace individuals of these species. However, these effects would not adversely affect populations of any of these animals. Those species affected by the construction of the transmission line would likely move into adjacent areas of similar habitat. Thus, such displacements would likely have minor effects on local wildlife populations. Additionally, provided BMPs are followed around streams and wetlands, potential effects to populations of species utilizing bodies of water within the project footprint are expected to be minor.

In summary, areas of suitable wildlife habitat including wetland, riparian, and mature forested habitat are a vital part in the continued health of wild amphibian, avian, mammalian and reptilian populations in this highly fragmented landscape. Over the long-term, operation and maintenance of this project would not threaten local populations of common terrestrial animal species, but potential short-term impacts associated with construction do exist for individuals in the direct path of the Action Alternative. The proposed construction activities would be conducted carefully and all relevant BMPs would be followed during construction and maintenance activities to prevent any long-term damage to the hydrology of wetlands and riparian zones in the project area.

4.6 Endangered and Threatened Species

4.6.1 No Action Alternative

Under the No Action Alternative, there would be no change from current conditions, and no direct effects to any local endangered or threatened species would occur. However, changes to the area would nonetheless occur over time, as factors such as population trends, land use and development, quality of air/water/soil, recreational patterns, and cultural, ecological, and educational interests change within the area. The status and conservation of any potentially affected listed species would continue to be determined by the actions of others. Thus, there would be no direct, indirect, or cumulative effects to federally listed or state-listed endangered or threatened terrestrial or aquatic animal species and their habitats from TVA project-related actions under the No Action Alternative.

4.6.2 Action Alternative

4.6.2.1 Aquatic Animals

As stated in Section 4.2, adverse effects to water quality can potentially result from the implementation of the proposed project, which could have direct and indirect impacts to aquatic biota within watercourses in the proposed ROW and in the local area.

However, as described in Sections 4.2.2 and 4.3.2, watercourses that could be affected by the proposed project would be protected by implementing standard BMPs and additional protection measures as identified in Muncy (2012) and in Appendices C and D. These BMPs are designed in part to minimize disturbance of riparian areas, and subsequent erosion and sedimentation that can be carried to streams.

Because appropriate BMPs and SMZs would be implemented during the construction, operation, and maintenance of the proposed transmission line and access roads, no direct, indirect, or cumulative impacts to state tracked aquatic species are anticipated. No federally listed aquatic animals are known to occur in the proposed ROW corridor or associated access roads; therefore, no effects to federally listed aquatic animals are expected.

4.6.2.2 Plants

The proposed project would have no effect on the federally listed Price's potato bean, because it does not occur in the project area. Implementation of the Action Alternative would negatively affect the state-listed American bladdernut, but the impacts would be minor. One of the occurrences of bladdernut located in the proposed project area is found within an SMZ. Standard BMPs for these areas prohibit shear-clearing of woody vegetation, which heavily disturbs the soil and vegetation. Instead, clearing of woody vegetation around this occurrence would be carried out with a feller-buncher or similar piece of equipment, which would leave the soil profile intact. This action would not remove the species from the site, at least in the short-term, and would allow the individual plants to resprout. The second occurrence is situated in a deciduous forest and is not associated with an SMZ. This site would likely be eliminated during construction by standard clearing practices. The long-term viability of both occurrences is questionable because the American bladdernut does not typically occur in open conditions like those found in a ROW. However, even if both occurrences were eliminated, the impact would not threaten the viability of the species in the state. American bladdernut has been reported from at least 20 counties in Mississippi. The habitat where the species was found in the project area was disturbed and possessed no special attributes, thereby suggesting that the species may be more common than current data suggest.

The eastern purple coneflower occurs in a portion of the proposed ROW that is co-located with the Browns Ferry-Union 500-kV Transmission Line. Therefore, the area where that species occurs would not require clearing or other significant disturbance during construction. As stated in Section 2.5, the area containing this species would be avoided during construction. With this measure in place, all impacts to eastern purple coneflower would be avoided and there would be no impact to the species.

4.6.2.3 Terrestrial Animals

In many areas, the transmission line would span agricultural and developed areas. Thus, effects to terrestrial habitat would be restricted to structure placement. Ground disturbance would occur in these locations as well as at access roads that need improvement.

Bachman's sparrow is associated with dry open pine or oak woodlots adjacent to early successional areas. Suitable habitat does not exist for this species in the area of proposed actions; thus, this species would not be impacted by the proposed project.

Mitchell's satyr butterflies require wetlands with a strong sedge component and a tree canopy nearby. Suitable habitat for this species exists in areas of forested wetland scattered across the proposed ROW. TVA BMPs include the use of mats and other techniques used to minimize disturbance to soils and groundwater hydrology within delineated wetlands and buffers. Use of BMPs within and around wetlands in the proposed path of the ROW would allow for maintenance of habitat for Mitchell's satyr in the project area. The proposed actions would not adversely affect Mitchell's satyr butterfly.

No suitable wintering hibernacula for the Indiana bat or the NLEB exist within the proposed ROW or access roads. Habitat suitable for summer roosting for both bat species was observed within the 73 acres of forested area. Eight areas, totaling approximately 13.45 acres, are located in mature, mixed hardwood and bottomland hardwood forest that would be removed during construction. These areas are situated in isolated forest fragments near the center of the proposed ROW. Installation of access roads outside the proposed ROW would not affect areas of suitable summer roosting bat habitat. To reduce the potential for

direct effects to Indiana bats and NLEBs, TVA would remove suitable habitat for these species between December 1 and March 15 when bats are in hibernation and not out on the forested landscape. Due to the relatively small areas of impact, the isolation of the patches across the landscape, and the abundance of similar suitable roosting habitat surrounding this proposed area of impact, TVA determined that any indirect or cumulative effects to Indiana and NLEB resulting from this action would be discountable.

Consultation with the USFWS under Section 7(a)(2) of the ESA was initiated on May 29, 2014. A letter of concurrence was received from USFWS on July 21, 2014 (see Appendix A), concurring with TVA's determination that the proposed project would not likely adversely affect Indiana bat, NLEB, or Mitchell's satyr butterfly. Thus TVA's obligations under Section 7 (a)(2) of the ESA have been fulfilled for this project.

4.7 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" (U.S. Water Resources Council 1978). 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.

4.7.1 No Action Alternative

Under the No Action Alternative, there would be no direct, indirect, or cumulative impacts to floodplains because there would be no physical changes to the current conditions found within local floodplains.

4.7.2 Action Alternative

The proposed transmission line and associated access roads would cross the 100-year floodplains of several creeks (see Section 3.7). The conductors for the transmission line would be located well above the 100-year floodplain of the creeks. Generally, TVA's policy is to span floodplain areas where this is feasible. However, in some circumstances, a structure may have to be located within a floodplain. Consistent with EO 11988, an overhead transmission line and related support structures are considered to be repetitive actions in the 100-year floodplain.

The construction of support structures for the proposed transmission line would not result in any increase in flood hazard either as a result of increased flood elevations or changes in the flow-carrying capacity of the streams being crossed. However, to minimize adverse impacts on natural and beneficial floodplain values, BMPs would be implemented during construction. These measures include re-vegetating the ROW in those areas where the natural vegetation would be removed (see Section 2.5).

As noted in Section 3.7, all of three access roads and portions of 15 access roads are located within 100-year floodplains. Consistent with EO 11988, roads are considered to be repetitive actions in the 100-year floodplain. As stated in Section 2.5, any road improvements would be done in such a manner that upstream flood elevations would not be increased. Based upon implementation of the above mitigation measures, construction, operation and maintenance of the proposed transmission line would cause only minor effects on floodplains.

4.8 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). Activities resulting in the discharge of dredge or fill into waters of the United States require authorization through a Nationwide General Permit or Individual Permit issued by the USACE under Section 404 of the CWA. EO 11990 requires federal agencies to minimize wetland destruction, loss, or degradation, and preserve and enhance natural and beneficial wetland values, while carrying out agency responsibilities.

4.8.1 No Action Alternative

Under the No Action Alternative, no project-related disturbance to wetlands within the project footprint would occur. Therefore, no wetlands would be affected. Changes to wetlands could nonetheless occur over time as other factors such as population trends, land use and development, quality of air/water/soil, recreational patterns, and cultural, ecological, and educational interests change within the area.

4.8.2 Action Alternative

The proposed project would span 16.58 acres of wetland, requiring the conversion of 9.25 acres of forested wetlands to emergent/scrub-shrub wetlands. The forested wetlands, considered moderate quality (i.e., TVARAM Category 2), would be cleared during construction and then maintained as emergent/scrub-shrub wetlands for the life of the line. Similarly, all wetland areas located within the proposed ROW would be subject to periodic vegetation management, and maintained as herbaceous or scrub-shrub wetland vegetation.

Efforts were made during the transmission line siting process to avoid wetlands. However, because of project and topographic constraints, and because of the goal of minimizing impacts to other environmental resources, no practicable alternative was available that would allow complete avoidance of wetlands

Conversion of 9.25 acres of moderate quality forested wetlands to emergent or shrub-scrub wetlands as a result of the proposed project would be subject to mitigation requirements under the USACE's regulations implementing Section 404 of the CWA. The impact on these wetlands would also be subject to review under EO 11990. Based on preliminary discussions between TVA and the USACE, mitigation would be required for the loss of trees and associated forested wetland functions resulting from the proposed project. TVA would purchase credits per USACE requirements from an approved mitigation bank prior to construction of the transmission line.

Cumulative impact analysis of wetland effects takes into account wetland loss and conversion at a watershed-level scale. Proposed wetland impacts are considered insignificant on a cumulative scale due to wetland mitigation provided at a sufficient ratio for compliance with wetland regulations and compensation for the loss of forested wetland habitat and associated functions and values. Therefore, no cumulative wetland impacts are anticipated as a result of the proposed new transmission line construction project.

Potential direct and indirect wetland impacts could result as vehicles and heavy equipment traverse the wetland areas. Efforts were made during the transmission line siting process to avoid wetlands. However, because of project and topographic constraints, and because of the goal of minimizing impacts to other environmental resources, no practicable alternative was available that would allow complete avoidance of wetlands. Consistent with

EO 11990, potential wetland impacts would be reduced to an insignificant level during the transmission line construction and ROW maintenance activities through implementation of appropriate BMPs (Muncy 2012). These BMPs would include use of low-ground pressure equipment (feller-buncher), conducting work within the wetland areas during the dry season, installation of silt fences to minimize siltation of wetland areas, and the use of mats for vehicular passage to minimize rutting. As a result of implementing these protective measures and fulfilling USACE and/or EO 11990 mitigation requirements, the transmission line construction project would have minor direct, indirect, or cumulative impacts to wetland areas or to the associated wetland functions and values provided within the general watershed.

4.9 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. 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.

4.9.1 No Action Alternative

Under this alternative, the proposed transmission line would not be constructed. Thus, the visual character of the local area would likely remain virtually unchanged, at least for the foreseeable future. However, some visual changes could occur over the long-term due to residential or commercial development. Likewise, no changes in local ambient noise levels or new sources of odors are likely to occur within the foreseeable future under the No Action Alternative.

4.9.2 Action Alternative

4.9.2.1 Visual Resources

Under the Action Alternative, the new transmission line would be built. Along the 6.5 miles of existing ROW, area motorists and local residents would likely not see a significant change. The landscape character may be altered slightly due to ROW clearing, resulting in a minor cumulative impact that would be visually similar to other clearing along the route.

As the remainder of the route continues along new ROW, motorists along local roads, area residents, and patrons to commercial districts would notice a minor cumulative change in the landscape as a result of new structures and lines. For residents, some views may be as far as middleground distances in both directions. As these distances increase, details become weak and visually insignificant. For other residents and motorists, the views would be in the foreground and briefly under lines and between poles, resulting in minor visual impacts.

Operation, construction, and maintenance of the proposed transmission line would be visually minor. 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 existing and proposed ROW and laydown areas have been restored through the use of TVA standard Best Management Practices (Muncy 2012). Therefore, any visual impacts anticipated as a result of this project would be minor.

4.9.2.2 Noise and Odors

During construction of the proposed transmission line, equipment could generate noise above ambient levels. Because of the short construction period, noise-related effects are expected to be temporary and insignificant. For similar reasons, noise related to periodic line maintenance is also expected to be insignificant. As described in Section 4.14.1, transmission lines may also produce noise during operation under certain atmospheric conditions. Off the ROW, this noise would be below the level that would interfere with speech. Construction and operation of the transmission line are not expected to produce any noticeable odors.

4.10 Archaeological and Historic Resources

A project may have effects on a historic property that are not adverse if those effects do not diminish the qualities of the property that identify it as eligible for listing on the NRHP. However, if the agency determines (in consultation) that the undertaking's effect on an historic property within the APE would diminish any of the qualities that make the property eligible for the NRHP, the effect would be considered adverse. Examples of adverse effects include ground disturbing activity in an archaeological site or erecting structures within the viewshed of a historic building in such a way as to diminish the building's historic setting.

4.10.1 No Action Alternative

Under the No Action Alternative, there would be no direct, indirect, or cumulative impacts to historic or archaeological resources because there would be no changes to the area within the proposed ROW. However, changes to cultural resources may occur over time, independently of TVA's actions, due to factors such as population increases, changes in land use, and the potential for development to occur in the area.

4.10.2 Action Alternative

The proposed actions would have no effects on archaeological resources listed in or eligible for listing in the NRHP. Although archaeological sites 22UN747, 22UN752, 22LE1074, and 22LE1075 may be eligible for the NRHP, TVA finds that the proposed actions would not adversely affect any of these sites, provided TVA uses wetland BMPs (i.e. mats) to prevent ground disturbance within the archaeological sites. The Mississippi SHPO agreed with this determination.

TVA and the SHPO agreed that the undertaking would have no effects on the NRHP-eligible Barlow-Burrow House (historic resource 081-SLT-0001). Although TVA and the SHPO do not agree on the NRHP eligibility of architectural resources 081-SLT-0004 (Presbyterian Church), 081-SLT-0005 (Methodist Church) or 081-SLT-0015 (bridge), the SHPO found that the undertaking would have no adverse effects to any of these resources. The SHPO also finds that there would be no adverse effect to any potential district in Downtown Saltillo based on modern intrusions and the location of the proposed transmission line.

TVA consulted with the NPS regarding the possible effects of the undertaking on the Natchez Trace Parkway. In response, the NPS asked for additional information about the location and heights of the proposed transmission line structures to adequately evaluate the project's possible impacts, and also suggested that the project could have a cumulative effect on the Natchez Trace Parkway. TVA supplied the requested information. However, the NPS did not respond, and the SHPO subsequently concurred with TVA's finding that

the undertaking would have no adverse effect on the Natchez Trace Parkway. TVA and the SHPO are in agreement that the undertaking would have no adverse effects to any historic architectural property listed or eligible for listing in the NRHP. No federally-recognized Native American tribe has objected to TVA's proposed undertaking.

4.11 Recreation, Parks, and Natural Areas

4.11.1 No Action Alternative

Because there would be no change in current conditions, no effects to local recreation facilities or opportunities, parks or natural areas are anticipated under this Alternative.

4.11.2 Action Alternative

Because of the intervening distance and the presence of visual barriers, no effects to local recreational facilities or recreational opportunities at the Campgrounds at Barnes Crossing, Lake Lamar Bruce or the Elvis Presley Birthplace are anticipated. The W. K. Webb Sportplex is physically separated from the proposed transmission line by a raised railroad bed and a wooded area. Thus, no adverse effects to this sports complex are anticipated under the Action Alternative.

No designated natural areas, including managed areas and ecologically significant sites currently exist within or immediately adjacent to the areas where the construction of new transmission lines and support structures would occur.

The final support structure (near the Turner Park 161-kV Substation) on the proposed new transmission line would be located approximately 60 feet from the boundary of the Natchez Trace Parkway property and about 900 feet from the roadway of the Natchez Trace Parkway. Access to the work site would be via existing access roads that do not cross property managed by the NPS as part of the Natchez Trace Parkway. No adverse effects to natural areas are anticipated under the Action Alternative because the proposed transmission line construction would not occur on any lands designated as natural areas. Activities on land immediately adjacent to the Natchez Trace Parkway boundary would occur on an existing transmission line segment using existing access roads and ROWs that do not interfere with the purpose or public use of the Natchez Trace Parkway and the Natchez Trace National Scenic Trail.

4.12 Land Use and Prime Farmland

4.12.1 No Action Alternative

Under the No Action Alternative, no changes in current land uses along the proposed ROW are anticipated within the foreseeable future. Thus, implementation of this alternative is not expected to directly cause any effects to current land uses or to prime farmlands.

4.12.2 Action Alternative

ROW construction for the proposed transmission line would involve clearing of approximately 73 acres of currently forested land. Approximately 121 acres of new ROW would cross land that is currently open (e.g., pasture) or in agricultural production.

As a term of the ROW agreement between TVA and the landowner, structures cannot be built or located within the ROW. However, neither the presence nor the operation of the proposed transmission line would preclude the continued use of land within the ROW for agricultural uses or the conversion of the land use within the ROW to agriculture.

Over the last few decades, Tupelo and the surrounding area has experienced commercial, industrial, and residential growth. Construction of the proposed transmission line would ensure a reliable supply of power to the Tupelo area for the foreseeable future. Thus, implementing the proposed action could indirectly facilitate some future urban expansion and the resultant change in land uses of some local agricultural areas to commercial and residential uses.

4.13 Socioeconomics and Environmental Justice

4.13.1 No Action Alternative

Under the No Action Alternative, no land or property easements for locating the proposed transmission line would be purchased by TVA, and the proposed transmission line would not be built. Over time, increasing power loads caused by commercial and industrial growth in the area could eventually result in overloads on the existing Union-Tupelo No. 1 and No. 2 161-kV Transmission Lines, as well as associated electrical transmission equipment. This could cause a loss of reliability of the local electrical power transmission system and possible power outages. In that case, local residences, businesses, and industries could be negatively affected by the lack of a reliable power supply. However, the amount of such economic impact cannot be quantified accurately due to the speculative nature of future conditions.

4.13.2 Action Alternative

To construct the proposed transmission line, TVA would normally purchase easements from private landowners. In certain cases, TVA may be required to acquire property. In either case, current landowners would be compensated for the value of such rights or properties. Nevertheless, the direct local economic effect from the purchase of any additional property or ROW easements would be minor. Implementing the proposed actions would accommodate anticipated increases in power loads in the area. Therefore, there would be some long-term indirect economic benefits to the area. Because of local demographic conditions, construction and operation of the transmission line would not disproportionally affect any economically disadvantaged or minority populations.

Along that portion of the transmission line route that would parallel the existing Browns Ferry-Union 500-kV Transmission Line, the route traverses very few residential areas. However, the proposed route would cross residential areas immediately east and south of Saltillo, where the route parallels a railroad. Most residences in this area, including a housing development near the Turner Industrial Park and W. K. Webb Sportplex, tend to be located west of the railroad embankment (see Figure 1-1), which serves as a visual and physical barrier. Because most homes in this local area are located far enough from the proposed route, any effects to local property values are expected to be minor.

4.14 Post-construction Effects

4.14.1 Electric and Magnetic Fields

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

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

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

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

Under certain weather conditions, high-voltage transmission lines such as the existing Browns Ferry-Union 500-kV Transmission Line and the proposed 161-kV line may produce an audible low-volume hissing or crackling noise (Appendix I). This noise is generated by the corona resulting from the dissipation of energy and heat as high voltage is applied to a small area. Under normal conditions, corona-generated noise is not audible. The noise may be audible under some wet conditions, but the resulting noise level away from the ROW would be well below the levels that can produce interference with speech. Corona is not associated with any adverse health effects in humans or livestock.

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

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

Research has been done on the effects of EMFs on animal and plant behavior, growth, breeding, development, reproduction, and production. Research has been conducted in the laboratory and under environmental conditions, and no adverse effects or effects on health or the above considerations have been reported for the low-energy power frequency fields (World Health Organization (WHO) 2007a). Effects associated with ungrounded, metallic objects' static charge accumulation and discharge in dairy facilities have been

found when the connections from a distribution line meter have not been properly installed on the consumer's side of a distribution circuit.

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

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

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

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

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

Although no federal standards exist for maximum EMF field strengths for transmission lines, two states (New York and Florida) do have such regulations. Florida's regulation is the more restrictive of the two with field levels being limited to 150 milligauss (mG) at the edge of the ROW for lines of 230 kV and less. The expected magnetic field strengths at the edge of the proposed ROW would fall well within these standards. Consequently, any EMF-related effects from the construction and operation of the proposed transmission line are anticipated to be minor.

4.14.2 Lightning Strike Hazard

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

4.14.3 Transmission Structure Stability

The pole structures (Figure 2-1) that would be used on the proposed 161-kV transmission line have demonstrated a good safety record. They are not prone to rot or crack, like wooden poles, nor are they subject to substantial storm damage due to their low cross-section in the wind.

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

4.14.4 Other Impacts

No significant impacts to air quality and solid waste are expected to result from the relatively short-term activities of construction. Appendices B and C contain procedures for dealing with these issues.

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

4.15 Long-term and Cumulative Impacts

The Tupelo area is experiencing commercial, industrial, and residential development. Construction of the proposed transmission line would provide another source of power to the Tupelo 161-kV Substation, thereby increasing the reliability of electric power service in the Tupelo area. The availability of reliable power is a positive factor to industries looking to locate in the area. Thus, the new transmission line would facilitate, to a degree, continued development and local economic growth.

The proposed transmission line would require approximately 194 acres for ROW. Although most agricultural operations could occur within the ROW, the land within the ROW would be encumbered and could not be used for other purposes such as residential development, building sites, or for silviculture. However, this cumulative loss of unencumbered acreage is minor compared to the amount of land within Lee and Union counties.

4.16 Unavoidable Adverse Environmental Impacts

As previously stated, clearing for the transmission line ROW would result in the removal of approximately 73 acres of forested areas. The following unavoidable effects would result from construction of the proposed transmission line.

- Clearing associated with construction of the proposed transmission line could result in a small amount of localized siltation.
- Trees would not be permitted to grow within the transmission line ROW or to a determined height adjacent to the ROW that would endanger the transmission line.
- Clearing and construction would result in the disruption and/or loss of some wildlife, and the permanent loss of about 73 acres of forested wildlife habitats.
- Any burning of cleared material would result in some short-term air pollution.
- The proposed transmission line would result in minor visual effects on the landscape in the immediate local area.

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

Land within the ROW of the proposed transmission line would be committed to use for electrical system needs for the foreseeable future. Approximately 194 acres of land within the proposed ROW would be committed to use for electrical system needs for the foreseeable future. The property within the proposed ROW is primarily used for agriculture and forested land. Although agricultural land uses are acceptable within the proposed ROW, this land could not be used for forestry for the operational life of the transmission line. These losses of long-term productivity with respect to timber production and as wildlife habitat are minor both locally and regionally.

4.18 Irreversible and Irretrievable Commitments of Resources

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

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

The ROW used for the transmission line would constitute an irretrievable commitment of certain onsite resources, particularly, wildlife habitat and forest resources, 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 could continue.

CHAPTER 5

5.0 LIST OF PREPARERS

5.1 NEPA Project Management

Anita E. Masters

Position:	Program Manager
Education:	M.S., Biology/Fisheries; B.S., Wildlife Management
Experience:	28 years in Project Management, NEPA Compliance, and Community and Watershed Biological Assessments
Involvement:	NEPA Compliance, Project Coordination, and Document Preparation

James F. Williamson Jr.

Position:	Contract Senior NEPA Specialist
Education:	Ph.D., Fisheries and Wildlife Sciences; M.S., Wildlife Ecology; B.S., General Science/Zoology
Experience:	10 years in Forest Management, Inventory, and Software Development; 23 years in NEPA Compliance
Involvement:	Document Compilation and Preparation

5.2 Other Contributors

W. Nannette Brodie, CPG

Position	Senior Environmental Scientist
Education	B.S., Environmental Science; B.S., Geology
Experience	17 years in Environmental Analyses, Surface Water Quality, and Groundwater/Surface Hydrology Evaluations
Involvement:	Groundwater

Kimberly D. Choate

Position	Manager, Transmission Siting
Education	B.S. and M.S. Civil Engineering
Experience	26 years in Civil Engineering, Environmental Engineering, NEPA Preparation, Project Management, and Manager of Siting Engineers
Involvement:	Document Review

Stephen C. Cole

Position:	Contract Archaeologist
Education:	Ph.D., Archaeology; M.A. and B.A., Anthropology
Experience:	11 years in Cultural Resources; 4 years teaching at university level
Involvement:	Cultural Resources Compliance

Patricia B. Cox

Position:	Botanist, Specialist
Education:	Ph.D., Botany (Plant Taxonomy and Anatomy); M.S. and B.S., Biology
Experience:	31 years in Plant Taxonomy; 9 years in Rare Species Monitoring, Environmental Assessment, and NEPA Compliance
Involvement:	Threatened and Endangered Species Compliance, Invasive Plant Species, and Terrestrial Ecology

Patricia Bernard Ezzell

Position:	Specialist, Native American Liaison
Education:	M.A., History with an emphasis in Historic Preservation; B.A., Honors History
Experience:	26 years in History, Historic Preservation, and Cultural Resource Management; 11 years in Tribal Relations
Involvement:	Tribal Liaison

John M. Higgins, P.E.

Position:	Water Quality Specialist
Education:	Ph.D., Environmental Engineering; M.S., B.S., Civil Engineering
Experience:	42 years in Environmental Engineering and Water Resources Management
Involvement:	Surface Water

John M. Hite, P.E.

Position:	Principal Engineer, Bulk Transmission Planning
Education:	B.S., Electrical Engineering
Experience:	13 years with TVA, 11 years in Transmission Engineering
Involvement:	Project Need, Project Justification, Electrical Alternatives and Document Review

Britta P. Lees

Position:	Wetlands Biologist
Education:	M.S., Botany-Wetlands Ecology Emphasis; B.A., Biology
Experience:	14 years in Wetlands Assessments, Botanical Surveys, Wetlands Regulations, and/or NEPA Compliance
Involvement:	Wetlands

Todd C. Liskey

Position:	Environmental Program Manager
Education:	M.B.A.; B.S., Civil Engineering
Experience:	20 years in Engineering associated with Environmental Compliance and Transmission System Siting; Preparation of Environmental Review Documents
Involvement:	Project Coordination, Purpose of and Need for Action, Alternatives including the Proposed Action

Carrie C. Mays, P.E.

Position:	Civil Engineer, Flood Risk
Education:	M.S., Civil Engineering; B.S., Civil Engineering
Experience:	1 year in Floodplains; 3 years in River Forecasting; 7 years in Compliance Monitoring
Involvement:	Floodplains

Craig L. Phillips

Position:	Aquatic Biologist
Education:	M.S. and B.S., Wildlife and Fisheries Science
Experience:	6 years Sampling and Hydrologic Determinations for Streams and Wet-Weather Conveyances; 5 years in Environmental Reviews
Involvement:	Aquatic Ecology/Threatened and Endangered Species

Kim Pilarski-Hall

Position:	Senior Wetlands Biologist
Education:	M.S., Geography, Minor Ecology
Experience:	17 years in Wetlands Assessment and Delineation
Involvement:	Natural Areas

Aurora Moldovanyi Pulliam

Position:	Recreation Representative
Education:	M.S., Recreation, Tourism, Park Planning and Management; B.S., Wildlife and Fisheries Biology and Management
Experience:	10 years in NEPA and recreational project planning
Involvement:	Recreational Resources

This page intentionally left blank

CHAPTER 6

6.0 ENVIRONMENTAL ASSESSMENT RECIPIENTS

6.1 Federal Agencies

United States Fish and Wildlife Service
Jackson, Mississippi

National Park Service
Tupelo, Mississippi

United States Army Corps of Engineers
Homewood, Alabama

6.2 Federally Recognized Tribes

The following tribes were notified of the availability of the document:

The Chickasaw Nation

Choctaw Nation of Oklahoma

Jena Band of Choctaw Indians

Mississippi Band of Choctaw Indians

6.3 State Agencies

Mississippi Department of Archives and History
Jackson, Mississippi

Mississippi Department of Environmental Quality
Jackson, Mississippi

Mississippi Department of Transportation
Jackson, Mississippi

This page intentionally left blank

CHAPTER 7

7.0 LITERATURE CITED

American Medical Association. 1994. *Effects of Electric and Magnetic Fields*. Chicago, Ill.: AMA, Council on Scientific Affairs (December 1994).

Barone, J.A. 2005. Historical presence and distribution of prairie in the Black Belt of Mississippi and Alabama. Castanea 70(3):170–183.

Chapman, S. S, G. E. Griffith, J. M. Omernik, J. A. Comstock, M. C. Beiser, and D. Johnson. 2004. Ecoregions of Mississippi, (color poster with map, descriptive text, summary tables, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:1,000,000).

Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. *Classification of Wetland and Deepwater Habitats of the United States*. Washington, D.C.: U.S. Fish and Wildlife Publication FWS/OBS-79/31.

Dickenson, J. G. 2001. Wildlife of Southern Forests: Habitat and Management. Blaine, WA: Hancock House Publishers.

Environmental Laboratory. 1987. *Corps of Engineers Wetland Delineation Manual*. Vicksburg, Miss.: U.S. Army Corps of Engineers Waterways Experiment Station. Technical Report Y-87-1

International Association for Research on Cancer. 2002. *Non-Ionizing Radiation, Part 1; Static and Extremely Low-Frequency (ELF) Electric and Magnetic Fields*. Lyon, France: IARC Press.

Journal of the American Medical Association. 2007. *Implantable Cardioverter-Defibrillators*. JAMA 297(17), May 2, 2007.

Leverett, R. 1996. *Definitions and History in Eastern Old-growth Forests: prospects for rediscovery and recovery*. Edited by Mary Byrd Davis. Island Press, Washington D.C. and Covelo, California.

Mack, J. 2001. *Ohio Rapid Assessment Method for Wetlands*, Version 5.0, User's Manual and Scoring Forms. Columbus: Ohio Environmental Protection Agency, Division of Surface Water, 401/Wetland Ecology Unit, EPA Technical Report WET/2001-1.

Miller, J. H., S. T. Manning, and S. F. Enloe. 2010. *A Management Guide for Invasive Plants in the Southern Forests*. Gen. Tech. Rep. SRS-131. U.S. Department of Agriculture, Forest Service, Southern Research Station: 1-3.

Mississippi Department of Environmental Quality. 2013. *State of Mississippi Ground Water Quality Assessment*. Office of Land and Water Resources. P.O. Box 2309, Jackson, Mississippi 39225. Available online at:

<https://www.deq.state.ms.us/mdeq.nsf/pdf/GPB_MSGroundwaterQualityAssessment305b2013/$FILE/305b_2013.pdf?OpenElement>.

_____. 2013. Available online at: <http://landandwater.deq.ms.gov/swap/onlinemaps/viewer.asp>.

Muncy, J. A. 2012. *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities* (revised edition). Edited by A. Bowen, J. Branum, C. Chandler, A. Dattilo, B. Dimick, S. Gaither, C. Henley et al. Norris: Tennessee Valley Authority Technical Note TVA/LR/NRM 92/1. Available online at: <http://www.tva.com/power/projects/bmp_manual_2012.pdf> (n.d.).

National Institute of Environmental Health Sciences. 1998. *Report on Health Effects From Exposure to Power Line Frequency Electric and Magnetic Fields*. Research Triangle Park: NIEHS, Publication No. 99-4493.

_____. 2002. *Electric and Magnetic Fields Associated With the Use of Electric Power*. Retrieved from: <http://www.niehs.nih.gov/health/materials/electric_and_magnetic_fields_associated_with_the_use_of_electric_power_questions_and_answers_english_508.pdf#search=electric%20and%20magnetic%20fields%20electric%20power>

National Research Council. 1997. *Possible Health Effects of Exposure to Residential Electric and Magnetic Fields*. NRC, Committee on the Possible Effects of Electromagnetic Fields on Biologic Systems. Washington National Academy Press.

Natural Resources Conservation Service. 2014. Web Soil Survey. Available online at: <http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>. Accessed June 2014.

NatureServe. 2013. NatureServe Explorer: An Online Encyclopedia of Life. Version 7.1. NatureServe, Arlington, Virginia. Available online at: <http://explorer.natureserve.org/servlet/NatureServe?sourceTemplate=tabular_report.wmt&loadTemplate=species_RptComprehensive.wmt&selectedReport=RptComprehensive.wmt&summaryView=tabular_report.wmt&elKey=105170&paging=home&save=true&startIndex=1&nextStartIndex=1&reset=false&offPageSelectedElKey=105170&offPageSelectedElType=species&offPageYesNo=true&post_processes=&radiobutton=radiobutton&selectedIndexes=105170 >. Accessed May 24, 2013.

Renken, R. A. 1998. Groundwater Atlas of the United States. Hydrologic Investigations Atlas 730-F. U.S. Geological Survey.

Strand, M. N. 1997. *Wetlands Deskbook*, 2nd Edition. Washington, D.C.: The Environmental Law Reporter, Environmental Law Institute.

Tennessee Valley Authority. 1983. *Procedures for Compliance with the National Environmental Policy Act: Instruction IX Environmental Review*. Tennessee Valley Authority. Retrieved from <http://www.tva.gov/environment/reports/pdf/tvanepa_procedures.pdf>.

_____. 2011. *Integrated Resource Plan: TVA's Environmental & Energy Future*. Knoxville, Tennessee.

U.S. Army Corps of Engineers. 2010. *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region*, ed. J. S. Wakely, R. W. Lichvar, C. V. Noble, and J. F. Berkowitz. ERDC/EL TR-10-9. Vicksburg, Miss.: U.S. Army Engineer Research and Development Center.

_____. 2014. National Wetland Plant List, Version 3.2. Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory, Hanover, New Hampshire. Available at: <http://wetland_plants.usace.army.mil/>.

U.S. Census Bureau. 2014. American Fact Finder. Available online at: <http://quickfacts.census.gov/qfd/states/28000.html>. Accessed January 2014.

U.S. Department of Defense and U.S. Environmental Protection Agency. 2003. *Advance Notice of Proposed Rulemaking on the Clean Water Act Regulatory Definition of Waters of the United States*. Federal Register, Volume 68(10), January 15, 2003.

U.S. Department of Energy. 1996. *Questions and Answers; EMF in the Workplace*. *Electric and Magnetic Fields Associated With the Use of Electric Power.* National Institute for Occupational Safety and Health, National Institute of Environmental Health Sciences, Report No. DOE/GO-10095-218, September 1996.

U.S. Environmental Protection Agency. 2013. Local Drinking Water Information. Available online at: <http://www.epa.gov/safewater/dwinfo/index.html>.

U.S. Fish and Wildlife Service. 2012. *Interim Indiana Bat Mitigation Guidance for the State of Tennessee*. Cookeville Ecological Services Field Office, Cookeville, Tennessee. Effective date March 12, 2012.

U.S. Fish and Wildlife Service. 2014. Northern Long-eared Bat Interim Conference and Planning Guidance.

United States Forest Service. 2013. Forest Inventory Data Online (FIDO). Version 1.5.1.05. Available online at: <http://apps.fs.fed.us/fia/fido/index.html>.

United States Water Resources Council. 1978. *Floodplain Management Guidelines for Implementing E.O. 11988*. Federal Register 43:6030, February 10, 1978.

World Health Organization. 2007a. *Electromagnetic Fields and Public Health.* WHO EMF Task Force Report, WHO Fact Sheet No. 299.

_____. 2007b. *Extremely Low Frequency Fields.* Environmental Health Criteria Monograph No. 238.

_____. 2007c. *Electromagnetic Fields and Public Health Exposure to Extremely Low Frequency Fields.* WHO Fact Sheet No. 322.

This page intentionally left blank

Appendix A – Correspondence

This page intentionally left blank

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

November 4, 2013

Mr. Jim Woodrick, Director
Mississippi Department of Archives and History
Historic Preservation Division
Post Office Box 571
Jackson, Mississippi 39205-0521

Dear Mr. Woodrick:

TVA, UNION-TUPELO #3 161-KV TRANSMISSION LINE PROJECT, UNION AND LEE COUNTIES, MISSISSIPPI

TVA proposes to improve the existing power supply system in Union, Lee, and Pontotoc counties and surrounding areas in Mississippi by constructing and operating a third 161-kV transmission line (TL) between the Union 500-kV Substation (SS) in Union County and the Tupelo 161-kV SS in Lee County. The new Union-Tupelo # 3 TL would be comprised of both new and existing TLs:

- The new 16-mile Union-Turner Park section would extend from the Union 500-kV SS to the Turner Park 161-kV SS located in the Turner Industrial Park, near the intersection of Highway 45 and Natchez Trace Parkway.
- This new section would then connect to the existing 6.6-mile Tupelo-Turner Park 161-kV TL, completing the connection to the Tupelo 161-kV SS. There would be no physical work required on this section.

TVA has determined that this proposed TL construction project is an undertaking (as defined at 36 CFR § 800.16(y)) that has the potential to cause effects on historic properties. We are initiating consultation under Section 106 of the National Historic Preservation Act for this undertaking.

New 100-foot-wide ROW would be required for the entire length of the proposed Union-Turner Park TL section. Approximately 10.5 miles would parallel TVA's existing Browns Ferry-Union 500-kV TL. One part of this section (the first 6.5 miles) would be on existing right-of-way (ROW) but would require 50 feet of ROW clearing. The rest of the section would require an additional 72.5 feet of new ROW, of which 50 feet would be cleared. The remaining 5.5 miles of the proposed Union-Turner Park section would be constructed on entirely new ROW, requiring 100 feet of clearing. (A portion of this latter segment will be on a former TVA Guntown 46-kV TL. The Guntown 46-kV TL was built in 1923 but later retired, and TVA no longer owns an easement within this former TL ROW.) The proposed 16-mile Union-Turner Park section of new

TL would occupy approximately 195 acres. TVA would clear vegetation as needed for the new TL, and this would affect approximately 131 acres (68% of the new TL ROW).

TVA identified the area of potential effects (APE) for archaeological resources for the undertaking as the proposed 16-mile Union-Turner Park section of new TL. The APE for historic architectural properties consists of the area within a one-half mile radius of the proposed new TL centerline. Because the undertaking would require no physical work within the 6.6-mile Tupelo-Turner Park TL, this section has no potential to affect cultural resources.

TVA contracted with Tennessee Valley Archaeological Research (TVAR) to perform a phase I cultural resources survey of the APE. Enclosed are three copies of the draft report titled *A Phase I Cultural Resources Survey of TVA's Proposed Union-Tupelo #3 161-kV Transmission Line in Union and Lee Counties, Mississippi*, along with three CDs containing digital copies of the report.

Background research conducted by TVAR prior to the survey indicated that one archaeological site (22LE843) has been recorded previously within the archaeological APE. TVAR reinvestigated this site and recommends that it is ineligible for listing in the National Register of Historic Places (NRHP). A second previously recorded site, 22LE544, is adjacent to the APE but the survey identified no evidence of the site within the APE. Nine previously unrecorded archaeological sites were identified within the APE during the survey. TVAR recommends that four of these sites (22UN747, 22UN752, 22LE1074, and 22LE1075) are potentially eligible for listing in the NRHP based on research potential. The remaining five newly recorded sites (22UN748, 22UN749, 22UN750, 22UN751, and 22LE1073) are recommended ineligible for listing in the NRHP.

In order to avoid project effects to the four potentially eligible archaeological sites, TVA will restrict work in the vicinity of those sites to times when the ground is dry and firm, or will use low ground pressure equipment, or will employ wetland mats within the site boundaries. These measures will minimize compaction and ground disturbance. TVA finds that, with the work performed under these conditions, the undertaking would have no adverse effects to any of the potentially eligible sites.

TVAR's historic architectural survey noted seventeen previously recorded above ground resources within the architectural APE. One of these, the Barlow Burrow House, is listed on the NRHP. The Barlow Burrow House is located approximately 0.17 miles west of the proposed TL centerline at 157 Second Street in Saltillo, MS. TVAR recommends that the Barlow Burrow House is outside the viewshed of the proposed project and would not be affected by the proposed action. Of the remaining 16 previously recorded architectural resources, TVAR's architectural survey found that ten are located outside a visual line of sight to the project area and one has been destroyed since its initial recordation. TVAR recommends the remaining five architectural resources ineligible for the NRHP. The survey identified seven previously unrecorded architectural resources, designated HS-1 through HS-7 in the enclosed report. TVAR recommends all seven of these resources ineligible for listing in the NRHP. TVAR also noted that a portion of the town of Saltillo falls within the architectural APE. TVAR recommends

that Saltillo is ineligible for listing in the NRHP, and notes that the town does not include any architectural properties that appear to be eligible for listing in the NRHP individually.

TVAR notes further that a section of the Natchez Trace Parkway falls within the architectural APE. TVA is aware that the state historic preservation officers of Tennessee, Alabama and Mississippi consider the Natchez Trace Parkway eligible for listing in the NRHP under criterion A for its association with a number of events that have made significant contributions to the broad patterns of American history. TVAR recommends that the two-mile section falling within the APE retains sufficient integrity to remain eligible for listing in the NRHP. TVAR recommends further that while the proposed undertaking would result in a visual effect on the Natchez Trace Parkway, the effect would not be adverse because views to the project would be largely screened by vegetation and because the historic setting of the Parkway in this area has been compromised by an existing TL, modern industrial development, and U.S. Highway 45.

TVA has reviewed the enclosed draft report and agrees with the findings and recommendations of the authors. TVA finds that the undertaking would have no effects on any historic architectural properties listed in, or eligible for listing in, the NRHP. TVA finds further that, with the work being performed under the above-listed conditions at each of the four potentially-eligible archaeological sites (22UN747, 22UN752, 22LE1074, and 22LE1075), the undertaking would have no adverse effects on archaeological sites listed in or eligible for listing in the NRHP.

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

Pursuant to 36 CFR Part 800.4(d)(1), we are seeking your concurrence with TVA's determinations regarding the eligibility of the above-listed archaeological sites and architectural resources for listing in the NRHP, and TVA's finding that the proposed Union-Tupelo #3 Transmission Line project will have no adverse effects on historic properties.

If you have any questions or comments, please contact Richard Yarnell in Knoxville, Tennessee, at (865) 632-3463 or by email at wryarnell@tva.gov.

Sincerely,

Clinton E. Jones
Senior Manager, Biological and Cultural Compliance
Environmental Permitting and Compliance
WT11B-K

Enclosures

Tennessee Valley Archaeological Research

MISSISSIPPI DEPARTMENT *of* ARCHIVES AND HISTORY

MDAH

PO Box 571, Jackson, MS 39205-0571
601-576-6850 • Fax 601-576-6975
mdah.state.ms.us
H.T. Holmes, Director

December 6, 2013

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

RE: Phase I Archaeological Survey for the Tennessee Valley Authority Proposed Union-Tupelo #3 161-kV Transmission Line, MDAH Project Log #11-050-13 (Report #13-0697), Lee and Union Counties

Dear Mr. Jones:

We have reviewed the October 2013 cultural resources survey report by Hunter B. Johnson, Principal Investigator, received on November 7, 2013, 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 22UN747 and 22UN752 are eligible for listing in the National Register of Historic Places. We also concur that sites 22UN748, 22UN749, 22UN750, and 22UN751 are ineligible for listing in the National Register of Historic Places. Regarding site 22LE1073, we would like more information regarding the owner, Ish Fah Lah Ma, and what role he may have had in Choctaw history during 1840s. We also request the THPO's opinion before we complete our comments regarding TVAR assessment of site eligibility. We are missing site cards or revisit information for sites 22LE843, 22LE544, and 22LE101, which may or may not be affected by the project. Finally, we cannot concur with you determination of effect because we could find no determination of effect for archaeological sites in the report.

Regarding historic structures, we concur that newly recorded resources HS-1 through HS-7 are ineligible for listing in the National Register of Historic Places. We concur the Barlow-Burrow House, resource 081-SLT-0001, is listed in the National Register of Historic Places, but will not be affected. We concur that resources 081-SLT-0006 (house) and 081-SLT-0011 (office) are ineligible for listing in the National Register of Historic Places. We do not concur that resources 081-SLT-0004 (Pres. Church), 081-SLT-0005 (Meth. Church), and 081-SLT-0015 (Bridge) are ineligible, but we do concur the project will have no adverse effect on these eligible resources. Regarding Downtown Saltillo, lacking a comprehensive survey, we cannot concur there is no eligible historic district present, but based on other modern intrusions and the location of the proposed transmission line, we concur there will be no adverse effect to any potential district. We concur that Natchez Trace Parkway is eligible, but would prefer to defer our final comments until the National Park Service determines the project will have no adverse effect on the Parkway.

We look forward to receiving the revised site cards and a revised report. Please be sure to solicit comments from the Natchez Trace Parkway office. Please provide a copy of this letter to Hunter Johnson at TVAR. Contact Patty Miller-Beech, MDAH archaeologist, at (601) 576-6944, if you have any questions.

Sincerely,

Greg Williamson
Review and Compliance Officer

FOR: H.T. Holmes
State Historic Preservation Officer

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

December 23, 2013

Dale Wilkerson, Acting Superintendent
Natchez Trace Parkway
2680 Natchez Trace Parkway
Tupelo, MS 38804

Dear Mr. Wilkerson:

TVA, UNION-TUPELO #3 161-KV TRANSMISSION LINE PROJECT, UNION AND LEE COUNTIES, MISSISSIPPI

TVA proposes to improve the existing power supply system in Union, Lee, and Pontotoc counties and surrounding areas in Mississippi by constructing and operating a third 161-kV transmission line (TL) between the Union 500-kV Substation (SS) in Union County and the Tupelo 161-kV SS in Lee County. The new Union-Tupelo # 3 TL would be comprised of both new and existing TLs:

- The new 16-mile Union-Turner Park section would extend from the Union 500-kV SS to the Turner Park 161-kV SS located in the Turner Industrial Park, near the intersection of Highway 45 and Natchez Trace Parkway.
- This new section would then connect to the existing 6.6-mile Tupelo-Turner Park 161-kV TL, completing the connection to the Tupelo 161-kV SS. There would be no physical work required on this section.

TVA has determined that this proposed TL construction project is an undertaking (as defined at 36 CFR § 800.16(y)) that has the potential to cause effects on historic properties. We have initiated consultation with the Mississippi State Historic Preservation Officer (SHPO) under Section 106 of the National Historic Preservation Act for this undertaking. We are now initiating consultation with your office concerning possible project effects to a historic property that is managed by the National Park Service and that is within the project area of potential effects (APE)—the Natchez Trace Parkway.

TVA identified the area of potential effects (APE) for archaeological resources for the undertaking as the proposed 16-mile Union-Turner Park section of new TL. The APE for historic architectural properties consists of the area within a one-half mile radius of the proposed new TL centerline. Because the undertaking would require no physical work within the 6.6-mile Tupelo-Turner Park TL, this section has no potential to affect cultural resources. In this letter, we address the section of the Union-Turner Park section of new TL that intersects the Natchez Trace Parkway.

TVA contracted with Tennessee Valley Archaeological Research (TVAR) to perform a phase I cultural resources survey of the APE. Enclosed is a copy of the draft report titled *A Phase I Cultural Resources Survey of TVA's Proposed Union-Tupelo #3 161-kV Transmission Line in Union and Lee Counties, Mississippi*, along with a CD containing a digital copy of the report.

TVAR's report notes that a section of the Natchez Trace Parkway falls within the visual APE. TVA is aware that the state historic preservation officers of Tennessee, Alabama and Mississippi consider the Natchez Trace Parkway eligible for listing in the National Register of Historic Places (NRHP) under criterion A for its association with a number of events that have made significant contributions to the broad patterns of American history. TVAR recommends that the two-mile section falling within the visual APE retains sufficient integrity to remain eligible for listing in the NRHP. TVAR recommends further that while the proposed undertaking would result in a visual effect on the Natchez Trace Parkway, the effect would not be adverse because views to the project would be largely screened by vegetation and because the historic setting of the Parkway in this area has been compromised by an existing TL, modern industrial development, and U.S. Highway 45.

TVA has reviewed the enclosed draft report and agrees with the findings and recommendations of the authors. TVA finds that the undertaking would have an effect on the Natchez Trace Parkway, but that the effect would not be adverse. TVA finds that the undertaking would have no adverse effects on any historic property listed in or eligible for listing in the NRHP.

Pursuant to 36 CFR Part 800.4(d)(1), TVA is seeking the concurrence of the Mississippi SHPO with TVA's determinations regarding the eligibility of the above-listed archaeological sites and architectural resources for listing in the NRHP, and TVA's finding that the proposed Union-Tupelo #3 Transmission Line project will have no adverse effects on historic properties

By this letter, TVA is soliciting your comment on the project's effects to the Natchez Trace Parkway. We respectfully ask that you review the enclosed draft report and provide any comments on the undertaking's effects to the Natchez Trace Parkway to us within 30 days of your receipt of this letter.

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

If you have any questions or comments, please contact Richard Yarnell in Knoxville, Tennessee, at (865) 632-3463 or by email at wryarnell@tva.gov.

Sincerely,

Clinton E. Jones
Senior Manager
Biological and Cultural Compliance
Environmental Permits and Compliance
WT11B-K

Enclosure

United States Department of the Interior
NATIONAL PARK SERVICE
Natchez Trace Parkway
2680 Natchez Trace Parkway
Tupelo, Mississippi 38804

IN REPLY REFER TO:

L7615(NATR)1.A
L303C
JAN 2 8 2014

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

Dear Mr. Jones,

This letter is in response to your request for consultation regarding the TVA, Union-Tupelo #3 161-KV Transmission Line Project and the potential impacts of the project to the Natchez Trace Parkway (Parkway). We have reviewed the associated cultural resource study that was submitted with the request. The author states on page two, paragraph three, that "…the Parkway is located approximately 0.1-mile south of the project area." The map on page 100 of the report illustrates the project's proximity to the Parkway.

In order to adequately evaluate the project's impacts, we request additional information regarding the height and location of the power poles that will be closest to the Parkway boundary. Pending our review of that information, we may request balloon tests for the structures that are potentially visible from the Parkway motor road.

The author also states in the same paragraph that "…the historic setting of the Parkway in this area has been compromised by modern development, which is visible at various points along the Parkway." However, this undertaking could constitute a cumulative adverse effect to the Natchez Trace Parkway which is eligible for listing on the National Register of Historic Places. As stated in 36 CFR Part 800.5 (a)(1), "Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative." As defined in 40 CFR 1508.7, "A cumulative impact can result from individually minor but collectively significant actions taking place over time."

We look forward to receiving additional information and working with you on this project to achieve both the missions of the National Park Service and the Tennessee Valley Authority. Should you have questions or need further information, you may contact Landscape Architect Greg C. Smith at 662-680-4024 or email at Greg_Smith@nps.gov.

Sincerely,

Mary Risser
Superintendent

cc: MS SHPO

TAKE PRIDE IN AMERICA

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

April 8, 2014

Mary Risser
Superintendent
Natchez Trace Parkway
2680 Natchez Trace Parkway
Tupelo, MS 38804

Dear Ms. Risser:

TVA, UNION-TUPELO #3 161-KV TRANSMISSION LINE PROJECT, UNION AND LEE COUNTIES, MISSISSIPPI—L7615 (NATR) 1.A, L303C

We have received your letter of January 28, 2014, regarding TVA's proposed Union-Tupelo #3 161-kV Transmission Line (TL) Project and potential impacts to the Natchez Trace Parkway (Parkway). In your letter, you requested additional information regarding the height and location of the power poles that will be nearest the Parkway boundary. By this letter, we are providing the requested information.

In the past few weeks TVA has completed a preliminary design of the Union-Tupelo #3 TL project, which includes the heights and locations of the power poles. Figures 1 and 2 show the proposed locations of the poles that would be installed within a visual area of potential effects (APE). The table below lists the heights of proposed new structures within one-half mile of the Parkway, along with the type of structure and their distance to the boundary of the Parkway. The distances were measured using GIS with the USGS Tupelo 7.5-minute quadrangle base map, and represent the shortest straight line path from the structure to the Parkway boundary. Figures 3-5 below are photographs showing examples of each type of structure, taken at various locations in TVA's power service area. Figure 6 is a photograph of TVA's existing Tupelo-Turner Park 161-kV TL, which crosses the Parkway near the southern end of the current APE.

Structure No.	Distance to Parkway Boundary (feet)	Structure Type	Height (feet)
124	2,260	Double circuit, two pole	106
125	1,893	Double circuit, two pole	115
126	1,410	Double circuit, two pole	106
127	1,210	Double circuit, two pole	88
128	1,130	Double circuit, two pole	88
129	1,190	Double circuit, two pole	83
130	1,100	Double circuit, two pole	83

1

Structure No.	Distance to Parkway Boundary (feet)	Structure Type	Height (feet)
131	1,062	Double circuit, two pole	97
132	1,106	Double circuit, two pole	83
133	1,250	Double circuit, two pole	83
134	1,010	Double circuit, two pole	88
135	580	Switch	35
135A	580	Single pole	88
61A	58	Switch	35
62	318	(Existing)	88

Please note a correction to information previously provided by TVA. The draft Phase I cultural resources survey report that we submitted to your office in December 2013 stated that the "Parkway is located approximately 0.1-mile south of the project area." This statement was based on our knowledge of TVA's plans at the time, which identified Structures 135 and 135A as the structures nearest the Parkway. Based on the design that TVA recently completed, a switch structure (Structure 61A) would be installed within approximately 58 feet of the Parkway boundary. The other proposed new structures are all located farther away from the Parkway, ranging in distances from 580 feet to 2,260 feet from the Parkway boundary.

To help illustrate the undertaking's setting in the vicinity of the Parkway, we are providing some additional imagery to supplement the photos in the draft Phase I cultural resources survey report. Figure 7, taken from Microsoft Bing aerial imagery, shows an oblique aerial view looking north of the existing Structure 61 on the on TVA's Tupelo-Turner Park 161-kV TL, with the location of the proposed Union-Tupelo No. 3 switch structure circled in red. The existing TL structure in the center of this photo is Structure 61 on TVA's Tupelo-Turner Park 161-kV TL, a double-pole structure that is 110 feet high. Figure 8, also taken from Microsoft Bing aerial imagery, shows an oblique view of the same area, looking west. Structure 61 is visible in the upper left of this photo, and the Parkway runs along the left part of the photo. The Turner Industrial Park is out of the frame (beyond the upper center). The wooden pole structures visible in the upper right hand of the photo are part of TVA's Tupelo-Guntown TL, which is out of service. The wood pole visible in the upper right of the photo is 75 feet high. To construct the proposed Union-Tupelo #3 161-kV TL, TVA would remove the Tupelo-Guntown TL structures in this area and install new steel pole structures within the same right of way. Figure 9 is an oblique aerial view looking south along the Tupelo-Guntown TL right of way, with Old Saltillo Road in the foreground. The Parkway is approximately 1,800 feet east of (left in this view) this right of way.

Based on the findings of the cultural resources survey, and on our examination of maps and aerial imagery, we agree with the report authors' recommendation that TVA's undertaking would not have an adverse effect on the Parkway. As shown in several of the figures below, the portion of the Parkway in the project vicinity is bordered by a thick stand of trees, which would partially or fully block views to the proposed new TL from the Parkway. In addition, in the local

area where the proposed new TL would be nearest to the Parkway boundary, the integrity of setting has already been diminished by the construction of a bridge over Old Saltillo Road, U.S. Highway 45 and the Parkway overpass, the Illinois Central Gulf Railroad (and Parkway overpass), Turner Industrial Park, Tupelo-Turner Park 161-kV TL, and by the laying of asphalt on the Parkway and the installation of modern road signs and transportation safety devices. TVA's proposed undertaking would not have any additive (i.e. cumulative) effect to this local area of the Parkway such that this area could suffer any further diminution in its historic integrity.

In summary, we believe that the undertaking would not have an adverse effect on the Parkway because this local portion of the Parkway already has experienced a loss of integrity, and TVA's proposed undertaking would not cause any further diminution in this integrity. Thus, we do not foresee any direct, indirect or cumulative impacts to the Parkway as a result of TVA's proposed undertaking. Once the TL has been constructed, TVA would conduct maintenance activities within the TL right of way such as vegetation management and maintenance on or repairs to the equipment, but none of these activities would have a permanent visual component.

If you have any questions or comments, please contact Richard Yarnell in Knoxville, Tennessee, at (865) 632-3463 or by email at wryarnell@tva.gov.

Sincerely,

Clinton E. Jones, Manager
Biological and Cultural Compliance, Environment
WT11B-K

SCC:CSD
Enclosures

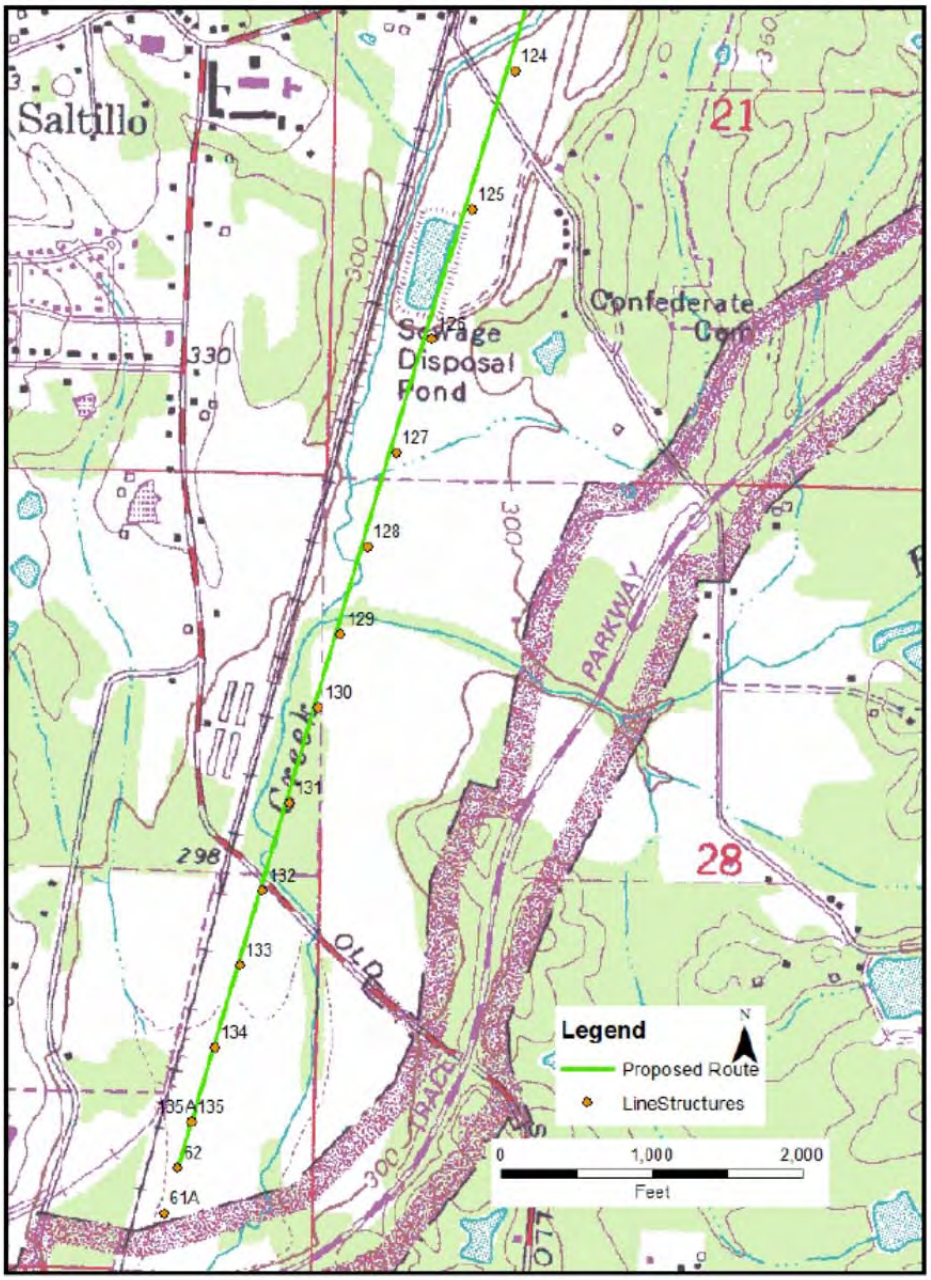

Figure 1. Map of proposed structure locations within 0.5-mile radius of the Parkway Boundary, with the exception of #62, which is existing. Source: USGS Tupelo 7.5-minute quadrangle.

5

Figure 2. Map showing locations of proposed structures on aerial imagery (Structure #62 is existing). Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

6

Figure 3. Single pole structure similar to those proposed for the current project.

Figure 4. Double pole structures similar to those proposed for the current project.

7

Figure 5. Switch structure similar to those proposed for the current project.

Figure 6. View from the Parkway to the South along TVA's Tupelo-Turner Park 161-kV TL.

8

Figure 7. Oblique aerial view, looking north, showing existing and proposed TL structure locations, with the Parkway in the foreground (Source: ©2014 Microsoft Corporation, Pictometry Bird's Eye ©2010 Pictometry International Corporation).

Figure 8. Oblique aerial view, looking west, showing existing TL structure locations in the far distance with the Parkway in the left of the photo. Approximate locations of proposed new structures 62A, 135/135A, and 134 (from left to right) indicated by red circles. (Source: ©2014 Microsoft Corporation, Pictometry Bird's Eye ©2010 Pictometry International Corporation).

9

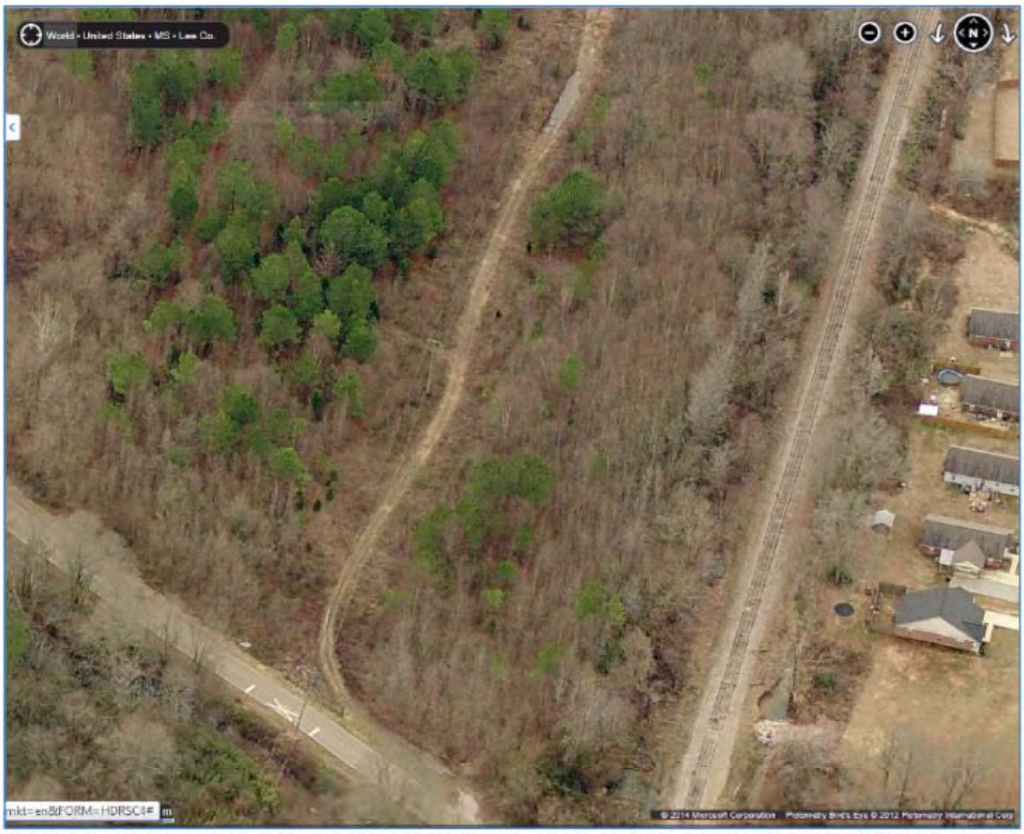

Figure 9. Oblique aerial view looking south along the existing (out of service) Tupelo-Guntown Transmission Line. (Source: ©2014 Microsoft Corporation, Pictometry Bird's Eye ©2010 Pictometry International Corporation).

10

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

May 29, 2014

Ms. Kathy Lunceford
U. S. Fish and Wildlife Service
207 Thompson Hall
Mississippi State University
Starkville, MS 39762

Dear Ms. Lunceford:

REQUEST FOR CONCURRENCE: TENNESSEE VALLEY AUTHORITY (TVA) UNION-TUPELO #3 161-KV TRANSMISSION LINE, UNION AND LEE COUNTIES, MS

In order to continue to resolve heavy electrical loading in the area, TVA is proposing to build a new transmission line and install new equipment at the existing substations on either end of the line in Union and Lee Counties, MS. Assessments of the existing transmission lines in the area determined that inclement weather or loss of an existing transmission line could result in the loss of electricity to a large area of homes and businesses. Upgrading existing transmission lines would only provide temporary relief in such a situation, therefore an additional line with the capacity for increased power is needed to meet North American Electric Reliability Corporation (NERC) standards. The proposed transmission line is approximately 16-miles long and spans Union and Lee Counties, Mississippi. The right-of-way (ROW) would be 100-feet wide along the entire line but due to previously cleared area only 5.5 miles of this would require the full 100 feet to be cleared. Two-thirds of the line parallels existing ROW only requiring an additional 50 feet of clearing to meet ROW width standards. TVA has identified 30 access roads needed to reach the line at specific locations. All proposed access roads, with one exception, are on existing ROW, proposed new ROW, or existing roads. Construction and road improvements would be required on some of these roads. Clearing for road widening would be minimal. Access road 21 would require construction of a new section of road approximately 112-feet long and 20-feet wide through forested habitat (Figures 1 and 2).

Four species listed as endangered, threatened, candidate for listing, or in review for listing under the Endangered Species Act potentially occur within the project action area. These species were identified during review of the TVA Regional Natural Heritage database, the U.S. Fish and Wildlife Service (USFWS) ECOS website, as well as direct conversation with USFWS. These species include one invertebrate (Mitchell's satyr butterfly), one plant (Price's potato-bean), and two mammals (Indiana bat, northern long-eared bat) that have the potential to occur within Union and Lee counties, Mississippi based on historic range, proximity to known occurrence records, biological characteristics and/or physiographic characteristics. See accompanying Table 1 for listing of species potentially occurring within the project action area.

Comprehensive field surveys conducted in August 2013 did not identify the federally threatened plant Price's potato-bean in the project area. One small section of mesic forest adjacent to a remnant chalk prairie was potential habitat for the plant, but surveys did not locate the species there. Since the species does not occur within the project action area, TVA has determined that the proposed new transmission line and access road construction would have no effect on Price's potato-bean.

The same field reviews reported suitable habitat for Mitchell's satyr butterfly in areas of forested wetland scattered across the proposed ROW. Suitable habitat for this species exists in eight wetlands with a heavy sedge component along the proposed right-of-way and access road 14. TVA's Best Management Practices (BMPs) include the use of mats and other techniques used to minimize disturbance to soils, low lying wetland vegetation, and groundwater hydrology within delineated wetlands and wetland buffers. Any herbicides used near wetlands are approved for aquatic use by the Environmental Protection Agency and would only be applied selectively to woody species. (See TVA – Guide for Environmental Protection and Best Management Practices, Muncy 2012). Use of BMPs within and around wetlands within the project area would prevent destruction of habitat for Mitchell's satyr during the proposed project activities. The proposed actions would have no effect on Mitchell's satyr butterfly.

TVA biologists conducted habitat suitability assessments for Indiana and northern long-eared bat within the proposed project area in August 2013 and April 2014 (including the 30 planned access roads). Habitat assessments focused on presence of live and dead trees greater than or equal to three inches in diameter, with exfoliating bark, cavities, and solar exposure. Potentially suitable summer roosting habitat was found in eight patches across the middle section of the proposed ROW and along access road 06. However, no suitable habitat would be removed along access road 06. Overall it was estimated that 13.45 acres of suitable habitat could be removed during construction of the ROW and access roads (Figure 3).

Identified patches of suitable roosting habitat vary in quantity of suitable roosting trees and clutter of understory. See Table 2 for summary of habitat within each identified patch of suitable habitat. In general, areas of suitable habitat had a high concentration of snags, white oaks and/or shagbark hickories with a relatively open understory (Figures 4-10, Summer_Habitat_Assessment_Forms.pdf, Site_Photos.pdf).

No records of Indiana bat exist within Union or Lee Counties, Mississippi. The nearest known extant records of Indiana bat hibernacula are in Lawrence County, Alabama approximately 73.4 and 77.1 miles away at Backward-Confusion Cave and Armstrong Cave, respectively. A historical record exists from an abandoned chalk mine in Tishomingo County, Mississippi, approximately 45.7 miles from the project area. The nearest known summer roosting Indiana bat record is from Holly Springs National Forest in Benton County, Mississippi. Indiana bats were tracked to a maternity roost in the National Forest in April 2013, approximately 35 miles from the project area (Figure 11).

No records of northern long-eared bat (NLEB) exist within Union or Lees Counties, Mississippi. The nearest known record of an NLEB hibernaculum is from 1990 in Ed Johnson Cave, Franklin

County, Alabama, approximately 40 miles from the project area. Additionally, a historical record exists from an abandoned chalk mine in Tishomingo County, Mississippi, approximately 45.7 miles from the project area. The nearest known NLEB summer record is from a TVA mist netting survey in Franklin County, Alabama, approximately 58 miles from the project area. A male northern long-eared bat was captured over Devil's Den Hollow Creek during this survey (Figure 11).

The number and quality of suitable summer roosting trees within the proposed project area has led TVA biologists to determine that this area could present suitable summer roosting habitat for Indiana bat and northern long-eared bat. TVA proposes to remove suitable roosting trees between December 1 and March 15 to eliminate any potential for direct effects to Indiana and northern long-eared bats. Due to the relatively small areas of impact, the isolation of the patches across the landscape, and the abundance of similar suitable roosting habitat surrounding this proposed area of impact which will not be disturbed by project activities, TVA has determined that any indirect or cumulative effects to Indiana and northern long-eared bat resulting from this action would be discountable. TVA has determined that actions related to construction of this new transmission line and access roadsmay effect but are not likely to adversely affect Indiana bats, nor would the actions jeopardize the continued existence of the northern long-eared bat.

TVA respectfully requests concurrence with these determinations. If you have any questions regarding this project, please contact Liz Burton at 865-632-4011.

Sincerely,

John T. Baxter, Jr.
Manager
Natural Resources Compliance Programs
Environment

ECB:CSD
Enclosures

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

June 16, 2014

Mr. Jim Woodrick, Director
Mississippi Department of Archives and History
Historic Preservation Division
200 North Street
Jackson, Mississippi 39201

Dear Mr. Woodrick:

TENNESSEE VALLEY AUTHORITY (TVA), UNION-TUPELO #3 161-KV TRANSMISSION LINE PROJECT, UNION AND LEE COUNTIES, MISSISSIPPI (MDAH Project Log #11-050-13)

We consulted with your office last year concerning TVA's proposal to improve the existing power supply system in Union, Lee, and Pontotoc counties and surrounding areas in Mississippi by constructing and operating a third 161-kV transmission line (TL) between the Union 500-kV Substation (SS) in Union County and the Tupelo 161-kV SS in Lee County. Based on a Phase I cultural resources survey of the right-of-way (ROW) for the proposed new Union-Tupelo #3 161-kV TL, TVA determined there are four potentially eligible archaeological sites in the APE and found that the project, as then planned, had potential to adversely affect all four. In your letter dated December 6, 2013, you agreed with some of TVA's findings and determinations, but also requested additional information (we discuss this further, below). Subsequently, TVA developed plans for the access roads that would be used during construction and maintenance of the new TL. TVA has determined that these proposed access roads are part of the undertaking and have the potential to cause effects on historic properties. In this letter, we address the requests you made in December 2013 for additional information, and also present our findings and determinations based on a recent Phase I archaeological survey of the access roads pursuant to Section 106 of the National Historic Preservation Act. First, however, we summarize the status of our Section 106 consultation concerning this undertaking.

Table 1 (below) summarizes TVA's determinations regarding the NRHP eligibility of resources in the area of potential effect (APE), TVA's findings regarding project effects, and your responses as stated in your December 6, 2013 letter. In our November 4, 2013 letter, we stated TVA's plans to avoid effects to the four potentially eligible archaeological sites by restricting the work to certain conditions: doing the work during times of dry and firm ground, or using low ground pressure equipment, or using wetland mats within the site boundary. Our offices have reached agreement regarding NRHP eligibility and potential effects for a majority of the resources in the APE. However, we have not yet reached agreement concerning the NRHP eligibility of

archaeological sites 22LE544, 22LE843, 22LE101, 22LE1073, 22LE1074, and 22LE1074, nor the project's potential effects on these sites, on 22LE752, or on the Natchez Trace Parkway.

Table 1. TVA determinations, findings of effect, and MDAH response as of December 2013

Site/structure	NRHP eligibility-TVA	Effects-TVA	MDAH response
Archaeological sites			
22LE101	(not in APE)	No effect	Need site card
22LE544	(not in APE)	No effect	Need site card
22LE843	Ineligible	N/A	Need site card
22LE1073	Ineligible	N/A	Need more info
22LE1074	Potentially eligible	No effect given the avoidance measures	No response
22LE1075	Potentially eligible	No effect given the avoidance measures	No response
22UN747	Potentially eligible	No effect given the avoidance measures	Eligibility: concur. Effects: no comment
22UN748	Ineligible	N/A	Eligibility: concur.
22UN749	Ineligible	N/A	Eligibility: concur.
22UN750	Ineligible	N/A	Eligibility: concur.
22UN751	Ineligible	N/A	Eligibility: concur.
22UN752	Potentially eligible	No effect given the avoidance measures	Eligibility: concur. Effects: no comment
Historic structures			
HS-1	Ineligible	N/A	Concur
HS-2	Ineligible	N/A	Concur
HS-3	Ineligible	N/A	Concur
HS-4	Ineligible	N/A	Concur
HS-5	Ineligible	N/A	Concur
HS-6	Ineligible	N/A	Concur
HS-7	Ineligible	N/A	Concur
Barlow-Burrow House	Listed/eligible	Non adverse	Concur
Downtown Saltillo	Ineligible	No effect	Eligibility: disagree Effect: concur
Natchez Trace Parkway	Eligible	No effect	Eligibility: concur Effect: defer to NPS opinion

TVA asked Tennessee Valley Archaeological Research (TVAR), who performed the Phase I cultural resources survey and prepared the draft report, to provide the missing site cards for 22LE544, 22LE843, and 22LE101, and the information you requested concerning site 22LE1073. They have done so and have revised the draft report accordingly. Enclosed are three copies of the revised draft report titled *A Phase I Cultural Resources Survey of TVA's Proposed Union-Tupelo #3 161-kV Transmission Line in Union and Lee Counties, Mississippi*,

along with three CDs containing digital copies of the report. The updated site cards and additional information supplied by this revised draft report should address your questions regarding sites 22LE101, 22LE544, 22LE843, and 22UN1073.

Your December 6, 2013 letter also requested "THPO's opinion before we complete our comments regarding TVAR assessment of site eligibility." (Please note that, although THPOs have assumed the historic preservation officer functions for tribal lands, not all tribal governments have designated the THPO to function as the sole point of contact for the review of undertakings on and off tribal lands. Therefore, TVA contacts both the tribal governmental leaders and the THPO prior to formal initiation of Section 106 consultation in order to determine the appropriate point of contact.) We have enclosed copies of all correspondence between TVA and federally-recognized Indian tribes regarding this undertaking. To date, no Tribe has stated objections to the undertaking or expressed an opinion regarding the NRHP eligibility of cultural resources in the APE.

Your letter also stated that you "Cannot concur with your determination of effect because we could find no determination of effect for archaeological sites in the report." However, following 36 CFR Part 800.5(a), TVA (as the lead federal agency for Section 106 purposes in the undertaking), not TVA's subcontractor, has responsibility for applying the criteria of adverse effects. We stated our effect findings in our letter of November 4, 2013. We summarize those findings here, and also present additional findings of effect, taking into consideration the access roads portion of the project (see below).

TVA has revised the undertaking's APE to include the access roads. Most of TVA's access for construction and maintenance would be confined to the proposed TL ROW, which was included within the earlier survey. TVA asked TVAR to carry out a Phase I archaeological survey of those access roads that are outside the previously surveyed portions of the APE. This survey included approximately 4.03 miles of access roads with a width of 20 feet, for a total of 9.66 acres. Enclosed are three copies of the draft report titled *A Phase I Archaeological Survey of Planned Access Roads Associated with Tennessee Valley Authority's Union-Tupelo #3 161 kV Transmission Line in Lee and Union Counties, Mississippi*, along with three CDs containing digital copies of the report.

Background research conducted by TVAR prior to the survey indicated that four archaeological sites have been recorded previously within the archaeological APE (22UN747, 22UN752, 22LE1074, and 22LE1075). All four of these sites were identified by TVAR during the cultural resources survey of the proposed new TL ROW, and are listed in Table 1. TVAR reinvestigated all four sites and identified additional archaeological material, which resulted in modifications to the original site boundaries. TVAR recommends all four sites as eligible for listing in the NRHP. Four previously unrecorded archaeological sites were identified within the APE during the survey (22UN753, 22UN755, 22UN754, and 22LE1077). Sites 22UN754 and 22LE1077, although recorded on separate site cards, are two parts of a single archaeological site that straddles the Lee/Union county line. TVAR recommends that all of these sites are ineligible for listing in the NRHP (Table 2).

Table 2. TVA's determinations and findings of effect for archaeological sites identified during the access roads survey.

Site	NRHP eligibility-TVA	Effects-TVA
22UN753	Ineligible	N/A
22UN755	Ineligible	N/A
22UN754/ 22LE1077	Ineligible	N/A
22UN747	Potentially eligible	Non-adverse given the minimization measures
22UN752	Potentially eligible	Non-adverse given the minimization measures
22LE1074	Potentially eligible	Non-adverse given the minimization measures
22LE1075	Potentially eligible	Non-adverse given the minimization measures

We earlier described conditions that TVA proposed to place on the construction work, and on future maintenance activities, in order to avoid adverse project effects to the four potentially eligible archaeological sites (22UN747, 22UN752, 22LE1074, and 22LE1075). However, based on further consideration of the undertaking's potential to affect these resources, TVA has modified its avoidance/minimization plan. TVA now plans to deploy wetland mats within the site boundaries, whenever work is planned within 10 meters (33 feet) of any of these four sites. This measure will minimize any compaction and ground disturbance that might occur during the work. In addition, no structures will be erected within any of the four site boundaries. TVA finds that, with the work performed in this manner, the undertaking would have no adverse effects to any of the potentially eligible archaeological sites.

In your letter, you agreed that the Natchez Trace Parkway (Parkway) is eligible for listing in the NRHP. However, you expressed your preference for deferring your final comments on the undertaking's effects to the Parkway until the National Park Service (NPS) determines the project will have no adverse effect. We consulted with the NPS regarding the undertaking's potential effects to the Parkway by letter dated December 23, 2013 (enclosed). In their response letter, which we received January 28, 2014, the NPS requested additional information regarding the heights and locations of the power poles that would be closest to the Parkway boundary. The NPS also raised the possibility that the undertaking could result in a cumulative adverse effect to the Parkway. TVA supplied the requested information, as well as additional information about the project, to the NPS by letter dated April 8, 2014 (enclosed). In that letter we presented our finding, based on a review of all the available information, that the undertaking would have no adverse effect on the Parkway. The portion of the Parkway in the project vicinity is bordered by a thick stand of trees, which would partially or fully block views to the proposed new TL from the Parkway. In addition, in the local area where the proposed new TL would be nearest to the Parkway boundary, the integrity of setting has already been diminished by the construction of a bridge over Old Saltillo Road, U.S. Highway 45 and the Parkway overpass, the Illinois Central Gulf Railroad (and Parkway overpass), Turner Industrial Park, and the Tupelo-

Turner Park 161-kV TL, and by the paving of the Parkway and the installation of modern road signs and transportation safety devices. In our opinion, TVA's proposed undertaking would have no additive (i.e. cumulative) effects on this local area of the Parkway such that this area could suffer any further diminution in its historic integrity. We have received no response to this last letter and the time prescribed in the Advisory Council's regulations implementing Section 106 has expired.

TVA has reviewed the enclosed draft reports and agrees with the findings and recommendations of the authors. TVA finds that, with the work being performed under the above-listed conditions at each of the four potentially-eligible archaeological sites (22UN747, 22UN752, 22LE1074, and 22LE1075), the undertaking would have no adverse effects on archaeological sites listed in or eligible for listing in the NRHP. TVA finds further that the undertaking would have no adverse effect on the Natchez Trace Parkway.

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

Pursuant to 36 CFR Part 800.4(d)(1), we are seeking your concurrence with TVA's determinations regarding the eligibility of archaeological sites 22LE544, 22LE843, 22LE101, 22LE1073, 22LE1074, and 22LE1074 for listing in the NRHP, and TVA's finding that the undertaking will have no adverse effects on historic properties.

If you have any questions or comments, please contact Richard Yarnell in Knoxville, Tennessee, at (865) 632-3463 or by email at wryarnell@tva.gov.

Sincerely,

Clinton E. Jones, Manager
Biological and Cultural Compliance
Environment
WT11B-K

SCC: CSD
Enclosures

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mississippi Field Office
6578 Dogwood View Parkway, Suite A
Jackson, Mississippi 39213

July 21, 2014

Mr. John T. Baxter, Jr.
Natural Resources Compliance Programs
Tennessee Valley Authority
400 West Summit Hill Drive, WTC-K
Knoxville, Tennessee

Dear Mr. Baxter:

The Fish and Wildlife Service has reviewed your effects determination dated May 29, 2014, regarding a proposed electrical transmission line (Union-Tupelo #3) in Union and Lee Counties, Mississippi. The 16 mile long 161-KV line would run east/west between the Towns of Blue Springs and Saltillo across the Town Creek flood plain. Our comments are provided in accordance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq*.), and the Migratory Bird Treaty Act (40 Stat. 775, as amended; 16 U.S.C. 703 et seq.)

The proposed transmission line would be constructed typically using double steel-pole structures. Structure heights would vary according to the terrain and would average between 50 and 130 feet. Most of the structures would range between 90 and 100 feet tall, and would be imbedded directly in holes augured into the ground. Some structures may be self-supporting (nonguyed) poles fastened to a concrete foundation that is formed and poured into an excavated hole.

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

Work activities would require a 100–foot wide right-of-way (ROW); however, two-thirds of the transmission line would parallel an existing ROW. Consequently, only 5.5 miles of the corridor would require complete vegetation removal. There would be 30 construction/maintenance access roads needed to reach the line, although all but one are on existing ROW, the proposed new ROW, or existing roads. Although the existing roads require some road improvements, clearing would be minimal. Access Road 21 would require new construction approximately 112-feet long and 20-feet wide through forested habitat. A total of 73 acres of wooded habitat would

be removed in eight locations along the proposed corridor. Vegetation removal would be completed during the non-growing season (between October 1 and March 15.)

On May 8, 2014, we met with your staff to discuss federally protected species that might be found in the project area. Per that information and the information found in the effects determination, we provide the following comments regarding project activities and their effects on federally protected species:

Bats

As you are aware, the endangered Indiana bat *(Myotis sodalis)* was recently identified in Benton County, and the proposed endangered Northern long-eared bat *(Myotis septentrionalis)* may also occur in Mississippi. Considered to be summer residents in Mississippi, reproductive females occupy roost sites under the exfoliating bark of dead trees that retain large, thick slabs of peeling bark, or in tree cavities. Primary roosts usually receive direct sunlight for more than half the day. Roost trees are typically within canopy gaps in a forest, in a fence line, or along a wooded edge.

Habitats include riparian zones, bottomland and floodplain habitats, wooded wetlands, and upland communities. Indiana bats typically forage in semi-open to closed (open understory) forested habitats, forest edges, and riparian areas.

Female bats may migrate in April from winter hibernacula to maternity colonies typically using 10 to 20 roost trees in an area. A lactating female will raise her single pup over the summer; and once the young bats are volant (August), the maternity colony begins to disperse and bats return to wintering habitat.

Currently, the greatest general threat to the survival and recovery of the Indiana bat and Northern long-eared bat in Mississippi is destruction of maternity and foraging habitats, and human disturbance.

Per the effects determination, the project corridor was surveyed and eight areas were found to possess a total of 13.45 acres that meet the suitability criteria for bat roosting habitats (USFWS 2014.) These impacted forested areas are discontinuous, with the largest area being 4.19 acres. Also, the work activities would occur outside the maternity season (April through August).

Mitchell's satyr butterfly

The endangered Mitchell's satyr butterfly (*Neonympha mitchellii mitchellii*) has been found in nearby Monroe and Prentiss Counties. This butterfly is one of the most geographically restricted eastern butterflies as it occurs in wetlands where low nutrient systems receive carbonate-rich ground water from seeps and springs. In Mississippi, Mitchell's satyr has been found in wetlands created by beaver dams and in wetlands formed by road culverts. Typical habitat requirements include wetlands with dappled sunlight, predominance of sedges, and some shrub cover, similar to that found in beaver ponds and other small impoundments.

The greatest threat to the Mitchell's satyr is habitat destruction caused by draining and filling of wetlands, removal of herbaceous vegetation, invasion of exotic weeds, and contamination of wetlands by pesticides, fertilizer, and nutrient runoff from adjacent agriculture.

Per the effects determination, the proposed corridor contains eight areas with potential Mitchell's satyr habitat. However, any work activities in early successional wetlands would be restricted to vehicular access only, and mats would be used to prevent excessive damage to vegetation or ground surface. Also, all activities would occur outside the butterfly flight periods.

Price's potato bean

The threatened plant Price's potato bean (*Apios priceana*) is found in Lee and Union Counties. It is an herbaceous, twining vine that belongs to the pea family. It is often found in wooded areas that grade into creek and river bottoms. An onsite survey in August 2013 revealed one location with potential suitable habitat, however no evidence of the species was found.

Migratory birds

The proposed project may result in short term impacts to bird species protected under the Migratory Bird Treaty Act, specifically, construction activities that are conducted during the nesting season for such birds. However, per the information provided, vegetation removal would take place during the non-nesting season (October through early March.)

Based on our discussions and information submitted in the effects determination, it is our opinion that any work activities conducted on the proposed site would not likely adversely affect any protected species or their habitats. However, if the scope of the project is changed or evidence of any protected species is found on the site, further consultation with the office would be necessary.

If you have any questions, please contact our office, telephone (601) 218-4298.

Sincerely,

Kathy L. Lancaster

For Stephen M. Ricks
Field Supervisor

References

U.S. Fish and Wildlife Service. 2014. Range-wide Indiana bat summer survey guidelines.

MISSISSIPPI DEPARTMENT *of* ARCHIVES AND HISTORY

MDAH

HISTORIC PRESERVATION
Jim Woodrick, director
PO Box 571, Jackson, MS 39205-0571
601-576-6940 • Fax 601-576-6955
mdah.state.ms.us

July 14, 2014

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

RE: Revised Phase I Archaeological Survey for the Tennessee Valley Authority Proposed Union-Tupelo #3 161-kV Transmission Line, MDAH Project Log #06-157-14 (#11-050-13), Report #13-0697,
Lee and Union Counties

Dear Mr. Jones:

We have reviewed the revised October 2013 cultural resources survey report by Hunter B. Johnson, Principal Investigator, received on June 19, 2014, and your June 16, 2014, cover letter with effect determinations 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 22LE1074, 22LE1075 22UN747 and 22UN752 are potentially eligible for listing in the National Register of Historic Places and should be avoided to minimize adverse effects. We also concur that sites 22LE843 (revisited), 22LE1073, 22UN748, 22UN749, 22UN750, and 22UN751 are ineligible for listing in the National Register of Historic Places. We agree that sites 22LE101 and 22LE544 are not in the APE and won't be affected.

As previously noted, regarding historic structures, we concur that newly recorded resources HS-1 through HS-7 are ineligible for listing in the National Register of Historic Places. We concur the Barlow-Burrow House, resource 081-SLT-0001, is listed in the National Register of Historic Places, but will not be affected. We concur that resources 081-SLT-0006 (house) and 081-SLT-0011 (office) are ineligible for listing in the National Register of Historic Places. We do not concur that resources 081-SLT-0004 (Pres. Church), 081-SLT-0005 (Meth. Church), and 081-SLT-0015 (Bridge) are ineligible, but we do concur the project will have no adverse effect on these eligible resources. Regarding Downtown Saltillo, lacking a comprehensive survey, we cannot concur there is no eligible historic district present, but based on other modern intrusions and the location of the proposed transmission line, we concur there will be no adverse effect to any potential district. Based on the information provided, we also concur the project will not have an adverse effect on the Natchez Trace Parkway.

There remains the possibility that unrecorded cultural resources may be encountered in or adjacent to this surveyed area during construction. Should this occur, we would appreciate your contacting this office immediately in order that we may offer appropriate comments.

Thank you for providing revised site cards and a revised report. Please provide a copy of this letter to Hunter Johnson at TVAR. Contact me if you have any questions.

Sincerely,

Greg Williamson
Review and Compliance Officer

FOR: H.T. Holmes
State Historic Preservation Officer

MISSISSIPPI DEPARTMENT of ARCHIVES AND HISTORY

MDAH

HISTORIC PRESERVATION
Jim Woodrick, director
PO Box 571, Jackson, MS 39205-0571
601-576-6940 • Fax 601-576-6955
mdah.state.ms.us

July 14, 2014

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

RE: Phase I Archaeological Survey of Planned Access Roads Associated with the Tennessee Valley Authority's Proposed Union-Tupelo #3 161-kV Transmission Line, MDAH Project Log #06-123-14 (11-050-13) (Report #14-0276), Lee and Union Counties

Dear Mr. Jones:

We have reviewed the June 2014 cultural resources survey report by J. Rocco de Gregory, Principal Investigator, received on June 19, 2014, 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 22UN753, 22UN755, 22UN754/22LE1077 are ineligible for listing in the National Register of Historic Places. We concur that sites 22UN747, 22UN752, 22LE1074 and 22Le1075 (expanded) are potentially eligible for listing in the National Register of Historic Places, and should be avoided to minimize adverse effects. Base on the information provided, we also concur the project will not have an adverse effect on the Natchez Trace Parkway. While we concur with the report's findings, please label all topographic maps with the USGS name of the map (see pages 7, 8, 9, 10, 11, and 12). We concur with TVA's finding of no adverse effect on sites 22UN747, 22UN752, 22LE1074 and 22Le1075, provided the sites are successfully avoided.

There remains the possibility that unrecorded cultural resources may be encountered in or adjacent to this surveyed area during construction. Should this occur, we would appreciate your contacting this office immediately in order that we may offer appropriate comments.

Regarding the determinations of effect discussed in your letter for Project Log #11-050-13, Report 13-0697; we will address those in a separate letter.

Please provide a copy of this letter to Mr. de Gregory at TVAR. Contact Patty Miller-Beech, MDAH archaeologist, at (601) 576-6944, or call me if you have any questions.

Sincerely,

Greg Williamson
Review and Compliance Officer

FOR: H.T. Holmes
State Historic Preservation Officer

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mississippi Field Office
6578 Dogwood View Parkway, Suite A
Jackson, Mississippi 39213

July 21, 2014

Mr. John T. Baxter, Jr.
Natural Resources Compliance Programs
Tennessee Valley Authority
400 West Summit Hill Drive, WTC-K
Knoxville, Tennessee

Dear Mr. Baxter:

The Fish and Wildlife Service has reviewed your effects determination dated May 29, 2014, regarding a proposed electrical transmission line (Union-Tupelo #3) in Union and Lee Counties, Mississippi. The 16 mile long 161-KV line would run east/west between the Towns of Blue Springs and Saltillo across the Town Creek flood plain. Our comments are provided in accordance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*), and the Migratory Bird Treaty Act (40 Stat. 775, as amended; 16 U.S.C. 703 et seq.)

The proposed transmission line would be constructed typically using double steel-pole structures. Structure heights would vary according to the terrain and would average between 50 and 130 feet. Most of the structures would range between 90 and 100 feet tall, and would be imbedded directly in holes augured into the ground. Some structures may be self-supporting (nonguyed) poles fastened to a concrete foundation that is formed and poured into an excavated hole.

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

Work activities would require a 100–foot wide right-of-way (ROW); however, two-thirds of the transmission line would parallel an existing ROW. Consequently, only 5.5 miles of the corridor would require complete vegetation removal. There would be 30 construction/maintenance access roads needed to reach the line, although all but one are on existing ROW, the proposed new ROW, or existing roads. Although the existing roads require some road improvements, clearing would be minimal. Access Road 21 would require new construction approximately 112-feet long and 20-feet wide through forested habitat. A total of 73 acres of wooded habitat would

be removed in eight locations along the proposed corridor. Vegetation removal would be completed during the non-growing season (between October 1 and March 15.)

On May 8, 2014, we met with your staff to discuss federally protected species that might be found in the project area. Per that information and the information found in the effects determination, we provide the following comments regarding project activities and their effects on federally protected species:

Bats

As you are aware, the endangered Indiana bat *(Myotis sodalis)* was recently identified in Benton County, and the proposed endangered Northern long-eared bat *(Myotis septentrionalis)* may also occur in Mississippi. Considered to be summer residents in Mississippi, reproductive females occupy roost sites under the exfoliating bark of dead trees that retain large, thick slabs of peeling bark, or in tree cavities. Primary roosts usually receive direct sunlight for more than half the day. Roost trees are typically within canopy gaps in a forest, in a fence line, or along a wooded edge.

Habitats include riparian zones, bottomland and floodplain habitats, wooded wetlands, and upland communities. Indiana bats typically forage in semi-open to closed (open understory) forested habitats, forest edges, and riparian areas.

Female bats may migrate in April from winter hibernacula to maternity colonies typically using 10 to 20 roost trees in an area. A lactating female will raise her single pup over the summer; and once the young bats are volant (August), the maternity colony begins to disperse and bats return to wintering habitat.

Currently, the greatest general threat to the survival and recovery of the Indiana bat and Northern long-eared bat in Mississippi is destruction of maternity and foraging habitats, and human disturbance.

Per the effects determination, the project corridor was surveyed and eight areas were found to possess a total of 13.45 acres that meet the suitability criteria for bat roosting habitats (USFWS 2014.) These impacted forested areas are discontinuous, with the largest area being 4.19 acres. Also, the work activities would occur outside the maternity season (April through August).

Mitchell's satyr butterfly

The endangered Mitchell's satyr butterfly (*Neonympha mitchellii mitchellii*) has been found in nearby Monroe and Prentiss Counties. This butterfly is one of the most geographically restricted eastern butterflies as it occurs in wetlands where low nutrient systems receive carbonate-rich ground water from seeps and springs. In Mississippi, Mitchell's satyr has been found in wetlands created by beaver dams and in wetlands formed by road culverts. Typical habitat requirements include wetlands with dappled sunlight, predominance of sedges, and some shrub cover, similar to that found in beaver ponds and other small impoundments.

The greatest threat to the Mitchell's satyr is habitat destruction caused by draining and filling of wetlands, removal of herbaceous vegetation, invasion of exotic weeds, and contamination of wetlands by pesticides, fertilizer, and nutrient runoff from adjacent agriculture.

Per the effects determination, the proposed corridor contains eight areas with potential Mitchell's satyr habitat. However, any work activities in early successional wetlands would be restricted to vehicular access only, and mats would be used to prevent excessive damage to vegetation or ground surface. Also, all activities would occur outside the butterfly flight periods.

Price's potato bean

The threatened plant Price's potato bean (*Apios priceana*) is found in Lee and Union Counties. It is an herbaceous, twining vine that belongs to the pea family. It is often found in wooded areas that grade into creek and river bottoms. An onsite survey in August 2013 revealed one location with potential suitable habitat, however no evidence of the species was found.

Migratory birds

The proposed project may result in short term impacts to bird species protected under the Migratory Bird Treaty Act, specifically, construction activities that are conducted during the nesting season for such birds. However, per the information provided, vegetation removal would take place during the non-nesting season (October through early March.)

Based on our discussions and information submitted in the effects determination, it is our opinion that any work activities conducted on the proposed site would not likely adversely affect any protected species or their habitats. However, if the scope of the project is changed or evidence of any protected species is found on the site, further consultation with the office would be necessary.

If you have any questions, please contact our office, telephone (601) 218-4298.

Sincerely,

For Stephen M. Ricks
Field Supervisor

References

U.S. Fish and Wildlife Service. 2014. Range-wide Indiana bat summer survey guidelines.

\

This page intentionally left blank

Appendix B – TVA Right-of-Way Clearing Specifications

This page intentionally left blank

Tennessee Valley Authority Right-of-Way Clearing Specifications

1. General - The clearing contractor shall review the environmental evaluation documents (categorical exclusion checklist, environmental assessment, or environmental impact statement) for the project or proposed activity, along with all clearing and construction appendices, conditions in applicable general and/or site-specific permits, the storm water pollution prevention plan, and any Tennessee Valley Authority (TVA) commitments to property owners. The contractor shall then plan and carry out operations using techniques consistent with good engineering and management practices as outlined in TVA's best management practices (BMPs) manual (Muncy 1992, and revisions thereto). The contractor will protect areas that are to be left unaffected by access or clearing work at and adjacent to all work sites. In sensitive areas and their buffers, the contractor will retain as much native ground cover and other vegetation as possible.

   If the contractor fails to use BMPs or to follow environmental expectations discussed in the prebid or prework meeting or present in contract specifications, TVA will order corrective changes and additional work as deemed necessary in TVA's judgment to meet the intent of environmental laws and regulations or other guidelines. Major violations or continued minor violations will result in work suspension until correction of the situation is achieved or other remedial action is taken at the contractor's expense. Penalty clauses may be invoked as appropriate.

2. Regulations - The clearing contractor shall comply with all applicable federal, state, and local environmental and antipollution laws, regulations, and ordinances including without limitation all air, water, solid and hazardous waste, noise, and nuisance laws, regulations, and ordinances. The contractor shall secure or ensure that TVA has secured all necessary permits or authorizations to conduct work on the acres shown on the drawings and plan and profile for the contract. The contractor's designated project manager will actively seek to prevent, control, monitor, and safely abate all commonly recognized forms of workplace and environmental pollution. Permits or authorizations and any necessary certifications of trained or licensed employees shall be documented with copies submitted to TVA's right-of-way inspector or construction environmental engineer before work begins. The contractor will be responsible for meeting all conditions specified in permits. Permit conditions shall be reviewed in prework discussions.

3. Land and Landscape Preservation - The clearing contractor shall exercise care to preserve the condition of cleared soils by avoiding as much compacting and deep scarring as possible. As soon as possible after initial disturbance of the soil and in accordance with any permit(s) or other state or local environmental regulatory requirements, cover material shall be placed to prevent erosion and sedimentation of water bodies or conveyances to surface water or groundwater. In areas outside the clearing, use, and access areas, the natural vegetation shall be protected from damage. The contractor and his employees must not deviate from delineated access routes or use areas and must enter the site at designated areas that will be marked. Clearing operations shall be conducted to prevent any unnecessary destruction, scarring, or defacing of the remaining natural vegetation and adjacent surroundings in the vicinity of the work. In sensitive public or environmental areas, appropriate buffer zones shall be observed and the methods of clearing or reclearing modified to protect

the buffer and sensitive area. Some areas may require planting native plants or grasses to meet the criteria of regulatory agencies or commitments to special program interests.

4. Streamside Management Zones - The clearing contractor must leave as many rooted ground cover plants as possible in buffer zones along streams and other bodies of water or wet-weather conveyances thereto. In such streamside management zones (SMZ), tall-growing tree species (trees that would interfere with TVA's National Electrical Safety Code clearances) shall be cut, and the stumps may be treated to prevent resprouting. Low-growing trees identified by TVA as marginal electrical clearance problems may be cut, and then stump treated with growth regulators to allow low, slow-growing canopy development and active root growth. Only approved herbicides shall be used, and herbicide application shall be conducted by certified applicators from TVA's Transmission, Operations, and Maintenance (TOM) organization after initial clearing and construction. Cutting of trees within SMZs must be accomplished by using either hand-held equipment or other appropriate clearing equipment, such as a feller-buncher. The method will be selected based on site-specific conditions and topography to minimize soil disturbance and impacts to the SMZ and surrounding area. Disturbed soils in SMZs must be stabilized by appropriate methods immediately after the right-of-way is cleared. Stabilization must occur within the time frame specified in applicable storm water permits or regulations. Stumps within SMZs may be cut close to the ground but must not be removed or uprooted. Trees, limbs, and debris shall be immediately removed from streams, ditches, and wet areas using methods that will minimize dragging or scarring the banks or stream bottom. No debris will be left in the water or watercourse. Equipment will cross streams, ditches, or wet areas only at locations designated by TVA after the application of appropriate erosion control BMPs consistent with permit conditions or regulatory requirements.

5. Wetlands - In forested wetlands, tall trees will be cut near the ground, leaving stumps and roots in place. The cambium may be treated with herbicides applied by certified applicators from the TOM organization to prevent regrowth. Understory trees that must be initially cut and removed may be allowed to grow back or may be treated with tree growth regulators selectively to slow growth and increase the reclearing cycle. The decision will be situationally made based on existing ground cover, wetland type, and tree species since tall tree removal may "release" understory species and allow them to grow quickly to "electrical clearance problem" heights. In many circumstances, herbicides labeled for water and wetland use may be used in reclearing.

6. Sensitive Area Preservation - If prehistoric or historic artifacts or features that might be of archaeological significance are discovered during clearing or reclearing operations, the activity shall immediately cease within a 100-foot radius, and a TVA right-of-way inspector or construction environmental engineer and the Cultural Resources Program manager shall be notified. The site shall be protected and left as found until a determination about the resources, their significance, and site treatment is made by TVA's Cultural Resources Program. Work may continue beyond the finding zone and the 100-foot radius beyond its perimeter.

7. Water Quality Control - The contractor's clearing and disposal activities shall be performed using BMPs that will prevent erosion and entrance of spillage, contaminants, debris, and other pollutants or objectionable materials into drainage

ways, surface water, or groundwater. Special care shall be exercised in refueling equipment to prevent spills. Fueling areas shall be remote from any sinkhole, crevice, stream, or other water body. Open burning debris will be kept away from streams and ditches and shall be incorporated into the soil.

The clearing contractor will erect and (when TVA or contract construction personnel are unable) maintain BMPs such as silt fences on steep slopes and adjacent to any stream, wetland, or other water body. BMPs will be inspected by the TVA field engineer or other designated TVA or contractor personnel routinely and during periods of high runoff, and any necessary repairs will be made as soon as practicable. BMP inspections will be conducted in accordance with permit requirements. Records of all inspections will be maintained on site, and copies of inspection forms will be forwarded to the TVA construction environmental engineer.

8. Turbidity and Blocking of Streams - If temporary clearing activities must interrupt natural drainage, appropriate drainage facilities and erosion/sediment controls shall be provided to avoid erosion and siltation of streams and other water bodies or water conveyances. Turbidity levels in receiving waters or at storm water discharge points shall be monitored, documented, and reported if required by the applicable permit. Erosion and sediment control measures such as silt fences, water bars, and sediment traps shall be installed as soon as practicable after initial access, site, or right-of-way disturbance in accordance with applicable permit or regulatory requirements.

   Mechanized equipment shall not be operated in flowing water except when approved and, then, only to construct necessary stream crossings under direct guidance of TVA. Construction of stream fords or other crossings will only be permitted at approved locations and to current TVA construction access road standards. Material shall not be deposited in watercourses or within stream bank areas where it could be washed away by high stream flows. Any clearing debris that enters streams or other water bodies shall be removed as soon as possible. Appropriate U.S. Army Corps of Engineers and state permits shall be obtained for stream crossings.

9. Air Quality Control - The clearing or reclearing contractor shall take appropriate actions to limit the amount of air emissions created by clearing and disposal operations to well within the limits of clearing or burning permits and/or forestry or local fire department requirements. All operations must be conducted in a manner that prevents nuisance conditions or damage to adjacent land crops, dwellings, highways, or people.

10. Dust and Mud Control - Clearing activities shall be conducted in a manner that minimizes the creation of fugitive dust. This may require limitations as to type of equipment, allowable speeds, and routes utilized. Control measures such as water, gravel, etc., or similar measures may be used subject to TVA approval. On new construction sites and easements, the last 100 feet before an access road approaches a county road or highway shall be graveled to prevent transfer of mud onto the public road.

11. Burning - The contractor shall obtain applicable permits and approvals to conduct controlled burning. The contractor will comply with all provisions of the permit, notification, or authorization including burning site locations, controlled draft, burning hours, and such other conditions as stipulated. If weather conditions such as wind speed or wind direction change rapidly, the contractor's burning operation may be

temporarily stopped by TVA's field engineer. The debris to be burned shall be kept as clean and dry as possible and stacked and burned in a manner that produces the minimum amount of smoke. Residue from burning will be disposed of according to permit stipulations. No fuel starters or enhancements other than kerosene will be allowed.

12. Smoke and Odors - The contractor will properly store and handle combustible and volatile materials that could create objectionable smoke, odor, or fumes. The contractor shall not burn oil or refuse that includes trash, rags, tires, plastics, or other manufactured debris.

13. Vehicle Exhaust Emissions - The contractor shall maintain and operate equipment in a manner that limits vehicle exhaust emissions. Equipment and vehicles will be kept within the manufacturers' recommended limits and tolerances. Excessive exhaust gases will be eliminated, and inefficient operating procedures will be revised or halted until corrective repairs or adjustments are made.

14. Vehicle Servicing - Routine maintenance of personal vehicles will not be performed on the right-of-way. However, if emergency or "have to" situations arise, minimal/temporary maintenance to personal vehicles will occur in order to mobilize the vehicle to an off-site maintenance shop. Heavy equipment will be serviced on the right-of-way, except in designated sensitive areas. The clearing or reclearing contractor will properly maintain these vehicles with approved spill protection controls and countermeasures. If emergency maintenance in a sensitive or questionable area arises, the area environmental coordinator or construction environmental engineer will be consulted. All wastes and used oils will be properly recovered, handled, and disposed/recycled. Equipment shall not be temporarily stored in stream floodplains, whether overnight or on weekends or holidays.

15. Noise Control - The contractor shall take steps to avoid the creation of excessive sound levels for employees, the public, or the site and adjacent property owners. Concentration of individual noisy pieces as well as the hours and locations of operation should be considered.

16. Noise Suppression - All internal combustion engines shall be properly equipped with mufflers. The equipment and mufflers shall be maintained at peak operating efficiency.

17. Sanitation - A designated representative of TVA or the clearing contractor shall contact a sanitary contractor who will provide sanitary chemical toilets convenient to all principal points of operation for every working party. The facilities shall comply with applicable federal, state, or local health laws and regulations. They shall not be located closer than 100 feet to any stream or tributary or to any wetland. The facilities shall be required to have proper servicing and maintenance, and the waste disposal contractor shall verify in writing that the waste disposal will be in state-approved facilities. Employees shall be notified of sanitation regulations and shall be required to use the toilet facilities.

18. Refuse Disposal - The clearing or reclearing contractor shall be responsible for daily cleanup and proper labeling, storage, and disposal of all refuse and debris on the site produced by his operations and employees. Facilities that meet applicable regulations

and guidelines for refuse collection will be required. Only approved transport, storage, and disposal areas shall be used.

19. Brush and Timber Disposal (Reclearing) - The reclearing contractor shall place felled tree boles in neat stacks at the edge of the right-of-way, with crossing breaks at least every 100 feet. Property owner requests shall be reviewed with the project manager or right-of-way specialist before accepting them. Lop and drop activities must be specified in the contract and on plan and profile drawings with verification with the right-of-way specialist before conducting such work. When tree trimming and chipping is necessary, disposal of the chips on the easement or other locations on the property must be with the consent of the property owner and the approval of the right-of-way specialist. No trees, branches, or chips shall remain in a surface water body or be placed at a location where washing into a surface water or groundwater source might occur.

20. Brush and Timber Disposal (Initial Clearing) - For initial clearing, trees are commonly part of the contractor's contract to remove as they wish. Trees may be removed from the site for lumber or pulpwood or they may be chipped or stacked and burned. All such activities must be coordinated with the TVA field engineer, and the open burning permits, notifications, and regulatory requirements must be met. Trees may be cut and left in place only in areas specified by TVA and approved by appropriate regulatory agencies. These areas may include sensitive wetlands or SMZs where tree removal would cause excessive ground disturbance or in very rugged terrain where windrowed trees are used as sediment barriers along the edge of the right-of-way.

21. Restoration of Site - All disturbed areas, with the exception of farmland under cultivation and any other areas as may be designated by TVA's specifications, shall be stabilized in the following manner unless the property owner and TVA's engineer specify a different method:

    A. The subsoil shall be loosened to a minimum depth of 6 inches if possible and worked to remove unnatural ridges and depressions.

    B. If needed, appropriate soil amendments will be added.

    C. All disturbed areas will initially be seeded with a temporary ground cover such as winter wheat, rye, or millet, depending on the season. Perennials may also be planted during initial seeding if proper growing conditions exist. Final restoration and final seeding will be performed as line construction is completed. Final seeding will consist of permanent perennial grasses such as those outlined in TVA's *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities.* Exceptions would include those areas designated as native grass planting areas. Initial and final restoration will be performed by the clearing contractor.

    D. TVA holds the option, depending upon the time of year and weather condition, to delay or withdraw the requirement of seeding until more favorable planting conditions are certain. In the meantime, other stabilization techniques must be applied.

Revision April 2007

This page intentionally left blank

Appendix C – TVA Environmental Quality Protection Specifications for Transmission Line Construction

This page intentionally left blank

Tennessee Valley Authority Environmental Quality Protection Specifications for Transmission Line Construction

1. General – Tennessee Valley Authority (TVA) and/or the assigned contractor shall plan, coordinate, and conduct operations in a manner that protects the quality of the environment and complies with TVA's environmental expectations discussed in the preconstruction meeting. This specification contains provisions that shall be considered in all TVA and contract construction operations. If the contractor fails to operate within the intent of these requirements, TVA will direct changes to operating procedures. Continued violation will result in a work suspension until correction or remedial action is taken by the contractor. Penalties and contract termination will be used as appropriate. The costs of complying with the Environmental Quality Protection Specifications are incidental to the contract work, and no additional compensation will be allowed. At all structure and conductor pulling sites, protective measures to prevent erosion will be taken immediately upon the end of each step in a construction sequence, and those protective measures will be inspected and maintained throughout the construction and right-of-way rehabilitation period.

2. Regulations - TVA and/or the assigned contractor shall comply with all applicable federal, state, and local environmental and antipollution laws, regulations, and ordinances related to environmental protection and prevention, control, and abatement of all forms of pollution.

3. Use Areas - TVA and/or the assigned contractor's use areas include but are not limited to site office, shop, maintenance, parking, storage, staging, assembly areas, utility services, and access roads to the use areas. The construction contractor shall submit plans and drawings for their location and development to the TVA engineer and project manager for approval. Secondary containment will be provided for fuel and petroleum product storage pursuant to 29CFR1910.106(D)(6)(iii)(OSHA).

4. Equipment - All major equipment and proposed methods of operation shall be subject to the approval of TVA. The use or operation of heavy equipment in areas outside the right-of-way, access routes, or structure, pole, or tower sites will not be permitted without permission of the TVA inspector or field engineer. Heavy equipment use on steep slopes (greater than 20 percent) and in wet areas will be held to the minimum necessary to construct the transmission line. Steps will be taken to limit ground disturbance caused by heavy equipment usage, and erosion and sediment controls will be instituted on disturbed areas in accordance with state requirements.

   No subsurface ground-disturbing equipment or stump-removal equipment will be used by construction forces except on access roads or at the actual structure, pole, or tower sites, where only footing locations and controlled runoff diversions shall be created that disturb the soil. All other areas of ground cover or in-place stumps and roots shall remain in place. (Note: Tracked vehicles disturb surface layer of the ground due to size and function.) Some disking of the right-of-way may occur for proper seedbed preparation.

   Unless ponding previously occurred (i.e., existing low-lying areas), water should not be allowed to pond on the structure sites except around foundation holes; the water must be directed away from the site in as dispersed a manner as possible. At tower or

structure sites, some means of upslope interruption of potential overland flow and diversion around the footings should be provided as the first step in construction-site preparation. If leveling is necessary, it must be implemented by means that provide for continuous gentle, controlled, overland flow or percolation. A good grass cover, straw, gravel, or other protection of the surface must be maintained. Steps taken to prevent increases in the moisture content of the in-situ soils will be beneficial both during construction and over the service life of any structure.

5. Sanitation - A designated TVA or contractor representative shall contact a sanitary contractor who will provide sanitary chemical toilets convenient to all principal points of operation for every working party. The facilities shall comply with applicable federal, state, or local health laws and regulations. They shall not be located closer than 100 feet to any stream or tributary or to any wetland. The facilities shall be required to have proper servicing and maintenance, and the waste disposal contractor shall verify in writing that the waste disposal will be in state-approved facilities. Employees shall be notified of sanitation regulations and shall be required to use the toilet facilities.

6. Refuse Disposal - Designated TVA and/or contractor personnel shall be responsible for daily inspection, cleanup, and proper labeling, storage, and disposal of all refuse and debris produced by his operations and by his employees. Suitable refuse collecting facilities will be required. Only state-approved disposal areas shall be used. Disposal containers such as dumpsters or roll-off containers shall be obtained from a proper waste disposal contractor. Solid, special, construction/demolition, and hazardous wastes as well as scrap are part of the potential refuse generated and must be properly managed with emphasis on reuse, recycle, or possible give away, as appropriate, before they are handled as waste. Contractors must meet similar provisions on any project contracted by TVA.

7. Landscape Preservation - TVA and its contractors shall exercise care to preserve the natural landscape in the entire construction area as well as use areas, in or outside the right-of-way, and on or adjacent to access roads. Construction operations shall be conducted to prevent any unnecessary destruction, scarring, or defacing of the natural vegetation and surroundings in the vicinity of the work.

8. Sensitive Areas Preservation - Certain areas on site and along the right-of-way may be designated by the specifications or the TVA engineer as environmentally sensitive. These areas include but are not limited to areas classified as erodible, geologically sensitive, scenic, historical and archaeological, fish and wildlife refuges, water supply watersheds, and public recreational areas such as parks and monuments. Contractors and TVA construction crews shall take all necessary actions to avoid adverse impacts to these sensitive areas and their adjacent buffer zones. These actions may include suspension of work or change of operations during periods of rain or heavy public use; hours may be restricted or concentrations of noisy equipment may have to be dispersed. If prehistoric or historic artifacts or features are encountered during clearing or construction operations, the operations shall immediately cease for at least 100 feet in each direction, and TVA's right-of-way inspector or construction superintendent and Cultural Resources Program shall be notified. The site shall be left as found until a significance determination is made. Work may continue elsewhere beyond the 100-foot perimeter.

9. Water Quality Control - TVA and contractor construction activities shall be performed by methods that will prevent entrance or accidental spillage of solid matter, contaminants, debris, and other objectionable pollutants and wastes into flowing caves, sinkholes, streams, dry watercourses, lakes, ponds, and underground water sources.

   The clearing contractor will erect and (when TVA or contract construction personnel are unable) maintain best management practices (BMPs) such as silt fences on steep slopes and adjacent to any stream, wetland, or other water body. Additional BMPs may be required for areas of disturbance created by construction activities. BMPs will be inspected by the TVA field engineer or other designated TVA or contractor personnel routinely and during periods of high runoff, and any necessary repairs will be made as soon as practicable. BMP inspections will be conducted in accordance with permit requirements. Records of all inspections will be maintained on site, and copies of inspection forms will be forwarded to the TVA construction environmental engineer.

   Acceptable measures for disposal of waste oil from vehicles and equipment shall be followed. No waste oil shall be disposed of within the right-of-way, on a construction site, or on access roads.

10. Turbidity and Blocking of Streams - Construction activities in or near SMZs or other bodies of water shall be controlled to prevent the water turbidity from exceeding state or local water quality standards for that stream. All conditions of a general storm water permit, aquatic resource alteration permit, or a site-specific permit shall be met including monitoring of turbidity in receiving streams and/or storm water discharges and implementation of appropriate erosion and sediment control measures.

    Appropriate drainage facilities for temporary construction activities interrupting natural site drainage shall be provided to avoid erosion. Watercourses shall not be blocked or diverted unless required by the specifications or the TVA engineer. Diversions shall be made in accordance with TVA's *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities.*

    Mechanized equipment shall not be operated in flowing water except when approved and, then, only to construct crossings or to perform required construction under direct guidance of TVA. Construction of stream fords or other crossings will only be permitted at approved locations and to current TVA construction access road standards. Material shall not be deposited in watercourses or within stream bank areas where it could be washed away by high stream flows. Appropriate U.S. Army Corps of Engineers and state permits shall be obtained.

    Wastewater from construction or dewatering operations shall be controlled to prevent excessive erosion or turbidity in a stream, wetland, lake, or pond. Any work or placing of equipment within a flowing or dry watercourse requires the prior approval of TVA.

11. Clearing - No construction activities may clear additional site or right-of-way vegetation or disturb remaining retained vegetation, stumps, or regrowth at locations other than the structure sites and conductor setup areas. TVA and the construction contractor(s) must provide appropriate erosion or sediment controls for areas they have disturbed that have previously been restabilized after clearing operations. Control measures shall be

implemented as soon as practicable after disturbance in accordance with applicable federal, state, and/or local storm water regulations.

12. Restoration of Site - All construction disturbed areas, with the exception of farmland under cultivation and any other areas as may be designated by TVA's specifications, shall be stabilized in the following manner unless the property owner and TVA's engineer specify a different method:

    A. The subsoil shall be loosened to a minimum depth of 6 inches if possible and worked to remove unnatural ridges and depressions.

    B. If needed, appropriate soil amendments will be added.

    C. All disturbed areas will initially be seeded with a temporary ground cover such as winter wheat, rye, or millet, depending on the season. Perennials may also be planted during initial seeding if proper growing conditions exist. Final restoration and final seeding will be performed as line construction is completed. Final seeding will consist of permanent perennial grasses such as those outlined in TVA's *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities.* Exceptions would include those areas designated as native grass planting areas. Initial and final restoration will be performed by the clearing contractor.

    D. TVA holds the option, depending upon the time of year and weather condition, to delay or withdraw the requirement of seeding until more favorable planting conditions are certain. In the meantime, other stabilization techniques must be applied.

13. Air Quality Control - Construction crews shall take appropriate actions to minimize the amount of air pollution created by their construction operations. All operations must be conducted in a manner that avoids creating a nuisance and prevents damage to lands, crops, dwellings, or persons.

14. Burning - Before conducting any open burning operations, the contractor shall obtain permits or provide notifications as required to state forestry offices and/or local fire departments. Burning operations must comply with the requirements of state and local air pollution control and fire authorities and will only be allowed in approved locations and during appropriate hours and weather conditions. If weather conditions such as wind direction or speed change rapidly, the contractor's burning operations may be temporarily stopped by the TVA field engineer. The debris for burning shall be piled and shall be kept as clean and as dry as possible, then burned in such a manner as to reduce smoke. No materials other than dry wood shall be open burned. The ash and debris shall be buried away from streams or other water sources and shall be in areas coordinated with the property owner.

15. Dust and Mud Control - Construction activities shall be conducted to minimize the creation of dust. This may require limitations as to types of equipment, allowable speeds, and routes utilized. Water, straw, wood chips, dust palliative, gravel, combinations of these, or similar control measures may be used subject to TVA's approval. On new construction sites and easements, the last 100 feet before an access

road approaches a county road or highway shall be graveled to prevent transfer of mud onto the public road.

16. Vehicle Exhaust Emissions - TVA and/or the contractors shall maintain and operate equipment to limit vehicle exhaust emissions. Equipment and vehicles that show excessive emissions of exhaust gasses and particulates due to poor engine adjustments or other inefficient operating conditions shall not be operated until corrective repairs or adjustments are made.

17. Vehicle Servicing - Routine maintenance of personal vehicles will not be performed on the right-of-way. However, if emergency or "have to" situations arise, minimal/temporary maintenance to personal vehicles will occur in order to mobilize the vehicle to an off-site maintenance shop. Heavy equipment will be serviced on the right-of-way except in designated sensitive areas. The Heavy Equipment Department within TVA or the construction contractor will properly maintain these vehicles with approved spill prevention controls and countermeasures. If emergency maintenance in a sensitive or questionable area arises, the area environmental coordinator or construction environmental engineer will be consulted. All wastes and used oils will be properly recovered, handled, and disposed/recycled. Equipment shall not be temporarily stored in stream floodplains, whether overnight or on weekends or holidays.

18. Smoke and Odors - TVA and/or the contractors shall properly store and handle combustible material that could create objectionable smoke, odors, or fumes. The contractor shall not burn refuse such as trash, rags, tires, plastics, or other debris.

19. Noise Control - TVA and/or the contractor shall take measures to avoid the creation of noise levels that are considered nuisances, safety, or health hazards. Critical areas including but not limited to residential areas, parks, public use areas, and some ranching operations will require special considerations. TVA's criteria for determining corrective measures shall be determined by comparing the noise level of the construction operation to the background noise levels. In addition, especially noisy equipment such as helicopters, pile drivers, air hammers, chippers, chain saws, or areas for machine shops, staging, assembly, or blasting may require corrective actions when required by TVA.

20. Noise Suppression - All internal combustion engines shall be properly equipped with mufflers as required by the Department of Labor's *Safety and Health Regulations for Construction*. TVA may require spark arresters in addition to mufflers on some engines. Air compressors and other noisy equipment may require sound-reducing enclosures in some circumstances.

21. Damages - The movement of construction crews and equipment shall be conducted in a manner that causes as little intrusion and damage as possible to crops, orchards, woods, wetlands, and other property features and vegetation. The contractor will be responsible for erosion damage caused by his actions and especially for creating conditions that would threaten the stability of the right-of-way or site soil, the structures, or access to either. When property owners prefer the correction of ground cover condition or soil and subsoil problems themselves, the section of the contract dealing with damages will apply.

Revision April 2007

This page intentionally left blank

Appendix D – TVA Transmission Construction Guidelines Near Streams

This page intentionally left blank

Tennessee Valley Authority Transmission Construction Guidelines Near Streams

Even the most carefully designed transmission line project eventually will affect one or more creeks, rivers, or other type of water body. These streams and other water areas are protected by state and federal law, generally support some amount of fishing and recreation, and, occasionally, are homes for important and/or endangered species. These habitats occur in the stream and on strips of land along both sides (the streamside management zone [SMZ]) where disturbance of the water, land, or vegetation could have an adverse effect on the water or stream life. The following guidelines have been prepared to help Tennessee Valley Authority (TVA) Transmission Construction staff and their contractors avoid impacts to streams and stream life as they work in and near SMZs. These guidelines expand on information presented in *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities.*

Three Levels of Protection

During the preconstruction review of a proposed transmission line, the TVA Environmental Biological Compliance staff will have studied each possible stream impact site and will have identified it as falling into one of three categories: (A) standard streamside management protection, (B) protection of important permanent streams, springs, and sinkholes, or (C) protection of unique habitats. These category designations are based on the variety of species and habitats that exist in the stream, as well as federal requirements to avoid harming certain species.

As early as possible after field surveys are completed by the TVA Biological Compliance Staff, any streams that have been designated as either Category B or C will be discussed with the TVA Environmental Energy Delivery staff. The purpose of these discussions will be to minimize the number of crossings and their impact on the important resources in the streams during design and construction. The category designation for each stream site will then be marked on the transmission line plan and profile sheets. Construction crews are required to protect streams and other identified water habitats using the following pertinent set(s) of guidelines:

(A) Standard Stream Protection

This is the standard (basic) level of protection for streams, springs, sinkholes, and the habitats around them. The purpose of the following guidelines is to minimize the amount and length of disturbance to the water bodies without causing adverse impacts on the construction work.

Guidelines:

1. All construction work around streams, springs, and sinkholes will be done using pertinent best management practices (BMPs) such as those described in *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities,* especially Chapter 5, “Structural Controls Standards and Specifications” (Muncy 2012).

2. All equipment crossings of streams and shorelines must comply with appropriate state permitting requirements. Crossings of all drainage channels, intermittent streams, and permanent streams must be done in ways that avoid erosion problems and long-term changes in water flow. Crossings of any permanent streams must allow for natural movement of fish and other aquatic life.

3. Cutting of trees within SMZs must be accomplished by using either hand-held equipment or other appropriate clearing equipment (e.g., a feller-buncher) that would result in minimal soil disturbance and damage to low-lying vegetation. The method will be selected based on site-specific conditions and topography to minimize soil disturbance and impacts to the SMZ and surrounding area. Stumps can be cut close to ground level, but must not be removed or uprooted.

4. Other vegetation near streams must be disturbed as little as possible during construction. Soil displacement as a result of clearing operations by the actions of plowing, disking, blading, or other tillage or grading equipment will be minimized in SMZs. Shorelines that have to be disturbed must be stabilized as soon as feasible.

(B) Protection of Important Permanent Streams, Springs, and Sinkholes

This category will be used when there is one or more specific reason(s) why a permanent (always-flowing) stream, spring, or sinkhole requires protection beyond that provided by standard BMPs. Reasons for requiring this additional protection include high potential for occupancy by federally listed or significant state-listed species, federally designated critical habitat, or areas designated as special use classification (e.g., trout waters). The purpose of the following guidelines is to minimize the disturbance of the banks and water in the flowing stream(s) where this level of protection is required.

Guidelines:

1. Except as modified by Guidelines 2-4 below, all construction work around streams will be done using pertinent BMPs, such as those described in *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities,* especially Chapter 5, “Structural Controls Standards and Specifications” (Muncy 2012).

2. All equipment crossings of streams must comply with appropriate state (and, at times, federal) permitting requirements. Crossings of drainage channels and intermittent streams must be done in ways that avoid erosion problems and long-term changes in water flow. Category B designations will be discussed with the TVA Environmental Energy Delivery staff as early as possible in the process, to allow time to discuss possible avoidance or minimization of impacts with design and construction.

3. Cutting of trees within SMZs must be accomplished by using either hand-held equipment or other appropriate clearing equipment (e.g., a feller-buncher) that would result in minimal soil disturbance and damage to low-lying vegetation. The method will be selected based on site-specific conditions and topography to minimize soil disturbance and impacts to the SMZ and surrounding area. Cutting of trees near permanent streams must be limited to those required to meet National Electrical Safety Code and danger tree requirements. Stumps can be cut close to ground level, but must not be removed or uprooted.

4. Other vegetation near streams must be disturbed as little as possible during construction. Soil displacement by the actions of plowing, disking, blading, or other tillage or grading equipment will be minimized in SMZs. Shorelines that have to be disturbed must be stabilized as soon as possible and re-vegetated as soon as feasible.

(C) Protection of Unique Habitats

This category will be used when, for one or more specific reasons, a temporary or permanent aquatic habitat requires special protection. This relatively uncommon level of protection will be appropriate and required when a unique habitat requiring special protection is present (for example, the spawning area of a rare species), the stream is known to be occupied by a federally listed or significant state-listed species, or when required as a special condition resulting from consultation with the U.S. Fish and Wildlife Service to avoid project effects on a listed species or designated critical habitat. The purpose of the following guidelines is to avoid or minimize any disturbance of the unique aquatic habitat.

Guidelines:

1. Except as modified by Guidelines 2-4 below, all construction work around the unique habitat will be done using pertinent BMPs, such as those described in *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities,* especially Chapter 5, "Structural Controls Standards and Specifications" (Muncy 2012).

2. Category C designations would be discussed with the TVA Environmental Energy Delivery staff as early as possible following field surveys to allow time to discuss possible avoidance or minimization of impacts with design and construction. Environmental Energy Delivery staff would discuss construction activities to take place in the SMZ with the Environmental Biological Compliance staff. On-site planning sessions would be conducted as needed. All crossings of streams also must comply with appropriate state (and, at times, federal) permitting requirements.

3. Cutting of trees within SMZs must be accomplished by using either hand-held equipment or other appropriate clearing equipment (e.g., a feller-buncher) that would result in minimal soil disturbance and damage to low-lying vegetation. The method will be selected based on site-specific conditions and topography to minimize soil disturbance and impacts to the SMZ and surrounding area. Cutting of trees near permanent streams should be limited to those required to meet National Electrical Safety Code, Federal Energy Regulatory Commission standards, and danger tree requirements. Stumps can be cut close to ground level, but must not be removed or uprooted.

4. Other vegetation near the unique habitat must be disturbed as little as possible during construction. Soil disturbance by plowing, disking, blading, or grading must be kept at a minimum. Areas that have to be disturbed must be stabilized as soon as possible and re-vegetated as soon as feasible.

5. Special SMZ requirements will be coordinated with Environmental Biological Compliance staff.

Maintenance

During ongoing operations, SMZs will be inspected frequently; and during inactive periods, occasionally. Damaging or failing situations that may cause unacceptable water quality impacts will be corrected as soon as practical.

Revision 2.1 - June 2012

Comparison of Guidelines Under the Three Stream and Water Body Protection Categories[1] (page 1)

Guidelines	A: Standard Stream Protection	B: Important Permanent Streams, Springs, and Sinkholes	C: Protection of Unique Habitats
1. Reference	• All TVA construction work around streams, springs, and sinkholes will be done using pertinent Best Management Practices (BMPs) such as those described in *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities*, especially Chapter 5, "Structural Controls Standards and Specifications."	• Except as modified by Guidelines 2-4, all construction work around streams will be done using pertinent BMPs such as those described in *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities*, especially Chapter 5, "Structural Controls Standards and Specifications."	• Except as modified by Guidelines 2-4, all construction work around the unique habitat will be done using pertinent BMPs such as those described in *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities,* especially Chapter 5, "Structural Controls Standards and Specifications."
2. Equipment Crossings	• All equipment crossings of streams and shorelines must comply with appropriate state permitting requirements. • Crossings of all drainage channels, intermittent streams, and permanent streams must be done in ways that avoid erosion problems and long-term changes in water flow. • Crossings of any permanent streams must allow for natural movement of fish and other aquatic life.	• All equipment crossings of streams also must comply with appropriate state (and at times federal) permitting requirements. • Crossings of drainage channels and intermittent streams must be done in ways that avoid erosion problems and long-term changes in water flow. • ll construction activity would be discussed with the TVA Environmental Energy Delivery staff as early as possible in the process to allow time to discuss possible avoidance or minimization of impacts with design and construction.	• All crossings of streams also must comply with appropriate state (and, at times federal) permitting requirements. • All construction activity would be discussed with the TVA Environmental Energy Delivery staff as early as possible following field surveys to allow time to discuss possible avoidance or minimization of impacts with design and construction. • Special SMZ requirements will be coordinated with Environmental Biological Compliance staff.

[1]Source: *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities* (Muncy 2012)

Comparison of Guidelines Under the Three Stream and Water Body Protection Categories[1] (page 2)

Guidelines	A: Standard Stream Protection	B: Important Permanent Streams, Springs, and Sinkholes	C: Protection of Unique Habitats
3. Cutting Trees	• Cutting of trees within streamside management zones (SMZs) must be accomplished by using either hand-held equipment or other appropriate clearing equipment (e.g., a feller-buncher) that would result in minimal soil disturbance and damage to low-lying vegetation. The method will be selected based on site-specific conditions and topography to minimize soil disturbance and impacts to the SMZ and surrounding area. • Stumps can be cut close to ground level, but must not be removed or uprooted.	• Cutting of trees within SMZs must be accomplished by using either hand-held equipment or other appropriate clearing equipment (e.g., a feller-buncher) that would result in minimal soil disturbance and damage to low-lying vegetation. The method will be selected based on site-specific conditions and topography to minimize soil disturbance and impacts to the SMZ and surrounding area. • Cutting of trees near permanent streams must be limited to those meeting National Electrical Safety Code (NESC) and danger tree requirements. • Stumps can be cut close to ground level, but must not be removed or uprooted.	• Cutting of trees within SMZs must be accomplished by using either hand-held equipment or other appropriate clearing equipment (e.g., a feller-buncher) that would result in minimal soil disturbance and damage to low-lying vegetation. The method will be selected based on site-specific conditions and topography to minimize soil disturbance and impacts to the SMZ and surrounding area. • Cutting of trees near permanent streams must be limited to those meeting NESC, Federal Energy Regulatory Commission standards, and danger tree requirements. • Stumps can be cut close to ground level, but must not be removed or uprooted.
4. Other Vegetation	• Other vegetation near streams must be disturbed as little as possible during construction. • Soil displacement as a result of clearing operations by the actions of plowing, disking, blading, or other tillage or grading equipment will be minimized in SMZs. • Shorelines that have to be disturbed must be stabilized as soon as feasible.	• Other vegetation near streams must be disturbed as little as possible during construction. • Soil displacement by the actions of plowing, disking, blading, or other tillage or grading equipment will be minimized in SMZs. • Shorelines that have to be disturbed must be stabilized as soon as possible and re-vegetated as soon as feasible.	• Other vegetation near the unique habitat must be disturbed as little as possible during construction. • The soil disturbance by plowing, disking, blading, or grading must be kept at a minimum. • Areas that have to be disturbed must be stabilized as soon as possible and re-vegetated as soon as feasible. Special SMZ requirements will be coordinated with Environmental Biological Compliance staff.

[1]Source: *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities* (Muncy 2012)

Appendix E – Environmental Protection Procedures - Right-of-Way Vegetation Management Guidelines

This page intentionally left blank

Tennessee Valley Authority Environmental Energy Delivery Environmental Protection Procedures Right of Way Vegetation Management Guidelines

1.0 Overview

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

B. Each year TVA assesses the conditions of the vegetation on and along its rights-of-way. This is accomplished by aerial inspections, periodic field inspections, aerial photography, and information from TVA personnel, property owners, and the general public. Important information gathered during these assessments includes the coverage by various vegetation types, the mix of plant species, the observed growth, the seasonal growing conditions, and the density of the tall vegetation. TVA also evaluates the proximity, height, and growth rate of trees adjacent to the right-of-way that may be a danger to the line or structures.

C. TVA right-of-way specialists develop a vegetation reclearing plan that is specific to each line segment and is based on terrain conditions, species mix, growth, and density.

2.0 Right-of-Way Management Methods

A. TVA uses an integrated vegetation management approach. In farming areas, TVA encourages property owner management of the right-of-way using low-growing crops. In dissected terrain with rolling hills and interspersed woodlands, TVA uses mechanical mowing to a large extent.

B. When slopes become hazardous to farm tractors and rotary mowers, TVA may use a variety of herbicides specific to the species present with a variety of possible application techniques. When scattered small stands of tall-growing vegetation are present and access along the right-of-way is difficult or the path to such stands is very long, herbicides may be used.

C. In very steep terrain, in sensitive environmental areas, in extensive wetlands, at stream banks, and in sensitive property owner land use areas, hand clearing may be utilized. Hand clearing is recognized as one of the most hazardous occupations documented by the Occupational Safety and Health Administration. For that reason, TVA is actively looking at better control methods, including use of low-volume herbicide applications, occasional single tree injections, and tree growth regulators (TGRs).

Energy Delivery Guideline
Revision 2, April 27, 2012

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

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

F. TVA encourages property owners to sign an agreement to manage rights-of-way on their land for wildlife under the auspices of "Project Habitat," a joint project by TVA, BASF, and wildlife organizations, e.g., National Wild Turkey Federation, Quail Unlimited, and Buckmasters. The property owner maintains the right-of-way in wildlife food and cover with emphasis on quail, turkey, deer or other wildlife. A variation used in or adjacent to developing suburban areas is to sign agreements with the developer and residents to plant and maintain wildflowers on the right-of-way.

G. TVA places strong emphasis on managing rights-of-way in the above manner. When the property owners do not agree to these opportunities, TVA must maintain the right-of-way in the most environmentally acceptable, cost-effective, and efficient manner possible.

3.0 Herbicide Program

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

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

Trade Name	Active Ingredients	Label Signal
Accord	Glyphosate/Liquid	Caution
Arsenal	Imazapyr/Liquid/Granule	Caution
Chopper	Imazapyr/RTU	Caution
Clearstand	Imazapyr/Metsulfuron/Methyl/Liquid	Caution
Escort	Metsulfuron Methyl/Dry Flowable	Caution
Garlon	Triclopyr/Liquid	Caution
Garlon 3A	Triclopyr/Liquid	Danger
Habitat	Imazapyr/Liquid	Caution
Krenite S	Fosamine Ammonium	Caution
Milestone VM	Aminopyralid/Liquid	Caution
Pathfinder II	Triclopyr/RTU	Caution
Rodeo	Glyphosate/Liquid	Caution
Roundup	Glyphosate/Liquid	Caution
Roundup Pro	Glyphosate	Caution
Streamline	Aminocyclopyrachlor/Metsulfuron/Liquid	Caution
Transline	Clopyralid/Liquid	Caution

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

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

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

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

B. The herbicides listed in Tables 1 and 2 and TGRs listed in Table 3 have been evaluated in extensive studies in support of registration applications and label requirements. Many have been reviewed in the USFS vegetation management environmental impact statements (EISs), and those evaluations are incorporated here by reference (USFS 1989a, 1989b, 2002a, and 2002b). Electronic copies can be accessed at http://www.fs.fed.us/r8/planning/documents/vegmgmt/. The result of these reviews has been a consistent finding of limited environmental impact beyond that of control of the target vegetation. All the listed herbicides have been found to be of low environmental toxicity when applied by trained applicators following the label and registration procedures, including prescribed measures, such as buffer zones, to protect threatened and endangered species.

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

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

E. Property owners interested in tree production often request the use of low volume applications rather than hand or mechanical clearing because of the insect and fungus problems in damaged vegetation and debris left on the right-of-way. The insect and fungus invasions, such as pine tip moth, oak leaf blight, sycamore and dogwood blight, etc., are becoming widespread across the nation.

F. Best management practices (BMPs) governing application of herbicides are contained within *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities* (Muncy 1999) which is incorporated by reference. Herbicides can be liquid, granular, or powder and can be applied aerially or by ground equipment and may be selectively applied or broadcast, depending on the site requirements, species present, and condition of the vegetation. Water quality considerations include measures taken to keep herbicides from reaching streams whether by direct application or through runoff of or flooding by surface water. “Applicators” must be trained, licensed, and follow manufacturers’ label instructions, USEPA guidelines, and respective state regulations and laws.

G. When herbicides are used, their potential adverse impacts are considered in selecting the compound, formulation, and application method. Herbicides that are designated “Restricted Use” by USEPA require application by or under the supervision of applicators certified by the respective state control board. Aerial and ground applications are either done by TVA or by contractors in accordance with the following guidelines identified in TVA’s BMPs manual (Muncy 1999):

1. The sites to be treated are selected and application directed by the appropriate TVA official.
2. A preflight walking or flying inspection is made within 72 hours prior to applying herbicides aerially. This inspection ensures that no land use changes have occurred, that sensitive areas are clearly identified to the pilot, and that buffer zones are maintained.
3. Aerial application of liquid herbicides will normally not be made when surface wind speeds exceed 5 miles per hour, in areas of fog, or during periods of temperature inversion.
4. Pellet application will normally not be made when the surface wind speeds exceed 10 miles per hour, or on frozen or water-saturated soils.

5. Liquid application is not performed when the temperature reaches 95 degrees Fahrenheit or above.
6. Application during unstable, unpredictable, or changing weather patterns is avoided.
7. Equipment and techniques are used that are designed to ensure maximum control of the spray swath with minimum drift.
8. Herbicides are not applied to surface water or wetlands unless specifically labeled for aquatic use. Filter and buffer strips will conform at least to federal and state regulations and any label requirements. The use of aerial or broadcast application of herbicides is not allowed within a streamside management zone (SMZs) adjacent to perennial streams, ponds, and other water sources. Hand application of certain herbicides labeled for use within SMZs is used only selectively.
9. Buffers and filter strips (200 feet minimum width) are maintained next to agricultural crops, gardens, farm animals, orchards, apiaries, horticultural crops, and other valuable vegetation.
10. Herbicides are not applied in the following areas or times: (a) in city, state, and national parks or forests or other special areas without written permission and/or required permits (b) off the right-of-way and (c) during rainy periods or during the 48- hour interval prior to rainfall predicted with a 20 percent or greater probability by local forecasters, when soil active herbicides are used.

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

4.0 References

Muncy, J. A. 1999. A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities, revised edition. Edited by C. Austin, C. Brewster, A. Lewis, K. Smithson, T. Broyles, and T. Wojtalik. Norris: Tennessee Valley Authority, Technical Note TVA/LR/NRM 92/1.

U.S. Forest Service. 1989a. Vegetation Management in the Coastal Plain/Piedmont Final Environmental Impact Statement, Volumes I and II. Southern Region Management Bulletin R8-MB-23, January 1989. Atlanta, Ga.: USDA Forest Service.

———. 1989b. Vegetation Management in the Appalachian Mountains Final Environmental Impact Statement, Volumes I and II. Southern Region Management Bulletin R8-MB-38, July 1989. Atlanta, Ga.: USDA Forest Service.

———. 2002a. Vegetation Management in the Appalachian Mountains Final Environmental Impact Statement Supplement. Southern Region Management Bulletin R8-MB-97A, October 2002. Atlanta, Ga.: USDA Forest Service.

———. 2002b. Vegetation Management in the Coastal Plain/Piedmont Final Environmental Impact Statement Supplement. Southern Region Management Bulletin R8-MB-98A, October 2002. Atlanta, Ga.: USDA Forest Service.

Appendix F – Environmental Quality Protection Specifications for Transmission Substation or Communications Construction

This page intentionally left blank

Tennessee Valley Authority Environmental Quality Protection Specifications for Transmission Substation or Communications Construction

1. General – Tennessee Valley Authority (TVA) and/or the assigned contractor and subcontractors shall plan, coordinate, and conduct his or her operations in a manner that protects the quality of the environment and complies with TVA's environmental expectations discussed in the preconstruction meeting (including clearing and grading or reclearing and removal or dismantling). This specification contains provisions that shall be considered in all TVA and contract construction, dismantling, or forensic operations. If the contractor and his or her subcontractors fail to operate within the intent of these requirements, TVA will direct changes to operating procedures. Continued violation will result in a work suspension until correction or remedial action is taken by the contractor. Penalties and contract termination will be used as appropriate. The costs of complying with the Environmental Quality Protection Specifications are incidental to the contract work, and no additional compensation will be allowed. At all site perimeters, structure, foundation, conduit, grounding, fence, drainage ways, etc., appropriate protective measures to prevent erosion or release of contaminants will be taken immediately upon the end of each step in a construction, dismantling, or forensic sequence, and those protective measures will be inspected and maintained throughout the construction and site stabilization and rehabilitation period.

2. Regulations - TVA and/or the assigned contractor and subcontractor(s) shall comply with all applicable federal, state, and local environmental and antipollution laws, regulations, and ordinances related to environmental protection and prevention, control, and abatement of all forms of pollution.

3. Use Areas - TVA and/or the assigned contractor and/or subcontractor(s) use areas include but are not limited to site office, shop, maintenance, parking, storage, staging, assembly areas, utility services, and access roads to the use areas. The construction contractor and subcontractor(s) shall submit plans and drawings for their location and development to the TVA engineer and project manager for approval. Secondary containment will be provided for fuel and petroleum product storage pursuant to 29CFR1910.106(D)(6)(iii)(OSHA).

4. Equipment - All major equipment and proposed methods of operation shall be subject to the approval of TVA. The use or operation of heavy equipment in areas outside the right-of-way, access routes, site, or structure, pole, or tower sites will not be permitted without permission of the TVA inspector or field engineer. Heavy equipment use on steep slopes (greater than 20 percent) and in wet areas will be held to the minimum necessary to construct the transmission or communication facility. Steps will be taken to limit ground disturbance caused by heavy equipment usage, and erosion and sediment controls will be instituted on disturbed areas in accordance with state requirements and best management practices (BMPs).

   No subsurface ground-disturbing equipment or stump-removal equipment will be used by construction forces except on access roads or at the actual site, structure, pole, or tower sites, where only footing locations and controlled runoff diversions shall be created that disturb the soil. All other areas of ground cover or in-place stumps and roots shall remain in place. (Note: Tracked vehicles disturb surface layer of the ground

due to size and function.) Some disking of the right-of-way, access, and site(s) may occur for proper seedbed preparation.

Unless ponding previously occurred (i.e., existing low-lying areas), water should not be allowed to pond on the site or around structures except around foundation holes; the water must be directed away from the site in as dispersed a manner as possible. At tower or structure sites, some means of upslope interruption of potential overland flow and diversion around the footings should be provided as the first step in construction-site preparation. If leveling is necessary, it must be implemented by means that provide for continuous gentle, controlled, overland flow or percolation. A good grass cover, straw, gravel, or other protection of the surface must be maintained. Steps taken to prevent increases in the moisture content of the in-situ soils will be beneficial both during construction and over the service life of any anchor, foundation, or its structure.

5. Sanitation - A designated TVA or contractor and/or subcontractor(s) representative shall contract a sanitary contractor who will provide sanitary chemical toilets convenient to all principal points of operation for every working party. The facilities shall comply with applicable federal, state, or local health laws and regulations. They shall not be located closer than 100 feet to any stream or tributary or to any wetland. The facilities shall be required to have proper servicing and maintenance, and the waste disposal contractor shall verify in writing that the waste disposal will be in state-approved facilities. Employees shall be notified of sanitation regulations and shall be required to use the toilet facilities.

6. Refuse Disposal - Designated TVA and/or contractor and subcontractor(s) personnel shall be responsible for daily inspection, cleanup, and proper labeling, storage, and disposal of all refuse and debris produced by his or her operations and by his or her employees. Suitable refuse collecting facilities will be required. Only state-approved disposal areas shall be used. Disposal containers such as dumpsters or roll-off containers shall be obtained from a proper waste disposal contractor. Solid, special, construction/demolition, and hazardous wastes as well as scrap are part of the potential refuse generated and must be properly managed with emphasis on reuse, recycle, or possible give away, as appropriate, before they are handled as wastes. Records of the amounts generated shall be provided to the site's or project's designated environmental specialist. Contractor(s) and subcontractor(s) must meet similar provisions on any project contracted by TVA. Final debris, refuse, product, and material removal is the responsibility of the contractor unless special written agreement is made with the ultimate TVA owner of the site.

7. Landscape Preservation - TVA and its contractor(s) and subcontractor(s) shall exercise care to preserve the natural landscape in the entire construction, dismantling, or forensic area as well as use areas, in or outside the right-of-way, and on or adjacent to access roads. Construction operations shall be conducted to prevent any unnecessary destruction, scarring, or defacing of the natural vegetation and surroundings in the vicinity of the work.

8. Sensitive Areas Preservation - Certain areas on site and along the access and/or right-of-way may be designated by the specifications or the TVA engineer as environmentally sensitive. These areas include but are not limited to areas classified as erodible, geologically sensitive, scenic, historical and archaeological, fish and wildlife refuges, endangered species' habitat, water supply watersheds, and public recreational areas

such as parks and monuments. Contractors, their subcontractor(s), and TVA construction crews shall take all necessary actions to avoid adverse impacts to these sensitive areas and their adjacent buffer zones. These actions may include suspension of work or change of operations during periods of rain or heavy public use; hours may be restricted or concentrations of noisy equipment may have to be dispersed. If prehistoric or historic artifacts or features are encountered during clearing, grading, borrow, fill, construction, dismantling, or forensic operations, the operations shall immediately cease for at least 100 feet in each direction, and TVA's construction superintendent, project manager, or area environmental program administrator and TVA Cultural Resources Program shall be notified. The site shall be left as found until a significance determination is made. Work may continue elsewhere beyond the 100-foot perimeter.

9. Water Quality Control - TVA and contractor construction, dismantling, or forensic activities shall be performed by methods that will prevent entrance or accidental spillage of solid matter, contaminants, debris, and other objectionable pollutants and wastes into flowing caves, sinkholes, streams, dry watercourses, lakes, ponds, and underground water sources.

   The clearing contractor erected erosion and/or sedimentation control shall be maintained and (when TVA or contract construction personnel are unable) the construction crew(s) shall maintain BMPs such as silt fences on steep slopes and adjacent to any stream, wetland, or other water body. Additional BMPs may be required for areas of disturbance created by construction activities and at sequential steps of construction at the same location on site. BMPs will be inspected by the TVA field engineer or other designated TVA or contractor and/or subcontractor(s) personnel routinely and during periods of high runoff, and any necessary repairs will be made as soon as practicable. BMP inspections and any required sampling will be conducted in accordance with permit requirements. Records of all inspections and sampling results will be maintained on site, and copies of inspection forms and sampling results will be forwarded to the TVA project manager or supporting environmental specialist.

   Acceptable measures for disposal of waste oil from vehicles and equipment shall be followed. No waste oil shall be disposed of within the site, access, or right-of-way, on a related construction site or its access roads.

10. Turbidity and Blocking of Streams - Construction, dismantling, or forensic activities in or near streamside management zones or other bodies of water shall be controlled to prevent the water turbidity from exceeding state or local water quality standards for that stream. **All conditions** of a general storm water permit, aquatic resource alteration permit, or a site-specific permit **shall be met** including monitoring of turbidity in receiving streams and/or storm water discharges and implementation of appropriate erosion and sediment control measures.

    Appropriate drainage facilities for temporary construction, dismantling, or forensic activities interrupting natural site drainage shall be provided to avoid erosion. Watercourses shall not be blocked or diverted unless required by the specifications or the TVA engineer. Diversions shall be made in accordance with TVA's *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities (Muncy, 2012).*

On rights-of-way, mechanized equipment shall not be operated in flowing or standing water bodies except when approved and, then, only to construct crossings or to perform required construction under direct guidance of TVA. Construction of stream fords or other crossings will only be permitted at approved locations and to current TVA construction access road standards. Material shall not be deposited in watercourses, their adjacent wetlands, or within stream bank areas where it could be washed away by high stream flows. Appropriate U.S. Army Corps of Engineers' and state permits shall be obtained.

Mechanized equipment shall not be operated in flowing or standing water on substation, switching station, or telecommunication sites.

Wastewater from construction, dismantling, or dewatering operations shall be controlled to prevent excessive erosion or turbidity in a stream, wetland, lake, pond or conveyed to a sinkhole. Any work or placing of equipment within a flowing or dry watercourse requires the prior approval of TVA.

11. Floodplain Evaluation - During the planning and design phase of the substation or communications facility, floodplain information should be obtained to avoid locating flood-damageable facilities in the 100-year floodplain. If the preferred site is located within a floodplain area, alternative sites must be evaluated and documentation prepared to support a determination of "no practicable alternative" to siting in the floodplain. In addition, steps taken to minimize adverse floodplain impacts should also be documented.

12. Clearing - No construction, dismantling, or forensic activities may clear additional site or right-of-way vegetation or disturb remaining retained vegetation, stumps, or regrowth at locations other than the structure, substation, or communication site or access thereto. TVA and the construction, dismantling, or forensic contractor(s) must provide appropriate erosion or sediment controls for areas they have disturbed after each disturbance that have previously been restabilized after clearing operations. Control measures shall be implemented as soon as practicable after disturbance in accordance with applicable federal, state, and/or local storm water regulations.

13. Restoration of Site - All construction, dismantling, or forensic-related disturbed areas with the exception of farmland under cultivation and any other areas as may be designated by TVA's specifications shall be stabilized in the following manner unless the property owner and TVA's engineer specify a different method:

    A. The subsoil shall be loosened to a minimum depth of 6 inches if possible and worked to remove unnatural ridges and depressions.

    B. If needed, appropriate soil amendments will be added.

    C. All disturbed areas will initially be seeded with a temporary ground cover such as winter wheat, rye, or millet, depending on the season. Perennials may also be planted during initial seeding if proper growing conditions exist. Final restoration and final seeding will be performed as line construction is completed. Final seeding will consist of permanent perennial grasses such as those outlined in TVA's *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities (Muncy 2012).*

Exceptions would include those areas designated as native grass planting areas. Initial and final restoration will be performed by the clearing contractor.

D. Rehabilitation species shall use species designated by federal guidance that are low–maintenance, native species appropriate for the site conditions that prevail at that location.

E. TVA holds the option, depending upon the time of year and weather condition, to delay or withdraw the requirement of seeding until more favorable planting conditions are certain. In the meantime, other stabilization techniques must be applied.

F. The site must be protected from species designated by the federal Invasive Species Council and must not be the source of species that can be transported to other locations via equipment contaminated with viable materials; thus, the equipment must be inspected, and any such species' material found must be removed and destroyed prior to transport to another location.

14. Air Quality Control - Construction, dismantling, and/or forensic crews shall take appropriate actions to minimize the amount of air pollution created by their operations. All operations must be conducted in a manner that avoids creating a nuisance and prevents damage to lands, crops, dwellings, or persons.

15. Burning - Before conducting any open burning operations, the contractor and subcontractor(s) shall obtain permits or provide notifications as required to state forestry offices and/or local fire departments. Burning operations must comply with the requirements of state and local air pollution control and fire authorities and will only be allowed in approved locations and during appropriate hours and weather conditions. If weather conditions such as wind direction or speed change rapidly, the contractor's burning operations may be temporarily stopped by the TVA field engineer. The debris for burning shall be piled and shall be kept as clean and as dry as possible, then burned in such a manner as to reduce smoke. No materials other than dry wood shall be open burned. The ash and debris shall be buried away from streams or other water sources and shall be in areas coordinated with the property owner on rights-of-way or project manager for TVA sites.

16. RENOVATION OR DEMOLITION DEBRIS MAY NOT BE BURNED.

17. Dust and Mud Control - Construction, dismantling, or forensic activities shall be conducted to minimize the creation of dust. This may require limitations as to types of equipment, allowable speeds, and routes utilized. Water, straw, wood chips, dust palliative, gravel, combinations of these, or similar control measures may be used subject to TVA's approval. On new construction sites and easements, the last 100 feet before an access road approaches a county road or highway shall be graveled to prevent transfer of mud onto the public road.

18. Vehicle Exhaust Emissions - TVA and/or the contractor(s) and subcontractor(s) shall maintain and operate equipment to limit vehicle exhaust emissions. Equipment and vehicles that show excessive emissions of exhaust gasses and particulates due to poor engine adjustments or other inefficient operating conditions shall not be operated until corrective repairs or adjustments are made.

19. Vehicle Servicing - Routine maintenance of personal vehicles will not be performed on the right-of-way or access route to the site. However, if emergency or “have to” situations arise, minimal/temporary maintenance to personal vehicles will occur in order to mobilize the vehicle to an off-site maintenance shop. Heavy equipment will be serviced on the site except adjacent to or in designated sensitive areas. The Heavy Equipment Department within TVA or the construction, dismantling, or forensic contractor will properly maintain these vehicles with approved spill protection controls and countermeasures. If emergency maintenance in a sensitive or questionable area arises, the area environmental coordinator or construction environmental engineer will be consulted. All wastes and used oils will be properly recovered, handled, and disposed/recycled. Records of amounts generated shall be provided to TVA. Equipment shall not be temporarily stored in stream floodplains whether overnight or on weekends or holidays.

20. Smoke and Odors - TVA and/or the contractor(s) and subcontractor(s) shall properly store and handle combustible material that could create objectionable smoke, odors, or fumes. The contractor and subcontractor(s) shall not burn refuse such as trash, rags, tires, plastics, or other debris.

21. Noise Control - TVA and/or the contractor and subcontractor(s) shall take measures to avoid the creation of noise levels that are considered nuisances, safety, or health hazards. Critical areas including but not limited to residential areas, parks, public use areas, and some ranching operations will require special considerations. TVA's criteria for determining corrective measures shall be determined by comparing the noise level of the construction, dismantling, or forensic operation to the background noise levels. In addition, especially noisy equipment such as helicopters, pile drivers, air hammers, chippers, chain saws, or areas for machine shops, staging, assembly, or blasting may require corrective actions when required by TVA.

22. Noise Suppression - All internal combustion engines shall be properly equipped with mufflers as required by the Department of Labor's *Safety and Health Regulations for Construction.* TVA may require spark arresters in addition to mufflers on some engines. Air compressors and other noisy equipment may require sound-reducing enclosures in some circumstances.

23. Damages - The movement of construction, dismantling, or forensic crews and equipment shall be conducted in a manner that causes as little intrusion and damage as possible to crops, orchards, woods, wetlands, and other property features and vegetation. The contractor and subcontractor(s) will be responsible for erosion damage caused by his or her actions and employees and, especially, for creating conditions that would threaten the stability of the right-of-way or site soil, the structures, or access to either. When property owners prefer the correction of ground cover condition or soil and subsoil problems themselves, the section of the project to be handled shall be documented with an implementation schedule and a property owner signature obtained.

24. Final Site Cleanup and Inspection - The contractor’s designated person shall ensure that all construction, dismantling, or forensic-related debris, products, materials, and wastes are properly handled, labeled as required, and removed from the site. Upon completion of those activities, that person and a TVA-designated person shall walk down the site and complete an approval inspection.

References

Muncy, J. A. 2012. A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities (revised edition). Edited by Abigail Bowen, Jodie Branum, Corey Chandler, Adam Dattilo, Britta Dimick, Shea Gaither, Casey Henley, Todd Liskey, Joe Melton, Cherie Minghini, Paul Pearman, Kenton Smithson, Joe Turk, Emily Willard, Robby Wilson. Norris: TVA Technical Note TVA/LR/NRM 92/1. Retrieved from <http://www.tva.com/power/projects/bmp_manual_2012.pdf> (n.d.).

Revision January 2013

This page intentionally left blank

Appendix G – List of Stream and Pond Crossings

This page intentionally left blank

Appendix G

Stream/Pond Crossings along the Proposed Union - Tupelo No 3 161-kV Transmission Line Route and Access Roads in Lee and Union Counties, Mississippi

Stream ID	Stream Type	Streamside Management Zone Category	Stream Name	Field Notes
001	Intermittent	Category A (50 feet)	Unnamed tributary to Sand Creek	Approximately 25-foot-wide x 5-foot-deep channel with sand substrate. Dry at time of survey.
002	Perennial	Category A (50 feet)	Sand Creek	Approximately 25-foot-wide x 20-foot-deep channel with sand/clay substrate. Beaver dam present.
003	Perennial	Category A (50 feet)	Brock Creek	Approximately 35-foot-wide channel with sand/ clay substrate. 1 crayfish collected.
004	Other	Category A (50 feet)	-	Sewage disposal pond. Aquatic life observed in pond.
005	Other	Category A (50 feet)	-	Sewage disposal pond. Aquatic life observed in pond.
006	Other	Category A (50 feet)	-	Sewage disposal pond. Aquatic life observed in pond.
007	Perennial	Category A (50 feet)	Sand Creek	15-foot-wide x 15-foot-deep channel with sand substrate.
008	Perennial	Category A (50 feet)	Sand Creek	15-foot-wide x 15-foot-deep channel with sand substrate
009	Perennial	Category A (50 feet)	Unnamed tributary to Sand Creek	3-foot-wide x 4-foot-deep channel with sand substrate
010	Perennial	Category A (50 feet)	Unnamed tributary to Sand Creek	3-foot-wide x 3-foot-deep channel with sand substrate. Vehicle crossing present.
011	Perennial	Category A (50 feet)	Sand Creek	5-foot-wide x 12-foot-deep channel with sand substrate
012	Intermittent	Category A (50 feet)	Unnamed tributary to Sand Creek	NA
013	Intermittent	Category A (50 feet)	Unnamed tributary to Sand Creek	3-foot-wide x 3-foot-deep channel with sand substrate. Channel breaks down at edge of ROW.
014	Intermittent	Category A (50 feet)	Unnamed tributary to Sand Creek	2-foot-wide x 2-foot-deep channel with sand substrate. Dry at time of survey.
015	Intermittent	Category A (50 feet)	Unnamed tributary to Euclautubba Creek	3-foot-wide x 2-foot-deep channel with sand substrate. Dry at time of survey.
016	Intermittent	Category A (50 feet)	Unnamed tributary to Euclautubba Creek	3-foot-wide x 2-foot-deep channel with sand substrate. Dry at time of survey.

Stream ID	Stream Type	Streamside Management Zone Category	Stream Name	Field Notes
017	Perennial	Category A (50 feet)	Unnamed tributary to Euclautubba Creek	NA
018	Perennial	Category A (50 feet)	Unnamed tributary to Euclautubba Creek	12-foot-wide x 10-foot-deep channel with clay substrate. Fish observed.
019	Other	Category A (50 feet)	-	Pond
020	Intermittent	Category A (50 feet)	Unnamed tributary to Euclautubba Creek	NA
021	Perennial	Category A (50 feet)	Euclautubba Creek	NA
022	Other	Category A (50 feet)	-	Pond
023	Intermittent	Category A (50 feet)	Unnamed tributary to Flat Creek	8-foot-wide x 10-foot-deep channel
024	Perennial	Category A (50 feet)	Flat Creek	8-foot-wide x 10-foot-deep channel
025	Perennial	Category A (50 feet)	Tishomingo Creek	30-foot-wide x 20-foot-deep channel
026	Other	Category A (50 feet)	-	Pond
027	Intermittent	Category A (50 feet)	Unnamed tributary to Camp Creek	3-foot-wide x 3-foot-deep channel with clay substrate. Dry at time of survey.
028	Other	Category A (50 feet)	-	Pond
029	Perennial	Category A (50 feet)	Camp Creek	40-foot-wide channel with sand substrate. Fish and Asian clam observed.
030	Intermittent	Category A (50 feet)	Unnamed tributary to Camp Creek	6-foot-wide x 3-foot-deep channel with sand substrate. Dry at time of survey.
031	Perennial	Category A (50 feet)	Unnamed tributary to Camp Creek	Approximately 50-foot-wide channel with sand substrate. Flowing at time of survey.
032	Intermittent	Category A (50 feet)	Unnamed tributary to Bridge Creek	Approximately 12-foot-wide x 6-foot-deep channel with clay substrate. Dry at time of survey.
033	Intermittent	Category A (50 feet)	Unnamed tributary to Bridge Creek	Approximately 30-foot-wide x 10-foot-deep channel with clay substrate. Dry at time of survey.

Stream ID	Stream Type	Streamside Management Zone Category	Stream Name	Field Notes
034	Perennial	Category A (50 feet)	Bridge Creek	Approximately 50-foot-wide channel with sand substrate. Flowing at time of survey.
035	Perennial	Category A (50 feet)	Brown Creek	Approximately 120-foot-wide channel with sand substrate
036	Intermittent	Category A (50 feet)	Unnamed tributary to Brown Creek	Approximately 90-foot-wide channel with sand substrate
037	Perennial	Category A (50 feet)	Unnamed tributary to Brown Creek	Deep channel with sand substrate. Water flowing in this reach.
038	Perennial	Category A (50 feet)	Unnamed tributary to Wolf Creek	NA
039	Perennial	Category A (50 feet)	Wolf Creek	NA
040	Intermittent	Category A (50 feet)	Unnamed tributary to Wolf Creek	NA
001AR	Perennial	Category A (50 feet)	Brock Creek	Occurs adjacent to AR29 in agricultural field before entering SMZ003.

This page intentionally left blank

Appendix H – Common and Scientific Names of Species That Can Be Found Within the Lee and Union County Project Area

This page intentionally left blank

Appendix H – Common and Scientific Names of Species That Can Be Found Within the Lee and Union County Project Area

Animals

Common Name	Scientific Name
Acadian flycatcher	*Empidonax virescens*
American beaver	*Castor canadensis*
American redstart	*Septophaga ruticilla*
American toad	*Anaxyrus americanus*
Bachman's sparrow	*Peucaea aestivalis*
Barred owl	*Strix varia*
Big brown bat	*Eptesicus fuscus*
Black and white warbler	*Mniotilta varia*
Blue grosbeak	*Passerina caerulea*
Broad winged hawk	*Buteo platypterus*
Brown-headed cowbird	*Molothrus ater*
Brown thrasher	*Toxostoma rufum*
Chipping sparrow	*Spizella passerina*
Chorus frog	*Pseudacris* spp.
Common grackle	*Quiscalus quiscula*
Common yellowthroat	*Geothlypis trichas*
Corn snake	*Pantherophis guttatus*
Cotton mouse	*Peromyscus gossypinus*
Crayfish frog	*Lithobates areolatus*
Dickcissel	*Spiza americana*
Eastern box turtle	*Terrapene carolina carolina*
Eastern chipmunk	*Tamias striatus*
Eastern cottontail	*Sylvilagus floridanus*
Eastern gray squirrel	*Sciurus carolinensis*
Eastern harvest mouse	*Reithrodontomys humulis*
Eastern kingbird	*Tyrannus tyrannus*
Eastern meadowlark	*Stumella magna*
Eastern milk snake	*Lampropeltis triangulum triangulum*
Eastern red bat	*Lasiurus borealis*
Eastern slender glass lizard	*Ophisaurus attenuates longicaudus*
Eastern spadefoot toad	*Leptobrachium holbrookii*
Eastern spotted skunk	*Spirogale putorius*
Eastern wood-pewee	*Contopus virens*
Eastern woodrat	*Neotoma floridana*
Evening bat	*Nycticeius humeralis*
Field sparrow	*Spizella pusilla*
Fowler's toad	*Bufo fowleri*
Fox sparrow	*Passerella iliaca*
Golden-crowned kinglet	*Regulus satrapa*

Common Name	Scientific Name
Golden mouse	*Ochrotomys nuttalli*
Grasshopper sparrow	*Ammodramus savannarum*
Gray fox	*Urocyon cinereoargentus*
Gray rat snake	*Pantherophis spiloides*
Gray tree frog	*Hyla versicolor*
Green tree frog	*Hyla cinerea*
Hairy woodpecker	*Picoides villosus*
Hispid cotton rat	*Sigmodon hispidus*
Hoary bat	*Lasiurus cinereus*
Hooded warbler	*Setophaga citrina*
House finch	*Haemorhous mexicanus*
House sparrow	*Passer domesticus*
Indiana bat	*Myotis sodalis*
Little brown bat	*Myotis lucifugus*
Long-tailed weasel	*Mustela frenata*
Mud salamander	*Pseudotriton montanus diastictus*
Mississippi ringneck snake	*Diadophis punctatus stictogenys*
Mitchell's satyr butterfly	*Neonympha mitchelllii mitchellii*
Mole kingsnake	*Lampropeltis calligaster*
Narrowmouth toad	*Gastrophryne carolinensis*
Nine-banded armadillo	*Dasypus novemcinctus*
North American deer mouse	*Peromyscus maniculatus*
Northern cardinal	*Cardinalis cardinalis*
Northern cricket frog	*Acris crepitans*
Northern long-eared bat	*Myotis septentrionalis*
Northern parula	*Setophaga americana*
Pickerel frog	*Rana palustris*
Pileated woodpecker	*Dryocopus pileatus*
Pine warbler	*Setophaga pinus*
Prairie warbler	*Setophaga discolor*
Queen snake	*Regina septemvittata*
Raccoon	*Procyon lotor*
Rafinesque's big eared bat	*Corynorhinus rafinesquii*
Rayed creekshell	*Anodontoides radiatus*
Red-bellied woodpecker	*Melanerpes carolinus*
Red-headed woodpecker	*Melanerpes erythrocephalus*
Redshouldered hawk	*Buteo lineatus*
Red fox	*Vulpes vulpes*
Ribbon snake	*Thamnophis sauritus*
Rough fatmucket	*Lampsilis straminea straminea*
Rough green snake	*Opheodrys aestivus*
Ruby-crowned kinglet	*Regulus calendula*
Scarlet kingsnake	*Lampropeltis elapsoides*

Common Name	Scientific Name
Scarlet tanager	*Piranga olivacea*
Seminole bat	*Lasiurus seminolus*
Silver-haired bat	*Lasionycteris noctivagans*
Smooth earth snake	*Virginia valeriae*
Southern short-tailed shrew	*Blarina carolinensis*
Southeastern shrew	*Sorex longirostris*
Southern cricket frog	*Acris gryllus*
Spiny softshell turtle	*Apalone spinifera*
Spotfin shiner	*Cyprinella spiloptera*
Steelcolor shiner	*Cyprinella whipplei*
Striped skunk	*Mephitis mephitis*
Summer tanager	*Piranga rubra*
Tombigbee riverlet crayfish	*Hobbseus petilus*
Tricolored bat (eastern pipestrelle)	*Perimyotis subflavus*
Virginia opossum	*Didelphis marsupialis*
Water snake	*Nerodia* spp.
White-footed mouse	*Peromyscus leucopus*
White-tailed deer	*Odocoileus virginianus*
Woodland vole	*Microtus pinetorum*
Worm-eating warbler	*Helmitheros vermivorum*
Yellow-throated warbler	*Setophaga dominica*

Plants

Common Name	Scientific Name
American bladdernut	*Staphylea trifolia*
American buckwheat vine	*Brunnichia ovata*
American elm	*Ulmus americana*
American ginseng	*Panax quinquefolius*
American potato bean	*Apios americana*
American sycamore	*Platanus occidentalis*
Anise-scented goldenrod	*Solidago odora*
Bamboo	*Arundinaria gigantea*
Beaksedge	*Rhyncospora* spp.
Beauty-berry	*Callicarpa americana*
Bermudagrass	*Cynodon dactylon*
Black walnut	*Juglans nigra*
Black willow	*Salix nigra*
Boneset	*Eupatorium perfoliatum*
Box elder	*Acer negundo*
Brazilian vervain	*Verbena brasiliensis*
Butternut	*Juglans cinerea*
Cattail	*Typha latifolia*

Common Name	Scientific Name
Cherokee sedge	*Carex cherokeensis*
Cherrybark oak	*Quercus pagoda*
Clover	*Trifolium* spp.
Corn	*Zea mays*
Cotton	*Gossypium hirsutum*
Dallisgrass	*Paspalum dilatatum*
Deer-tongued grass	*Dicanthelium clandestinum*
Durand oak	*Quercus durandii*
Eastern cottonwood	*Populus deltoides*
Eastern gamagrass	*Tripsacum dactyloides*
Eastern purple coneflower	*Echinacea purpurea*
Eastern redcedar	*Juniperus virginiana*
English plantain	*Plantago lanceolata*
False aloe	*Manfreda virginica*
False nettle	*Boehmeria cylindrica*
False nutsedge	*Cyperus strigosus*
Field crown grass	*Paspalum laeve*
Giant ironweed	*Veronia gigantea*
Giant plume grass	*Saccharum giganteum*
Green ash	*Fraxinus pennsylvanica*
Hairy sunflower	*Helianthus hirsutus*
Hemp vine	*Mikania scandens*
Hickory	*Carya* spp.
Illinois bundleflower	*Desmanthus illinoensis*
Johnsongrass	*Sorghum halepense*
Knotweed	*Polygonum* spp.
Large yellow lady's slipper	*Cypripedium parviflorum* var. *pubescens*
Little bluestem	*Schizachyrium scoparium*
Lizard's tail	*Saururus cernuus*
Loblolly pine	*Pinus taeda*
Maryland meadow beauty	*Rhexia mariana*
Meadow beauty	*Rhexia virginica*
Nepalese browntop	*Microstegium vimineum*
Osage orange	*Maclura pomifera*
Pale spike lobelia	*Lobelia spicata*
Panic grass	*Panicum rigidulum*
Pasture helioptrope	*Heliotropium tenellum*
Pathrush	*Juncus tenuis*
Persimmon	*Diospyros virginiana*

Common Name	Scientific Name
Pignut hickory	*Carya glabra*
Pine	*Pinus* spp.
Prairie rosinweed	*Silphium integrifolium*
Price's potato bean	*Apios priceana*
Purple prairie clover	*Dalea purpurea*
Queen Anne's lace	*Daucus carota*
Red maple	*Acer rubrum*
River birch	*Betula nigra*
Rosinweed sunflower	*Helianthus silphioides*
Roundseed St. Johnswort	*Hypericum sphaerocarpum*
Sedge	*Carex* spp.
Seedbox	*Ludwigia alternifolia*
Sericea lespedeza	*Lespedeza cuneata*
Shagbark hickory	*Carya ovata*
Sicklepod	*Arabis canadensis*
Silktree	*Albizia julibrissin*
Soft pathrush	*Juncus effusus*
Southern red oak	*Quercus falcata*
Soybean	*Glycine max*
Spiderwort	*Tradescantia virginiana*
Sugarberry	*Celtis laevigata*
Sweetgum	*Liquidambar styraciflua*
Tall fescue	*Festuca arundinacea*
Tulip poplar	*Liriodendron tulipifera*
Water oak	*Quercus nigra*
White grass	*Leersia virginiana*
White prairie clover	*Dalea candida*
White sweet clover	*Melilotus albus*
White oak	*Quercus alba*
Whorled rosinweed	*Silphium asteriscus*
Willow oak	*Quercus phellos*
Winged elm	*Ulmus alata*
Wool grass	*Scirpus cyperinus*
Yellow fringed orchid	*Platanthera ciliaris*

This page intentionally left blank

Appendix I – Noise During Transmission Line and Substation Construction and Operation

This page intentionally left blank

Noise During Transmission Line and Substation Construction and Operation

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

Both the U.S. Environmental Protection Agency (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 J-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 J-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 substation and a transmission line are described in Section 2.2. Maximum noise levels generated by the various pieces of

construction equipment typically range from about 70 to 85 dBA at 50 feet (Bolt et al. 1971). An exception would be the use of track drills for building roads and installing foundations in rocky areas; track drills have a typical maximum noise level of 98 dBA at 50 feet. Use of track drills is not expected to be widespread.

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

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

Operational Noise

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

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

Transformers at the substation would generally operate in self-cooled mode; although a few days a year during extreme temperatures, transformers would operate in fan-cooled mode. When fans are used, they would generate approximately 85 dB at 3 feet. This is not expected to be audible over background noise at nearby residences.

The substation would produce a loud impulse noise when a breaker is tripped due to excessive current, high voltage, low voltage, low frequency, or other less common problems. When such problems occur, the circuit breaker opens to disconnect part of the system, and the flow of current is interrupted. The noise from the breaker is expected to last 1/20 of a second and range from 96 to 105 dB at 50 feet. Breaker noise would be quite loud, although it is only expected to occur about 18 times each year. Breaker noise may be audible to nearby residents. However, because of the infrequent occurrence, it would not result in a significant impact.

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

Literature Cited

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

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

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