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WEST BATESVILLE–NORTH OAKLAND, MISSISSIPPI 161-KV TRANSMISSION LINE

FINAL ENVIRONMENTAL ASSESSMENT

Panola, Tallahatchie, and Yalobusha Counties, Mississippi

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ACRONYMS, ABBREVIATIONS, AND GLOSSARY OF TERMS USED

acre	A unit measure of land area equal to 43,560 square feet
access road	A dirt, gravel, or paved road that is either temporary or permanent, and is used to access the right-of-way and transmission line structures for construction, maintenance, or decommissioning activities
APE	Area of potential effect
BMP	Best management practice or accepted construction practice designed to reduce environmental effects
bus	A conductor, which may be a solid bar or pipe, normally made of aluminum or copper, used to connect one or more circuits to a common interface. An example would be the bus used to connect a substation transformer to the outgoing circuits.
CAA	Clean Air Act
circuit	A section of conductors (three conductors per circuit) capable of carrying electricity to various points
conductors	Cables that carry electrical current
CRP	Conservation Reserve Program
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
ephemeral stream	Watercourses or ditches that only have water flowing after a rain event; also called a wet-weather conveyance
ESA	Endangered Species Act
extant	In existence; still existing; not destroyed or lost
feller-buncher	A piece of heavy equipment that grasps a tree while cutting it, which can then lift the tree and place it in a suitable location for disposal; this equipment is used to prevent trees from falling into sensitive areas, such as a wetland
GIS	Geographic information system
groundwater	Water located beneath the ground surface in the soil pore spaces or in the pores and crevices of rock formations
guy	A cable connecting a structure to an anchor that helps support the structure

hydric soil	A soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop conditions of having no free oxygen available in the upper part
HUC	Hydrologic unit code
hydrophytic vegetation	Aquatic and wetland plants that have developed physiological adaptations allowing a greater tolerance to saturated soil conditions including with limited or absence of oxygen
IPaC	Information, planning, and assessment database (USFWS)
kV	Symbol for kilovolt (1 kV equals 1,000 volts)
load	That portion of the entire electric power in a network consumed within a given area; also synonymous with “demand” in a given area
MDAH	Mississippi Department of Archives and History
MDEQ	Mississippi Department of Environmental Quality
MOA	Memorandum of Agreement
MS	Mississippi State Highway
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
NESC	National Electric Safety Code
NHPA	National Historic Preservation Act
NPS	National Park Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
outage	An interruption of the electric power supply to a user
riparian	Related to or located on the banks of a river or stream
ROW	Right-of-way, a corridor containing a transmission line
runoff	That portion of total precipitation that eventually enters a stream or river
SHPO	State Historic Preservation Office
SMZ	Streamside management zone
SR	State Route
structure	A pole or tower that supports a transmission line
substation	A facility connected to a transmission line used to reduce voltage so that electric power may be delivered to a local power distributor or user
surface water	Water collecting on the ground or in a stream, river, lake, or wetland; it is naturally lost through evaporation and seepage into the groundwater
switch	A device used to complete or break an electrical connection
SWPPP	Storm Water Pollution Prevention Plan
threatened species	A species likely to become endangered within the foreseeable future
TL	Transmission line
TMDL	Total maximum daily load
TVA	Tennessee Valley Authority

TVARAM	TVA Rapid Assessment Method, a version of the Ohio Rapid Assessment Method for categorizing wetlands, designed specifically for the TVA region
TVEPA	Tallahatchie Valley Electric Power Association
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
wetland	A marsh, swamp, or other area of land where the soil near the surface is saturated or covered with water, especially one that forms a habitat for wildlife
WHO	World Health Organization
WMA	Wildlife management area
WWC	Wet-weather conveyance (see ephemeral stream)

CHAPTER 1

1.0 PURPOSE OF AND NEED FOR ACTION

1.1 Proposed Action – Improve Power Supply

The Tennessee Valley Authority (TVA) proposes to construct, operate, and maintain a new 161-kilovolt (kV) transmission line (TL) in an area of northern Mississippi served by Tallahatchie Valley Electric Power Association (TVEPA), a local power company and distributor of TVA power. The TL would extend from TVA's West Batesville 161-kV substation to TVA's North Oakland 230-kV substation (Figure 1-1). This new TL would also connect into a new West Charleston 161-kV substation that TVEPA is planning to build in Tallahatchie County. The total length of the proposed TL is approximately 41 miles.

The new 161-kV TL would be built using a combination of single and double steel poles centered on a new 100-foot-wide right-of-way (ROW). The new TL would consist of approximately 38 miles of single-circuit construction, and approximately 3 miles of double-circuit construction to facilitate the TL connection into the new West Charleston substation. The proposed project would require approximately 497 acres of new ROW.

Additionally, TVA would provide revenue metering equipment (including the revenue meters, current transformers, voltage transformers, test switches, transducers, wiring, etc.) to TVEPA for installation at its new West Charleston 161-kV substation. The TVA map board displays would be updated to reflect the new facilities. The scheduled in-service date for this project would be March 2020 or as soon as possible after that date.

1.2 Need for the Proposed Action

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

TVEPA's service area is located on the western edge of TVA's service territory in Mississippi and receives electrical power from TVA through an intermediary utility company. Continued growth in the region has required TVEPA to extend its distribution feeder further from its power source. TVEPA seeks improved reliability, shorter response time when an interruption occurs, and more flexible operating arrangements.

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

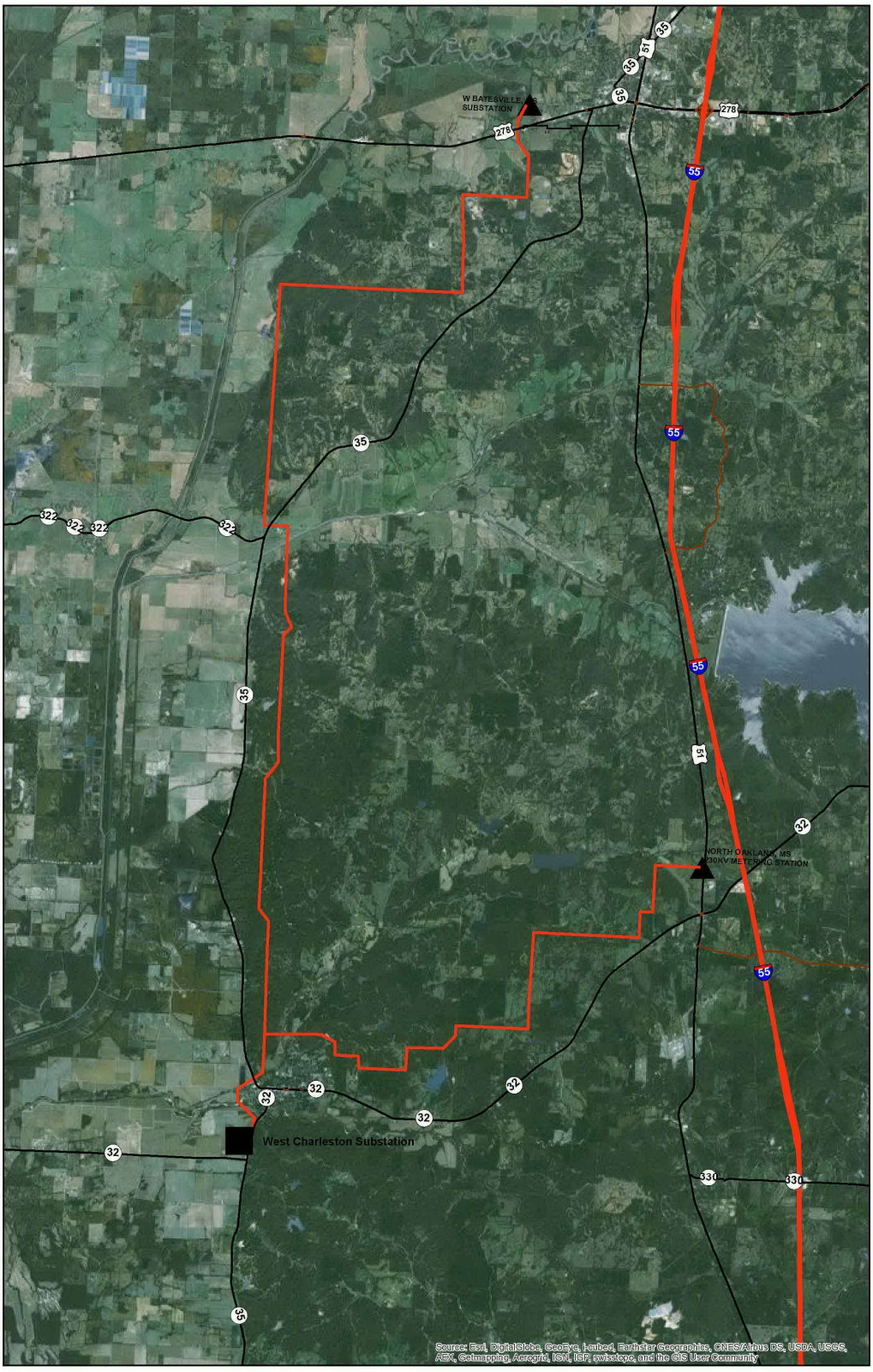

Figure 1-1 The Proposed West Batesville–North Oakland 161-kV Transmission Line Route

In order to address these needs, TVA proposes to improve its transmission system in the project area. To ensure that TVEPA is provided a continuous, reliable source of electric power for both current and future load growth, TVA needs to directly serve TVEPA rather than through an intermediary utility so that TVA can directly control the line's reliability. The construction of a new 29-mile TL to the new West Charleston 161-kV substation and continuing an additional 12 miles to TVA's North Oakland 161-kV substation would allow TVA to serve TVEPA directly with a more reliable power supply, thereby allowing TVA to meet NERC reliability criteria. Additionally, the proposed project would allow TVA to ensure the area is provided a strong, affordable source of power for continued economic health and residential and commercial growth.

1.3 Decisions to be Made

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

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

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

1.4 Related Environmental Reviews or Documentation

In 2015, TVA completed the Integrated Resource Plan (TVA 2015a) that provides a direction for how TVA will meet the long-term energy needs of the Tennessee Valley region. This document and the associated supplemental environmental impact statement evaluate scenarios that could unfold over the next 20 years. It discusses ways that TVA can meet future electricity demand economically while supporting TVA's equally important mandates for environmental stewardship and economic development across the valley. This report indicated that a diverse portfolio is the best way to deliver low-cost, reliable electricity. TVA released the accompanying Final Supplemental Environmental Impact Statement for TVA's Integrated Resource Plan in July 2015 (TVA 2015b) and its Record of Decision in October 2015 (80 FR 65282).

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:

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

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

TVA developed a public communication plan that included a website with information about the project, a map of the alternative routes, and numerous feedback mechanisms. To reduce drive times for attendees, TVA held two open houses. Property owners (approximately 570) potentially affected by, or near to, any of the route alternative segments and elected officials were invited to the open house. TVA used local news outlets and notices placed in local newspapers to notify other interested members of the public of the open houses. One open house was held in the City of Batesville, the northern portion of the study area, on July 28, 2014. Approximately 86 people attended this open house. The other open house was held in the City of Charleston, the southern portion of the study area, on July 29, 2014. Approximately 50 people attended this open house.

At the open houses, TVA presented maps with a network of alternative TL routes, comprised of 32 different line segments, to the public for comment (see Figure 1-2).

The interest of those who attended the open houses pertained to the effects of the proposed TL to the individual landowners, including impacts on development and/or property values, Conservation Reserve Program (CRP) conflicts, and lost timber revenue. Some individuals also expressed concern with impacts to pivot irrigation systems and future vegetation maintenance. Open house attendees voiced limited concerns relative to impacts of the proposed TL on natural resources.

A 30-day public review and comment period was held following the open houses, during which TVA accepted public comments on the alternative TL routes and other issues. A toll-free phone number and facsimile number were made available to facilitate comments. During the comment period, numerous 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 considered additional information and developed a preferred route. TVA announced the preferred route to the public in Spring 2016 (Figure 1-1). Letters were sent to affected property owners and information was provided to the public through TVA's website.

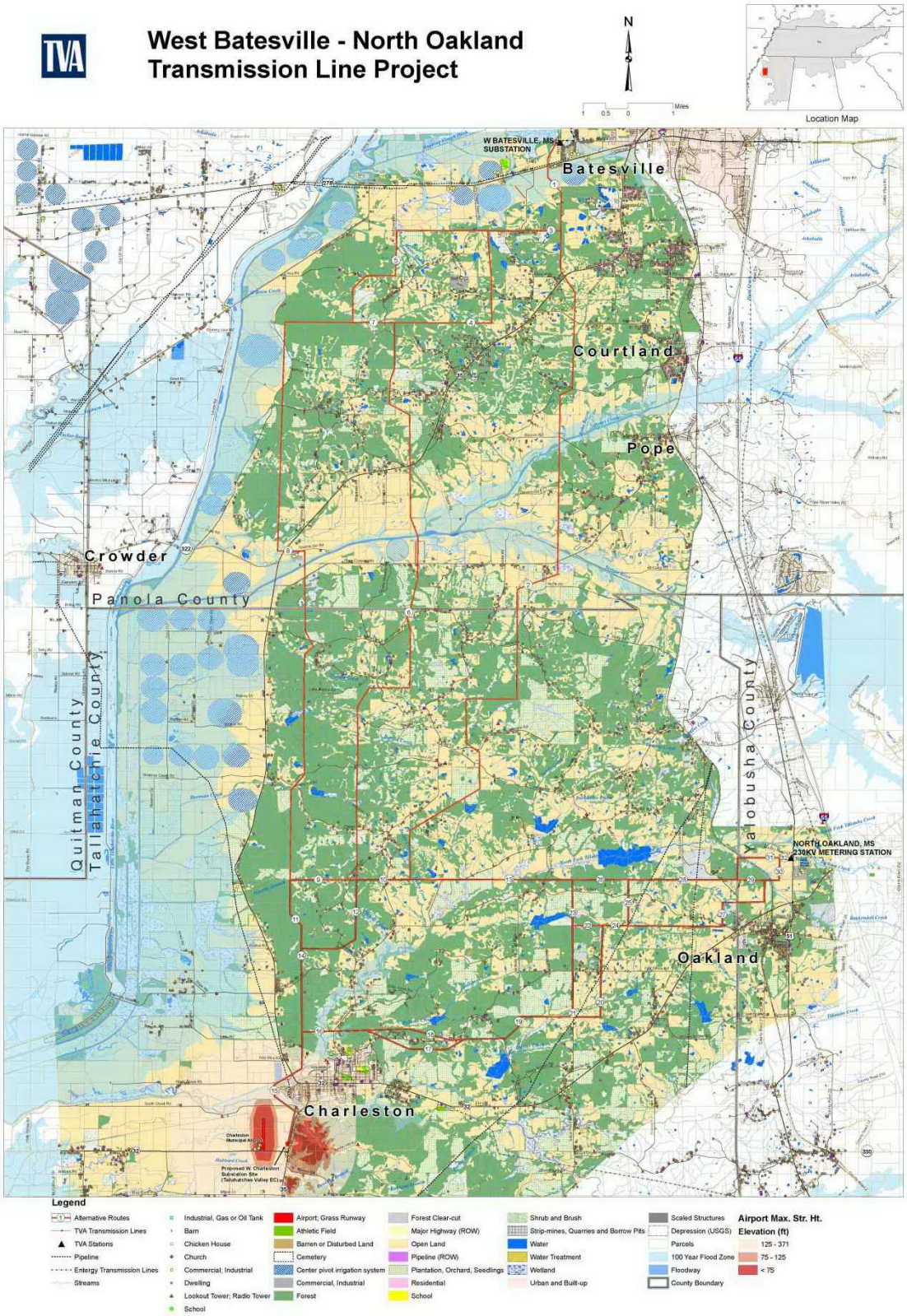

Figure 1-2 Alternative Routes for Proposed West Batesville to North Oakland 161-kV Transmission Line

1.6 Issues to be Addressed

TVA prepared this environmental assessment (EA) to comply with the National Environmental Policy Act (NEPA) and regulations promulgated by the Council of Environmental Quality and TVA to implement NEPA (TVA 1983). The EA investigates the construction, operation, and maintenance of a new TL, as well as the purchase of ROW for this purpose, or taking no action.

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

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

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

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

1.7 Necessary Federal Permits and Licenses

A permit would be required from the State of Mississippi and/or the local municipality for the discharge of construction site storm water associated with the construction of the TL. TVA would prepare the required erosion and sedimentation control plans and coordinate them with the appropriate state and local authorities. A permit may also be required if removed trees or other vegetation are disposed of through burning and for other combustible materials removed during construction of the proposed TL. A Section 401 Water Quality Certification would be obtained as required for physical alterations to waters of the State. A Section 404 nationwide permit would be obtained from the USACE if construction activities result in the discharge of dredge or fill into waters of the United States. A permit would be obtained from the Mississippi Department of Transportation for crossing state highways or federal interstates during TL construction. A general permit for application of pesticides, as part of construction or maintenance activities, would be obtained from MDEQ.

CHAPTER 2

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

As described in Chapter 1, TVA proposes to provide a power feed to TVEPA's new West Charleston 161-kV substation and TVA's North Oakland 161-kV substation. A description of the proposed action is provided below in Section 2.1.2. Additional background information about construction, operation, and maintenance of a TL is also provided and would be applicable regardless of the location of the proposed facilities.

This chapter has six major sections:

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

2.1 Alternatives

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

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

Under the No Action Alternative, TVA would continue to provide power to TVEPA through an intermediary utility, TVA would not construct the proposed TL, and TVEPA would not construct the proposed new substation. As a result, the TVEPA load in the Charleston service area would continue to have poor reliability and poor response times, and be operated in a manner not satisfactory to TVEPA. TVA's ability to continue to provide reliable service to address economic development and future residential and commercial growth in the area would be jeopardized, which would not support TVA's overall mission.

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

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

Under the Action Alternative, TVA proposes to build approximately 29 miles of 161-kV TL to power a new TVEPA 161-kV substation in Charleston, Mississippi, and an additional 12 miles of 161-kV TL to TVA's existing North Oakland 230-kV substation. TVA would provide

the standard revenue equipment for TVEPA to install in its new substation. The TVA map board display at TVA's System Operations Center and Regional Operations Center would be updated to reflect the new facilities. Temporary access roads would be required for construction and maintenance of the proposed TL.

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

2.1.3 Alternatives Considered but Eliminated from Further Discussion

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

Underground Utility Lines

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

Power lines can be buried. However, most buried TLs tend to be low-voltage distribution lines (lines that are 13-kV or less) rather than high-voltage TLs, which tend to be 69-kV and above. Although low-voltage distribution lines can be laid into trenches and buried without the need for special conduits, some TLs require armor casings for safety reasons. Burying higher voltage TLs requires extensive excavation, as these TLs must be encased in special conduits or tunnels.

Although buried TLs are much less susceptible to catastrophic storm damage, especially wind damage, they tend to be very expensive to install and maintain. Depending on the type of cable system used, special equipment or ventilation systems may be required to provide adequate cooling for the underground conductors. Similarly, special construction methods/equipment that are highly intrusive to the landscape must be used to protect the buried lines from flooding, which could cause an outage. High-voltage underground cables typically require the use of an underground vault that would require extensive excavation along the entire TL route for initial installation, and would also require excavation to make repairs in the event of a cable fault. Locating an electrical fault in a buried cable can be very time consuming, and is often exacerbated by the need to perform excavation to locate the damaged section. Usually, a road along or within the ROW for buried TLs must be maintained for routine inspection and maintenance. Roadways and water bodies also increase the difficulties of locating faults, since the cables would be buried under roadways and streams. The potential adverse environmental effects of constructing and operating a buried high-voltage TL would likely be greater overall than those associated with a traditional aboveground TL. In addition, the expense of a buried high-voltage TL would be prohibitive. For these reasons, burying the proposed TL is not a feasible option and this alternative was eliminated from further consideration.

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

2.2.1 Transmission Line Construction

Right-of-Way Acquisition and Clearing

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

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

Because of the need to maintain adequate clearance between tall vegetation and TL conductors, as well as to provide access for construction equipment, all trees and most shrubs would be removed from the entire width of the ROW. Equipment used during this ROW clearing would include chain saws, skidders, bulldozers, tractors, and/or low ground-pressure feller-bunchers[2]. Marketable timber would be salvaged where feasible; otherwise, woody debris and other vegetation would be piled and burned, chipped, or taken off site. In some instances, vegetation may be windrowed along the edge of the ROW to serve as sediment barriers.

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

TVA utilizes standard practices for ROW clearing and construction activities. These guidance and specification documents (listed below) are provided on TVA's transmission system projects web page and are taken into account when considering the effects of the proposed Action Alternative (TVA 2017a). TVA transmission projects also utilize best management practices (BMPs) to provide guidance for clearing and construction activities.

1. *TVA ROW Clearing Specifications*

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

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

3. *Transmission Construction Guidelines Near Streams*

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

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

The emission of criteria pollutants or their precursors would not exceed emission levels specified in 40 CFR § 93.153(b). Thus, consistent with Section 176(c) of the CAA, project activities would be in conformity with the requirements of Mississippi's state implementation plan for attaining air quality standards.

Following clearing and construction, an appropriate vegetative cover on the ROW would be restored. TVA would utilize appropriate seed mixtures as described in TVA's 2017 BMP manual or work with property owners with impacted cropland to ensure restoration supports or minimizes impacts to production. Erosion controls would remain in place until the plant communities become fully established. Streamside areas would be revegetated as described in the above documents. Failure to maintain adequate clearance can result in dangerous situations, including ground faults. As such, native vegetation or plants with favorable growth patterns (slow growth and low mature heights) would be maintained within the ROW following construction.

Access Roads

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

Culverts and other drainage devices, fences, and gates would be installed as necessary. Culverts installed in any perennial streams would be removed following construction. However, in ephemeral[3] streams, the culverts would be left or removed, depending on the wishes of the landowner or any permit conditions that might apply. If desired by the property owner, TVA would restore new temporary access roads to previous conditions. Additional applicable ROW clearing and environmental quality protection specifications are listed in *TVA ROW Clearing Specifications, Environmental Quality Protection Specifications for Transmission Line Construction* and *Transmission Construction Guidelines Near Streams* available on TVA's website (TVA 2017a).

Construction Assembly Areas

A construction assembly area (or "laydown" area) would be required for worker assembly, vehicle parking, and material storage. This area may be on existing substation property or may be leased from a private landowner for the duration of the construction period. The property is typically leased by TVA about a month before construction begins. Properties

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

such as existing parking lots or areas used previously as car lots are ideal laydown areas because site preparation is minimal. Selection criteria used for locating potential laydown areas include areas that are typically five acres in size; relatively flat; well drained; previously cleared; preferably graveled and fenced; preferably with wide access points with appropriate culverts; sufficiently distant from streams, wetlands, or sensitive environmental features; and located adjacent to an existing paved road near the TL. 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.

Structures and Conductors

Most of the proposed TL would utilize single steel-pole structures. However, the 3-mile section of the line north of the new proposed West Charleston substation would use double steel-pole structures. Examples of these structure types are shown in Figure 2-1. Structure heights would vary according to the terrain, but would range between 80 and 120 feet above ground.

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

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

Switch structures are necessary to periodically isolate sections of a TL for maintenance or in the event of an unplanned outage. A total of three 35-foot tall switch structures would be installed: one in the existing Batesville – West Batesville 161-kV TL ROW, and the other two within the proposed 100-foot-wide ROW outside of the West Batesville and North Oakland stations, respectively. These structures are similar to that shown in Figure 2-2.

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

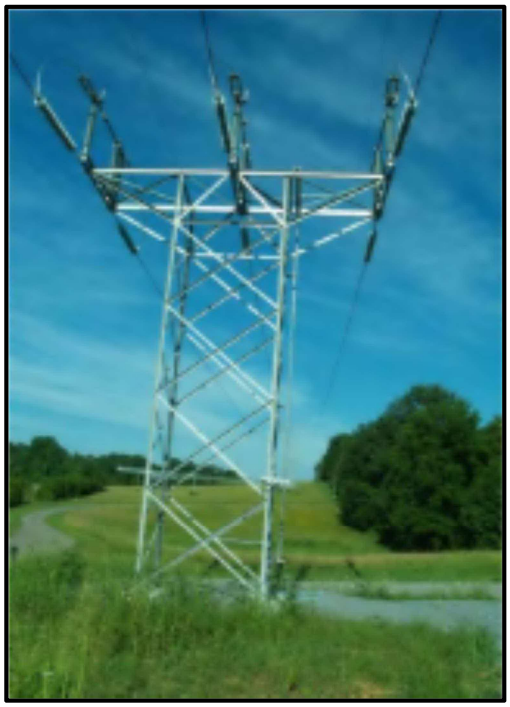

Figure 2-2 Typical Transmission Line Switch Structure

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

Conductor and Ground Wire Installation

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

2.2.2 Operation and Maintenance

Inspection

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

Vegetation Management

Management of vegetation along the ROW would be necessary to ensure access to structures and to maintain an adequate distance between TL conductors and vegetation. Adequate ground clearance is important to account for construction, design, and survey tolerances (e.g., conductor sagging). TVA uses more conservative distances than NESC requirements in order to ensure reliability. TVA uses a minimum ground clearance of 24 feet for a 161-kV TL at the maximum line operating temperature. Vegetation management along the ROW would consist of two different activities: felling danger trees adjacent to the cleared ROW (as described in Section 2.2.1.1), and controlling vegetation within the total width of the cleared ROW. These activities occur on approximately 3- to 5-year cycles.

After tall trees and other tall-growing vegetation are removed from the ROW during construction, routine management of vegetation within the cleared ROW is necessary and 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 TL 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.

Any herbicides used are applied in accordance with applicable state and federal laws and regulations. Only herbicides registered with the U.S. Environmental Protection Agency (USEPA) are used. A list of the herbicides currently used by TVA in ROW management is

presented in TVA's *Transmission Environmental Protection Procedures Right-Of-Way Vegetation Management Guidelines* (TVA 2017a). This list may change over time as new herbicides are developed or new information on presently approved herbicides becomes available.

Structure Replacement

Other than vegetation management within ROWs, only minor maintenance work is generally required as TL structures and other components (e.g., conductor, insulators, arms, etc.) typically last several decades. In the event that a structure needs to be replaced, the structure would normally be lifted out of the ground by crane-like equipment. The replacement structure would be inserted into the same hole or an adjacent hole. Access to the structures would be via existing roads. Replacement of structures may require leveling the area surrounding the replaced structures, but additional area disturbance would be minor compared to the initial installation of the structure.

2.3 Siting Process

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

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

2.3.1 Definition of the Study Area

The first task in defining the study area was to identify the power sources that could supply the planned substation. TVA's existing Batesville substation and North Oakland substation are located in the area and would provide reliable power sources for the new West Charleston substation.

The study area was determined primarily by the geographic boundaries of existing power system assets. The Batesville – West Batesville 161-kV TL bounds the northern section of the study area while the proposed West Charleston 161-kV substation and North Oakland 230-kV substation bounds the area to the south and east, respectively. The western portion of the study area is bounded physically by the Tallahatchie River and Panola/Quitman Floodway complex, which runs due north and south.

2.3.2 Description of the Study Area

The study area has a mix of flat and gently rolling terrain that is mostly forested. The forest is a combination of commercial (pine plantations) and noncommercial timber (hardwoods). There is little agricultural farmland east of Mississippi State Highway (MS) 35 due to the nature of the terrain, but what is there consists primarily of pasture used for cattle. Several first-order streams, which are streams with no tributaries, are within the study area: Tillatoba Creek, Bellamy Creek, Buntey Creek, Shelton Creek, and Sandy Creek. The

Mississippi Delta begins west of MS 35 and is represented by low-lying floodplain with an abundance of agriculture and pivot irrigation.

Three cities are located within the study area: Batesville to the north, Charleston to the southwest, and Oakland to the southeast. Residential homes and commercial structures are concentrated around the primary roadways (MS 35 and MS 32) with smaller roads branching off these main highways. A significant feature within the study area is the Charleston Municipal Airport, located just southwest of Charleston, Mississippi. The proposed West Charleston 161-kV substation is located just east of the airport. The proximity of the airport to the substation constrained potential TL routing due to airspace restrictions.

2.3.3 Data Collection

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

Additionally, TVA used aerial color orthophotography of the study area. These images were geo-referenced to produce an accurate image of the Earth by removing the distortions caused by camera tilt and topographic relief displacements, and then digitized for use in the GIS. This aerial photography was then interpreted to obtain land use and land cover data, such as forests, agriculture, pivot irrigation systems, wetlands, houses, barns, commercial and industrial buildings, churches, and cemeteries. An airspace model was developed for the Charleston Municipal Airport due to the close proximity of the West Charleston substation to the airport. The model results were used to determine TL height restrictions.

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

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

2.3.4 Establishment and Application of Siting Criteria

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

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

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

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

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

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

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

2.3.5 Development of General Route Segments and Potential Transmission Line Routes

As described in Section 2.3.3, the collected data were analyzed to develop possible TL route segments that would best meet the project needs while avoiding or reducing conflict with constraints.

Using the siting criteria identified in Section 2.3.4 and the identified termination points in Section 2.3.1, a total of 32 potential TL route segments were developed and presented at the open house (Figure 1-2). As a result of information received at the open house,

segments 29 and 30 were eliminated, and segment 32 was merged with segment 31 instead of being a stand-alone segment. There were 22 routes developed and evaluated from the 29 line segments for this TL project.

The straight-line distance from the TVA West Batesville substation to the planned TVEPA West Charleston substation site is about 21 miles. The straight-line distance from the TVEPA West Charleston substation site to the TVA North Oakland substation is about 12 miles. Those distances, along with the constraints listed above, limited the number of viable alternative corridors that could be identified and studied for the project.

Potential Transmission Line Corridors

As a result of the constraints mentioned in the previous section, 22 alternate TL routes were developed, consisting of a combination of 29 constituent segments (see Figure 1-2 and Table 2-1).

Table 2-1 Alternative Route Corridors with Constituent Segments

Transmission Line Corridor	Alternative Route	Constituent Segments
West Batesville – West Charleston	1	1,2,10,12,14,15
	2	1,2,9,10,11,14,15
	3	1,3,4,6,12,14,15
	4	1,3,4,6,9,11,14,15
	5*	1,3,4,7,8,11,14,15
	6	1,3,5,8,11,14,15
West Charleston – North Oakland	7	10,12,13,14,15,22,23,24,27,31
	8	10,12,13,14,15,25,26,27,31
	9	10,12,13,14,15,26,28,31
	10	15,16,17,19,20,24,25,28,31
	11*	15,16,17,19,20,24,27,31
	12	15,16,17,19,21,22,24,25,28,31
	13	15,16,17,19,21,22,24,27,31
	14	15,16,17,19,21,23,26,28,31
	15	15,16,18,19,20,24,25,28,31
	16	15,16,18,19,20,24,27,31
	17	15,16,18,19,21,22,24,25,28,31
	18	15,16,18,19,21,22,24,27,31
	19	15,16,18,19,21,23,26,28,31
	20	9,10,11,13,14,15,22,23,24,27,31
	21	9,10,11,13,14,15,25,26,27,31
	22	9,10,11,13,14,15,26,27,31

*Preferred transmission line routes.

2.4 Identification of the Preferred Transmission Line Route

Some of the considerations used in identifying and assessing alternative TL route locations were residential development, TL length, amount of existing ROW, road/highway crossings,

construction access, access to switches, airport flight zones, forest clearing, wetlands, sensitive stream and/or stream crossings, cultural resources, and number of parcel/property tracts.

The alternative TL segments were separated into two groups for analysis: the proposed West Batesville – West Charleston corridor, which runs primarily north to south; and the West Charleston – North Oakland corridor, which is oriented east to west. Line segments 1 through 15 represent the potential West Batesville – West Charleston TL alternatives, while line segments 9 thru 31 represent the potential West Charleston – North Oakland alternatives (Table 2-1). Route segments 9, 10, 11, 12, 14, and 15 are common to both alternative TL routes. Routes 1-6 were considered for the West Batesville – West Charleston portion of the line. Routes 7-22 were the alternatives for the West Charleston – North Oakland section of the line.

The West Batesville – West Charleston route had six alternatives for consideration. Routes 1 and 2 had pivot irrigation systems while the other routes did not. This information was obtained by TVA during the open house for the project. Pivot irrigation systems can cause engineering issues such as longer-than-normal spans and higher pole heights in order to avoid the systems. The TLs also cause operational issues with the farmers who are trying to irrigate their crops. Routes 1 and 2 also contained the highest number of acres in the CRP[4]. Taking a TL through these areas would impact the landowner's contract and conflicts with the CRP. Routes 1 and 2 also contained more acres of forested and non-forested wetlands than the other routes under consideration. Routes 1 through 4 had more stream crossings than routes 5 and 6. Routes 3 and 4 had a higher number of structures (dwellings, churches, barns) that would be impacted by the route than any of the other routes. Routes 5 and 6 were the best ranked routes with the fewest overall impacts. Route 6 had more road crossings, more impacts to structures, more forested wetlands, more acres of open water crossings, and more stream crossings in comparison to Route 5. Based on this information, Route 5 was selected as the preferred route consisting of line segments 1, 3, 4, 7, 8, 11, 14, and 15. The total length of Route 5 is approximately 28 miles.

The West Charleston – North Oakland portion of the line considered 16 route alternatives in order to determine the preferred route. Routes 10 and 15 had a high number of pipeline crossings that would have required additional costs if selected as the preferred route. Line segment 18 would have required the removal of a barn and was close to several other structures. Segment 18 also affected a greater amount of forestland in comparison to the preferred route (Route 11) and was eliminated from further consideration. Therefore, routes 15 through 19 were eliminated because they contained segment 18. Route 21 was the longest route and would therefore require additional materials and costs for design and construction. Route 22 had the most terrain constraints with a slope of over 30 percent. Route 20 contained the highest number of potential archaeological sites within 100 feet of the proposed centerline. Routes 10 and 11 were similar in that they both present the most direct paths with fewer angle structures; both routes received minimal public comments. Route 11 was identified as TVA's preferred route from West Charleston – North Oakland.

[4] The CRP is a land conservation program administered by the Farm Service Agency. In exchange for a yearly rental payment, farmers enrolled in the program agree to remove environmentally sensitive land from agricultural production and plant species that will improve the environmental health and quality. Contracts for land enrolled in CPR are 10 to 15 years in length. The long-term goal of the program is to re-establish valuable land cover to help improve water quality, prevent soil erosion, and reduce the loss of wildlife habitat.

Route 11 is made up of line segments 15, 16, 17, 19, 20, 24, 27, and 31. The total length of Route 11 is approximately 16 miles.

Routes 5 and 11 share a common ROW for approximately 3 miles. Therefore, the combined length of the two routes is approximately 41 miles from West Batesville to North Charleston.

In January 2015, TVA announced that the agency's preferred TL routes were Routes 5 and 11. Following this announcement, several adjustments were considered as a result of field surveys and additional public comment. The length of the proposed TL did not increase as a result of the route adjustments. These modifications are described below and reflected in Figure 1-1.

- A route adjustment was made to minimize impacts to a cattle-handling system and automated watering system, at owner's request. The adjustment also reduced the number of adjacent properties.
- A route adjustment was made to minimize impacts to a field identified as containing an eagle's nest. The adjustment remained on the same property.
- A route adjustment was made to increase the distance of the TL from a dwelling and a sinkhole.
- A route adjustment was made to increase the distance of the TL from a dwelling and remove from entrance of dwelling.
- During field surveys, a route adjustment was made to avoid an oak tree which appeared to be over 100 years old.

2.5 Comparison of Environmental Effects by Alternative

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

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

Resource Area	Impacts from Implementing the No Action Alternative	Impacts from Implementing the Action Alternative
Groundwater and Geology	No effects to local groundwater quality or quantity are expected.	Any direct or indirect short-term and long-term effects to groundwater quality or quantity are anticipated to be insignificant.
Surface Water	No changes in local surface water quality are anticipated.	Any effects to local surface waters would be minor, temporary, and insignificant.
Aquatic Ecology	Aquatic life in local streams would not be affected.	With the implementation of BMPs, effects to aquatic life in local surface waters are expected to be minor, temporary, and insignificant.

Resource Area	Impacts from Implementing the No Action Alternative	Impacts from Implementing the Action Alternative
Vegetation	Local vegetation would not be affected.	Site preparation and clearing of the proposed 161-kV TL ROW and substation would have a minor, temporary effect on most local vegetation. A direct long-term effect on approximately 315 acres of forested area is anticipated, but when compared to the substantial forest resources in the area, this impact is insignificant.
Wildlife	Local wildlife would not be affected.	Wildlife inhabiting onsite forest, early successional, and edge habitats along the proposed 161-kV TL ROW would be displaced. Because there are sufficient adjacent local habitats, any effects to wildlife are expected to be temporary and insignificant.
Endangered and Threatened Species	No effects to endangered or threatened species or any designated critical habitats are anticipated.	No impacts to federally listed aquatic species would occur. Impacts to the state-listed endangered southern redbelly dace would be minor and insignificant. No impacts to federally listed plant species would occur. There would be negative impacts to the state-listed sharp-scale sedge and yellowwood, but impacts would be insignificant. With implementation of mitigation measures, there would be no significant impacts to the longstyle sweet cicely. No impacts to the bald eagle or wood stork would occur. Tree clearing would remove 80.2 acres of potentially suitable summer roosting habitat for the federally threatened northern long-eared bat. To eliminate any potential for direct effects to northern long-eared bat, TVA would not clear the 80.2 acres of suitable summer roosting habitat between June 1 and July 31.
Floodplains	Local floodplain functions would not be affected.	With the implementation of standard mitigation measures, no significant impact on floodplains would occur.
Wetlands	No changes in local wetland extent or function are expected.	Although TVA was able to minimize potential wetland impacts through its routing process, TVA found no practicable alternative that avoids all wetlands. A total of 53 acres of wetlands are located within the proposed ROW, of which 8.1 are forested. Forested wetlands would be converted to emergent and/or scrub-shrub wetland habitat, thus reducing some wetland functions. With the implementation of identified minimization and mitigation measures, there would be insignificant direct, indirect, and cumulative impacts.

Resource Area	Impacts from Implementing the No Action Alternative	Impacts from Implementing the Action Alternative
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. Once built, the proposed TL would present a minor cumulative visual effect.
Archaeological and Historic Resources	No effects to archaeological or historic resources are anticipated.	With implementation of mitigation measures, no adverse impacts to four National Register of Historic Places (NRHP)–undetermined eligible archaeological sites would occur. For site 22TL1453, which cannot be avoided, TVA proposes to execute and implement a memorandum of agreement (MOA) with the Mississippi SHPO and with any of the consulted Indian tribes who agree to participate as a concurring party. The MOA will stipulate that TVA shall mitigate the adverse effect by completing a Phase III data recovery plan. TVA also finds that the proposed undertaking would have a visual effect on the sole NRHP-eligible architectural property located in the APE, 135-CHA-0011 (Old Masonic Cemetery). However, the effect would not be adverse due to modern development that has compromised the historic setting of the resource.
Recreation, Parks, and Natural Areas	No changes in local recreation opportunities or natural areas are expected.	There would be no impacts to natural areas as there are no natural areas within the proposed project footprint or within a mile of the project. Construction of the proposed TL and associated access roads could cause minor and insignificant recreation impacts.
Socioeconomics and Environmental Justice	Over time, the lack of reliable power service could have adverse economic effects to local businesses and residents.	There would be long-term beneficial impacts from ensuring the continued reliability of service that would benefit the area and help maintain economic stability and growth in the area. Any economic impacts would be minor and would diminish over time. The proposed TL is not expected to disproportionately affect any economically disadvantaged or minority populations.

2.6 Identification of Mitigation Measures

TVA employs standard practices when constructing, operating, and maintaining TLs, structures, and the associated ROW and access roads. These can be found on TVA's transmission website (TVA 2017a). Some of the more specific routine measures would be applied to reduce the potential for adverse environmental effects during the construction, operation, and maintenance of the proposed TL and access roads are as follows:

- TVA would utilize standard BMPs, as described in the BMP manual (TVA 2017b), to minimize erosion during construction, operation, and maintenance activities.

- To minimize the introduction and spread of invasive species in the ROW, access roads, and adjacent areas, TVA would follow standard operating procedures consistent with EO 13112 (Invasive Species) for revegetating with noninvasive plant species as defined in the BMP manual (TVA 2017b).

- Ephemeral streams that could be affected by the proposed construction would be protected by implementing standard BMPs as identified in the BMP manual (TVA 2017b).

- Perennial and intermittent streams would be protected by the implementation of standard stream protection (Category A), protection of important permanent steams, springs, and sinkholes (Category B), or protection of unique habitats (Category C) as defined in the BMP manual (TVA 2017b).

- TVA would utilize *Environmental Quality Protection Specifications for Transmission Substation or Communications Construction* during the proposed work at the Charleston 161-kV substation.

- To minimize adverse impacts on natural and beneficial floodplain values, the following standard mitigation measures would be implemented:

    - BMPs would be used during construction activities.

    - Construction would adhere to the TVA subclass review criteria for TL location in floodplains.

    - Construction or improvement of access roads would be done in such a manner that upstream flood elevations would not be increased.

- Pesticide/herbicide use as part of construction or maintenance activities would have to comply with the MDEQ general permit for application of pesticides, which also requires a pesticide discharge management plan. In areas requiring chemical treatment, only USEPA-registered and TVA-approved herbicides would be used in accordance with label directions designed in part to restrict applications near receiving waters and to prevent unacceptable aquatic impacts.

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

- To avoid potential impacts to the Mississippi state-listed plant longstyle sweet cicely in the ROW, TVA would implement the following mitigation measures.

    - The location of the longstyle sweet cicely would be included in TVA's sensitive area review database.

  - Construction personnel would consult with a TVA botanist before clearing and construction activities to coordinate avoidance measures and access in the portions of the ROW where longstyle sweet cicely occurs.

  - In areas where the species occurs, forest clearing would be conducted with a feller-buncher (or other similar piece of machinery) that can clear forest without intentionally disturbing the soil profile.

- To remove any potential for direct effects to the federally listed northern long-eared bat, any tree removal in the 80.2 acres of suitable summer roosting habitat for this species would occur between August 1 and May 31, outside of the roosting season.

- The proposed action would adversely affect NRHP-eligible archaeological site 22TL1453. TVA will enter into a Memorandum of Agreement (MOA) with the Mississippi state historic preservation officer, and with any of the consulted Indian tribes who agree to participate as a concurring party, for the resolution of the undertaking's adverse effect on site 22TL1453. The MOA will stipulate that TVA shall mitigate the adverse effect by completing a Phase III data recovery plan.
- For each NRHP undetermined or eligible site affected by access road use or vegetation clearing, TVA would implement the conditions below to avoid or minimize project impacts. TVA finds that with adherence to these conditions, the proposed action would not result in adverse effects to three newly recorded NRHP-undetermined archaeological sites 22TL1449, 22TL1455, and 22TL1458.

  - TVA would place a 10-meter sensitive buffer surrounding each of the three sites. Restrictions would be added to the design that must be followed by crews when they are working within 10 meters of any NRHP-eligible or NRHP-undetermined archaeological site. No transmission structures (poles or guy wires) will be installed within the sensitive area buffers. The buffers would be marked on all project drawings and work crews would be instructed to adhere to the appropriate restrictions.

  - TVA would restrict equipment use to the existing roads, restrict use of the roads to times when the ground is dry and firm, or require use of low ground pressure equipment, or wetland mats on access roads.

2.7 The Preferred Alternative

The Action Alternative—that TVA provides a new power supply to the Charleston service area—is TVA's preferred alternative for this proposed project. TVA would purchase ROW easements and any associated access road easements to accommodate the construction of a new 161-kV TL.

TVA's preferred alternative route for the Action Alternative is Alternative Routes 5 and 11. The approximate 28-mile route to the new TVEPA substation is comprised of alternative route segments 1, 3, 4, 6, 9, 11, 14, and 15. The 16-mile route to TVEPA's existing North Oakland substation is comprised of alternative route segments 15, 16, 17, 19, 20, 24, 27, and 31 (Figure 1-1).

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CHAPTER 3

3.0 AFFECTED ENVIRONMENT

The existing condition of environmental resources that could be affected by the proposed Action Alternative during construction, operation, or maintenance of the proposed 29-mile and 12-mile TLs are described in this chapter. The descriptions below of the potentially affected environment are based on field surveys conducted between December 2015 and April 2016, on published and unpublished reports, and on personal communications with resource experts. This information establishes the baseline conditions against which TVA decision-makers and the public can compare the potential effects of implementing the alternatives under consideration.

The analysis of potential effects to endangered and threatened species and their habitats included records of occurrence within a 3-mile radius for terrestrial animals, a 5-mile radius for plants, and an 8-digit hydrologic unit code[5] (HUC) watershed for aquatic animals. The analysis of potential effects to aquatic resources included the local watershed, but was focused on watercourses within or immediately adjacent to the proposed ROW and associated access roads. The area of potential effect (APE) for architectural resources included all areas within a 0.5-mile radius from the proposed TL route, as well as any areas where the project would alter existing topography or vegetation in view of a historic resource. The APE with respect to archaeological resources included the entire ROW width as described in Section 2.2.1.1 for the proposed route and the associated access roads.

3.1 Groundwater and Geology

The project area is located in the East Gulf Coastal Plain section of the Coastal Plain Physiographic Province. According to available mapping, the province is underlain by Cretaceous sedimentary rock which comprises units of the Middle Claiborne aquifer, a unit of the Mississippi embayment aquifer system. These units comprise the principle aquifer in the proposed project area and consist of an interbedded mix of fluvial sand and gravel, deltaic sand, silt and clay, and marginal marine sand, silt, and clay.

These rock units are not prone to the development of karst features. Aquifer recharge is by precipitation on recharge areas which are 100 to 400 feet higher in elevation than the flat-lying Mississippi alluvial plain. Wells completed in the aquifer system are capable of producing significant quantities of water (Renken 1998). As indicated by information supplied by the USEPA, groundwater is the primary source for the public water supply in the project area (USEPA 2016).

3.2 Surface Water

The project area drains to several streams within the Tallahatchie River, Yocona River, and Little Tallahatchie River watersheds (HUC-8: 08030202, 08030203 and 08030201). Precipitation in the general area of the proposed project averages about 56.8 inches per

[5] The U.S. is divided and subdivided to into hydrologic units by the USGS. There are six levels of classification. An 8-digit HUC is the fourth (subbasin) level of classification and the 10-digit HUC is the fifth (watershed) level of classification.

year. The average annual air temperature is 61.9 degrees Fahrenheit (USCD 2016). Stream flow varies with rainfall and averages about 21.1 inches of runoff per year; i.e., approximately 1.55 cubic feet per second, per square mile of drainage area (USGS 2008).

A total of 69 aquatic features, including 23 perennial streams, 34 intermittent streams, and 12 ponds were originally observed along the proposed TL route. The surface water streams in the vicinity of this project are listed below in Table 3-1.

The federal Clean Water Act requires all states to identify all waters where required pollution controls are not sufficient to attain or maintain applicable water quality standards and to establish priorities for the development of limits based on the severity of the pollution and the sensitivity of the established uses of those waters. States are required to submit reports to the USEPA. The term "303(d) list" refers to the list of impaired and threatened streams and water bodies identified by the state. Shelton Creek is listed on Mississippi's 303(d) list for impairment due to biological impairment of fish and wildlife resources. A total maximum daily load (TMDL) has not been developed for this impairment yet. Additionally, the Little Tallahatchie River and unnamed tributaries are also listed on the 303(d) list for pH and biological impairment to fish and wildlife resources; however, this impairment is not in the vicinity of the project (MDEQ 2016). The Yocona River is under a fish consumption advisory for the consumption of large-mouth bass and catfish due to elevated levels of mercury. Table 3-1 provides a listing of local streams with their state-designated uses (MDEQ 2010).

Table 3-1. Uses for Streams in the Vicinity of the Proposed West Batesville and North Oakland Transmission Line

Stream	Use Classification[1]				
	FW	REC	PWS	SH	ES
Little Tallahatchie River[2]	X	X			
Unnamed tributaries to Little Tallahatchie River	X				
Running Slough Ditch	X				
Running Slough	X				
Johnson Creek and unnamed tributaries	X				
O'Brien Creek and unnamed tributaries	X				
Yocona River	X				
Old Yocona River	X				
Unnamed tributaries of Yocona River	X				
Shelton Creek and unnamed tributaries	X				
Unnamed tributaries of Lake Martha[2]	X				
Sherman Creek and unnamed tributaries	X				
Murphy Branch					
North Fork Tillatoba Creek	X				
Bellamy Creek	X				
Hunter Creek and unnamed tributaries	X				
North Fork Tillatoba Creek and unnamed tributaries	X				

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

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

3.3 Aquatic Ecology

The proposed TL route crosses portions of the Tallahatchie River, Yocona River, and Little Tallahatchie River watersheds. Overall, a total of 218 watercourse intersections occur along the proposed TL route, access roads, and/or within the proposed ROW. These watercourses include 23 perennial streams, 34 intermittent streams, 149 ephemeral streams, and 12 ponds.

Because TL construction and maintenance activities mainly affect riparian conditions and instream habitat, TVA evaluated the condition of these factors at each stream crossing along the proposed TL route and proposed substation site. Riparian conditions were evaluated during December 2015 and April 2016 field surveys using the TVA habitat assessment form. A listing of stream crossings in the project area, excluding ephemeral streams, is provided in Appendix B. Additional information regarding watercourses in the vicinity of the project area can be found in Section 3.2.

Three classes were used to indicate the current condition of streamside vegetation across the length of the proposed TL and access roads, as defined below, and accounted for in Table 3-2.

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

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

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

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

Riparian Condition	Perennial Streams	Intermittent Streams	Total
Forested	15	27	42
Partially forested	2	6	8
Non-forested	6	1	7
Total	**23**	**34**	**57**

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

While pasture, cropland, and the city of Batesville occur in the region, woodland forests form most of the land cover associated with the streams identified along the proposed TL. While some channelization and removal of riparian areas has impacted streams along the proposed TL route, the majority of aquatic resources observed in the project vicinity appeared stable with intact riparian zones in forested areas. The primary impact to

watercourses in the project vicinity appeared to be logging operations and, in some instances, livestock access to stream channels.

3.4 Vegetation

The proposed upgrades to the TVA transmission system would occur in the Bluff Hills, Loess Plains, and Northern Pleistocene Valley Trains IV ecoregions (Chapman et al. 2004). About 65 percent of the project area occurs in the Bluff Hills, which is characterized by loess deposits often greater than 50 feet thick. The carved loess, a geologic deposit of wind-transported silt-sized quartz and other common minerals, has a mosaic of microenvironments, including dry slopes and ridges, ravines, bottomland areas, and small swamps. Species with more northern affinities occur far to the south in this ecoregion. White oak-hickory forest is the dominant natural vegetation type. About 30 percent of the proposed ROW is located within the Loess Plains, which are defined by gently rolling, irregular plains, between 250–500 feet in elevation. Portions of the Loess Plains were once highly productive agricultural areas; many locations are now pine plantation or have reverted to forest. The remaining 5 percent, found near the southern terminus of the ROW, is in the Northern Pleistocene Valley Trains. The Northern Pleistocene Valley Trains ecoregion is made up of Pleistocene glacial outwash deposits from the Mississippi and the Ohio rivers. Relief is extremely low and most of the original bottomland hardwood forest has been removed and replaced with row crops (Chapman et al. 2004).

Field surveys were conducted in December 2015 and March and April 2016 to document plant communities and any infestations of invasive plants, and to search for possible threatened and endangered plant species in areas where work would occur. All areas along the proposed ROW and substation were visited during the survey. Using the national vegetation classification system (Grossman et al. 1998), vegetation types observed during field surveys were classified as a combination of deciduous forest, evergreen forest, and herbaceous vegetation. No forested areas in the proposed project area had structural characteristics indicative of old growth forest stands (Leverett 1996). The plant communities observed onsite are common and well-represented throughout the region. Vegetation in the proposed TL ROW is characterized by two main types: forest (64 percent) and herbaceous (36 percent).

Deciduous forest, where deciduous trees account for more than 75 percent of the canopy cover, is the most common type of forest found along the proposed ROW and accounts for almost 57 percent of the total forest cover. The canopy is dominated by oaks (blackjack, post, scarlet, southern red, and white), hickory (mockernut and pignut), and the occasional loblolly pine and eastern red cedar. This forest type typically occurs on ridge tops and upper slopes and contains relatively few plants in the understory. Typical understory and herbaceous species include cat and saw greenbrier, Christmas fern, cranefly orchid, farkleberry, muscadine, Virginia creeper, wild comfrey, and winged elm. Mesic upland forest occurs on mid to lower slopes and supports a greater number of species. Common overstory trees in this forest type include American beech, American elm, black cherry, blackgum, hickory (mockernut and pignut), oak (cherrybark, northern red, water, and white), red maple, slippery elm, southern sugar maple, sweetgum, white ash, and yellow poplar, often with some component of loblolly and shortleaf pine. Common understory trees and shrubs include box elder, devil's walking stick, flowering dogwood, giant cane, hophornbeam, ironwood, oak leaf hydrangea, pawpaw, and red buckeye. The herbaceous layer was rich compared to dry deciduous forest and contained species like broad beech fern, Christmas fern, early blue violet, green dragon, jack in the pulpit, largeseed forget-me-

not, mayapple, poison ivy, slender woodrats, southern blackberry, Virginia snakeroot, and violet woodsorrel. The invasive plants Chinese privet and Japanese honeysuckle were common in this habitat type. In addition, all occurrences of the state-listed plants Allegheny spurge, longstyle sweet cicely, sharp-scale sedge, and yellowwood were located in this forest type.

Evergreen forest, which accounts for about 7 percent of total cover, has low species diversity and is dominated by loblolly pine in the overstory. Many of these stands were planted; therefore, canopy trees are approximately the same size, are regularly harvested to produce wood products, and bear little resemblance to native plant communities found in the region. Other evergreen forest stands are the result of land use. Here, loblolly pine was the first tree species to colonize a site after disturbance. While these stands were not planted, they are often similar in structure and species composition to their managed counterparts, with some examples having even more diversity. At least one of these forested areas encountered was burned recently.

Herbaceous vegetation, which accounts for about 36 percent of total cover, 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 recent clear-cuts account for the vast majority of herbaceous vegetation in the project area. Most of these sites are dominated by plants indicative of early successional habitats, including many non-native species. Early successional habitats with naturalized vegetation contain herbaceous species like beaked corn salad, black medick, blue grass, broomsedge, buttercup, crabgrass, crimson clover, dallisgrass, English plantain, fox sedge, goldenrod, kudzu, path rush, sericea lespedeza, tall fescue, and winter vetch. Areas of emergent wetlands were present in the project area. See Section 3.8 and Appendix C for species indicative of wetlands.

EO 13112 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 non-native species that invade natural areas, displace native species, and degrade ecological communities or ecosystem processes (Miller et al. 2010). During field surveys, non-native invasive plants were prevalent in both forest and herbaceous vegetation types. However, no federally listed noxious weeds were observed. Invasive species present across significant portions of the landscape include Chinese privet, Japanese honeysuckle, Japanese stilitgrass, kudzu, multiflora rose, and sericea lespedeza.

3.5 Wildlife

Wildlife habitat assessments were conducted in December 2015 and April 2016 for the proposed TL, associated ROW, and substation. The project area occupies approximately 496 acres. Landscape features within and surrounding the project area consist of a variety of forested habitat, wetlands, stream crossings, ponds, early successional habitat (i.e., pasture and agricultural), and residential or otherwise disturbed areas. Of the forested acreage in the project footprint, approximately 315 acres, including 80.2 acres of suitable bat habitat, would be cleared for the proposed TL and maintained as early successional habitat. Each of the varying community types offers suitable habitat for species common to the region, both seasonally and year-round.

Forest types present within the project footprint include mixed deciduous-evergreen, planted pine, and deciduous forests, the latter being the most common type of forest found along the proposed ROW. Mature mixed evergreen-deciduous forests contains a mixture of canopy species that includes eastern red cedar, loblolly pine, blackjack oak, hickories, post oak, southern red oak, and white oak. These forest types provide habitat for an array of terrestrial animal species. Birds typical of this habitat include Acadian flycatcher, chuck-will's-widow, downy and hairy woodpecker, eastern screech owl, eastern wood pewee, great horned owl, indigo bunting, red-breasted nuthatch, red-headed woodpecker, red-tailed hawk, summer tanager, wood thrush, wild turkey, and yellow-billed cuckoo (National Geographic 2002). This area also provides foraging and roosting habitat for several species of bat, particularly in areas where the forest understory is partially open. Bat species likely found within this habitat include big brown bat, eastern red bat, evening bat, silver-haired bat, and tricolored bat. Eastern chipmunk, eastern woodrat, gray fox, and woodland vole are other mammals likely to occur within this habitat (Kays and Wilson 2002). Speckled kingsnake, gray rat snake, Mississippi ringneck snake, and northern scarlet snake are common reptiles of eastern deciduous forests (Conant and Collins 1998, Dorcas and Gibbons 2005). In forests with aquatic features, amphibians likely found in the area include marbled, mole, Mississippi slimy, and spotted salamanders, eastern narrowmouth toad, eastern spadefoot toad, Fowler's toad, gray treefrog, and southern leopard frog (Conant and Collins 1998).

Evergreen forests, both natural and planted pine, comprise approximately 7 percent (35 acres) of the project footprint. These forests provide habitat for terrestrial wildlife such as barred owl, brown creeper, golden-crowned kinglet, hermit thrush, pine siskin, pine warbler, yellow-rumped warbler, and yellow-throated warbler (National Geographic 2002). White-footed deer mouse, eastern fox squirrel, Seminole bat, and wild boar are mammals that may utilize resources found in pine forests (Kays and Wilson 2002; Reid 2006). Eastern hognose snake and red corn snake are found in open pine forests in this region as well (Conant and Collins 1998, Dorcas and Gibbons 2005).

Both emergent and forested wetlands occur within and comprise approximately 63 percent (315 acres) of the project footprint. Such habitat provides resources for birds including killdeer, northern harrier, red-winged blackbird, song sparrow, swamp sparrow, and white-throated sparrow (National Geographic 2002). American beaver, golden mouse, muskrat, and nutria are common mammals in emergent wetland and aquatic communities. Eastern garter snake, midland brown snake, rough green snake, and timber rattlesnake are common reptiles likely present within this habitat along the proposed ROW (Dorcas and Gibbons 2005). Amphibians typical of this region found in and around emergent wetlands and open streams include American bullfrog, eastern red-spotted newt, bronze frog, spring peeper, and upland chorus frog (Conant and Collins 1998).

Pastures and agricultural fields comprise approximately 36 percent (181 acres) of the project footprint. Common inhabitants of this type of early successional habitat include brown-headed cowbird, brown thrasher, common yellowthroat, dickcissel, eastern bluebird, eastern kingbird, eastern meadowlark, field sparrow, and grasshopper sparrow (National Geographic 2002). Bobcat, coyote, eastern cottontail, hispid cotton rat, and red fox are mammals typical of fields and cultivated land (Kays and Wilson 2002). Reptiles, including northern copperhead, smooth earth snake, and southern black racer, are also known to occur in this habitat type (Dorcas and Gibbons 2005).

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

Review of the TVA Regional Natural Heritage database indicated that no caves occur within 3 miles of the project area, and no caves were observed within the project area during the field reviews. One barn in a state of disrepair was identified within the ROW for its potential use by summer roosting bats. No other unique or important terrestrial habitats were identified within the project area. Further, no aggregations of migratory birds or wading bird colonies have been documented within 3 miles of the project area and none were observed during field surveys.

3.6 Endangered and Threatened Species

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

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

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

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

Common Name	Scientific Name	Federal Status[2]	State Status[2]	State Rank[3]
Plants				
American Spikenard[4]	*Aralia racemosa*	-	SLNS	S1?
Sharp-scale Sedge[5]	*Carex oxylepis var. pubescens*	-	SLNS	S2S3
Climbing Bittersweet[4]	*Celastrus scandens*	-	SLNS	S2S3
Yellowwood[5]	*Cladrastis kentukea*	-	SLNS	S2
Red Iris[4]	*Iris fulva*	-	SLNS	S3
Pondberry[6]	*Lindera melissifolia*	END	SLNS	S2
Longstyle Sweet Cicely[5]	*Osmorhiza longistylis*	-	SLNS	S3
Allegheny Spurge[5]	*Pachysandra procumbens*	-	SLNS	S3
American Ginseng[4]	*Panax quinquefolius*	-	SLNS	S3
Bay Starvine[4]	*Schisandra glabra*	-	SLNS	S3?
Crayfish				
A Crayfish	*Orconectes hartfeildi*	-	TRKD	S2
Shutispear Crayfish	*Procambarus lylei*	-	TRKD	S2
Fishes				
Blue Sucker	*Cycleptus elongates*	-	TRKD	S3
Southern Redbelly Dace	*Chrosomus erythrogaster*	-	END	S2
Steelcolor Shiner	*Cyprinella whipplei*	-	TRKD	S3
Yazoo Darter	*Etheostoma raneyi*	-	TRKD	S2
Birds				
Wood Stork[7]	*Mycteria Americana*	PS:LT	END	S2N
Bald Eagle[8]	*Haliaeetus leucocephalus*	DM	-	S2B
Mammals				
Northern Long-eared Bat[7]	*Myotis septentrionalis*	LT	TRKD	S1

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

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

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

[4] Plant species previously reported from within 5 miles of ROW.

[5] Listed plant species observed in the proposed ROW.

[6] Plant species previously reported from Tallahatchie County.

[7] Federally threatened species whose known range includes Panola, Tallahatchie, and Yalobusha counties, Mississippi, but that has not yet been recorded in these counties.

[8] Federally listed species occurring within Panola County where work would occur, but not necessarily within 3 miles of the project area.

3.6.1 Aquatic Animals

A review of the TVA Regional Natural Heritage database indicated that one state-listed and one state-tracked (no legal status) species within a 10-mile radius of the proposed TL route have been reported (Table 3-3). Additionally, two crayfish and two fish that are tracked by the state heritage program occur within the Panola and Yalobusha counties. No federally listed aquatic species are known to occur within a 10-mile radius of the proposed TL route or within the counties in which the project occurs.

The state-listed endangered southern redbelly dace inhabits small streams with clear, cool waters and some areas of gravel substrate. It occurs in pools up to three feet deep and typically stays near the bottom feeding on invertebrates. Spawning occurs from April to July in gravel riffles (Etnier and Starnes 1993). The species has the potential to occur in the proposed project area.

3.6.2 Plants

A review of the TVA Regional Natural Heritage database indicated that seven state and no federally listed plant species have been previously reported within a 5-mile vicinity of the project area (Table 3-3). One federally listed plant species has been previously reported from Tallahatchie County; none has been reported from Panola or Yalobusha counties, Mississippi. In addition to the species previously reported from the vicinity of the project area, four state and no federally listed plants were observed in the proposed ROW during field surveys. No designated critical habitat for plants occurs in the project area.

One occurrence of the state-listed Allegheny spurge was observed in the proposed new ROW. This species has been previously reported from 21 counties in Mississippi (MMNS 2016). The population found contained about 100 plants.

Four occurrences of the state-listed plant longstyle sweet cicely were observed within the proposed new ROW. Longstyle sweet cicely has been previously reported from 17 counties in Mississippi (MMNS 2016). All of the plants observed were located wholly within the proposed ROW and most were flowering at the time of survey. One occurrence contained less than 10 plants, two contained 20-40 plants, and one contained about 200 individuals.

Hundreds of clumps of the state-listed sharp-scale sedge were observed in and near the proposed new ROW. This species has been previously reported from two counties in Mississippi (MMNS 2016). The species was a common component of mesic deciduous forest understory along several miles of proposed ROW. The plant was also common in adjacent forests outside of the proposed ROW.

One occurrence of the state-listed yellowwood was observed in the proposed new ROW. This species has been previously reported from 10 counties in Mississippi (MMNS 2016, SERNEC 2016). The small population found contained two mature trees, with one in flower.

3.6.3 Terrestrial Animals

The TVA Regional Natural Heritage database identified no state- or federally listed terrestrial animal record within 3 miles of the project area. One federally protected species (bald eagle) is known from Panola County. Additionally, the federally threatened northern long-eared bat and wood stork are thought by USFWS to have the potential to occur in

Panola, Tallahatchie and Yalobusha counties, although no records of their presence are known to date (Table 3-3).

Bald eagles are protected under the Bald and Golden Eagle Protection Act (USFWS 2013) and the Migratory Bird Treaty Act (16 United States Code §§ 703–712). This species is associated with larger mature trees capable of supporting its massive nests, which are usually found near larger waterways where the eagles forage (Natureserve 2016). The nearest bald eagle nesting record is 11 miles outside of the project footprint. No additional nests or individuals were observed during field surveys. Suitable bald eagle nesting and foraging habitat exists for this species within proximity to the Yocona River and other smaller creeks and tributaries within the project footprint.

Wood storks are highly colonial and require wetland habitat for nesting and foraging. They form large rookeries in upper parts of cypress trees, mangroves, or dead hardwoods over swamps, on islands, and along streams and shallow lakes. Wood storks breed in Florida, Georgia, South Carolina, and from Mexico to Argentina (Natureserve 2016). Wood storks feed on small fish, crayfish, reptiles, and amphibians in shallow fresh waterbodies and wetlands (Turcotte and Watts 1999). Although vagrant individuals are believed to occur statewide in Mississippi, no records are known from Panola, Tallahatchie or Yalobusha counties. Several wetlands that may provide suitable foraging habitat for wood storks were identified within the project footprint during field surveys.

The northern long-eared bat predominantly overwinters in large hibernacula, such as caves and abandoned mines, with high humidity and low air flow. During the fall and occasionally in spring, this species utilizes entrances of caves and surrounding forested areas for swarming (mating). In the summer, northern long-eared bats roost individually or in colonies beneath exfoliating bark or in crevices of both live and dead trees. They prefer mature forests with an open understory that is often near sources of water, switch roosts approximately every two days, and have a high site fidelity to summer roosting areas and winter hibernacula. Northern long-eared bats are thought to be opportunistic in roost site selection, roosting beneath the exfoliating bark and within cracks and crevices of both live and snag (dead) trees. This species is also known to roost in abandoned buildings and under bridges, though primary summer roosting sites appear to be trees. Northern long-eared bats emerge at dusk to forage below the canopy of mature forests on hillsides and roads, and occasionally over forest clearings and along riparian areas (USFWS 2014). The closest documented occurrence of northern long-eared bat is a historical hibernaculum record approximately 113.6 miles northeast of the project area in Tishomingo County, Mississippi. There are no documented caves within 3 miles of the project area. No caves were observed during field surveys. One derelict building suitable for use by roosting bats was observed during field surveys of the project footprint. Foraging habitat exists throughout the proposed project area in forest fragments and over streams, ponds, and wetlands. Suitable summer roosting habitat for northern long-eared bat exists within forested sections of the project area.

Assessment of the project area for presence of summer roosting habitat for the northern long-eared bat followed 2015 range-wide Indiana bat summer survey guidelines and resulted in the identification of 539 suitable roost trees scattered across 34 forest fragments, totaling 80.2 acres (USFWS 2014; USFWS 2015). Habitat quality ranged from moderate to high, based on the presence of trees with exfoliating bark (i.e., 520 white oaks, 5 shagbark hickories, one live cavity tree, and 13 dead trees) within the proposed ROW.

Suitable summer roosting areas were comprised of mature hardwood stands dominated by a mixture of blackjack oak, hickories, post oak, southern red oak, and white oak.

3.7 Floodplains

A floodplain is the relatively level land area along a stream or river that is subjected to periodic flooding. The area subject to a 1 percent chance of flooding in any given year is normally called the 100-year floodplain. It is necessary to evaluate development in the 100-year floodplain to ensure that the project is consistent with the requirements of EO 11988. The proposed TL route and access roads would cross several floodplain areas associated with streams (see Section 3.3) in Panola and Tallahatchie counties.

3.8 Wetlands

Wetlands are those areas inundated by surface or groundwater such that vegetation adapted to saturated soil conditions is prevalent. Examples include bottomland forests, swamps, marshes, wet meadows, and fringe wetlands along the edge of watercourses and impoundments. Wetlands provide many societal benefits including toxin absorption and sediment retention for improved water quality, storm water attenuation for flood control, shoreline buffering for erosion protection, and provision of fish and wildlife habitat for commercial, recreational, and conservation purposes. Field surveys were conducted in December 2015 and April 2016 to map wetland areas and delineate forested, scrub-shrub, and emergent wetland habitats potentially affected by the selected route under the proposed Action Alternative. Wetland determinations were performed according to the USACE standards, which require documentation of hydrophytic (wet-site) vegetation, hydric soil, and wetland hydrology (Environmental Laboratory 1987; Lichvar et al. 2016; USACE 2010; U.S. Department of Defense and USEPA 2003).

Using a TVA-developed modification of the Ohio Rapid Assessment Method (Mack 2001) specific to the TVA region (TVA Rapid Assessment Method or “TVARAM”), wetlands were evaluated by their functions and classified into three categories: low quality, moderate quality, and superior quality. Low quality wetlands are degraded aquatic resources which may exhibit low species diversity, minimal hydrologic input and connectivity, recent or ongoing disturbance regimes, and/or predominance of non-native species. These wetlands provide low functionality and are considered of low value. Moderate quality wetlands provide functions at a greater value due to a lesser degree of degradation and/or due to their habitat, landscape position, or hydrologic input. Moderate quality wetlands are considered healthy water resources of value. Disturbance to hydrology, substrate, and/or vegetation may be present to a degree at which valuable functional capacity is sustained and there is reasonable potential for restoration. Superior quality wetlands include those wetlands offering high functions and values within a watershed or are of regional/statewide concern. Superior quality wetlands may exhibit little, if any, recent disturbance, provide essential and/or large scale storm water storage, sediment retention, and toxin absorption, contain mature vegetation communities, and/or offer habitat to rare species. Conditions found in superior quality wetlands often represent restoration goals for wetlands functioning at a lower capacity.

The proposed TL route would traverse a rural landscape, dominated by plantations, forested uplands and bottomlands, pastureland, and sporadic agricultural fields. Based on mapped wetland resources (NWI, Soil Survey Geographic Database, TIGER Hydrography, USGS topography, land use-land cover data, canopy cover, etc.), potential forested wetland

area within the general region was estimated to cover approximately 17 percent of the landscape. The ROW crosses several watercourses (see Section 3.2) and their associated wetland features. Field surveys identified 53 wetland areas, totaling 15.19 acres, within the proposed TL ROW construction area and access roads (Table 3-4). Of this, forested wetland comprises 8.1 acres (1.6 percent of project footprint), scrub-shrub wetland comprises 2.12 acres (less than 1 percent of project footprint), and emergent wetland habitat comprises 4.97 acre (1 percent of project footprint). A detailed description of all wetlands identified during the surveys can be found in Appendix C.

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

Wetland Identifier	Wetland Type[1]	TVARAM[2] Existing Functional Capacity (Score)	Wetland Acreage within the Project Footprint	Impacted Wetland Acreage
W001	PFO1E	Moderate (39)	0.06	0.06
W002/ W001-AR07[3]	PEM1E	Low (28)	1.31 0.1	0 0 (temporary)
W003	PEM1E	Low (14.5)	0.1	0
W004	PEM1E	Moderate (32)	0.31	0
W005	PUB/PFO1H	Moderate (41)	0.1	0.1
W006	PFO1E	Moderate (55)	0.3	0.3
W007	PFO1E	Moderate (55)	0.77	0.77
W008	PSS1/PUBH	Low (27)	0.01	0
W009	PEM1E	Low (20)	1.03	0
W010	PSS1E	Moderate (35)	0.57	0
W011	PFO1E	Moderate (59)	1.03	1.03
W012	PSS1E	Low (22)	0.1	0
W013	PSS1E	Low (22)	0.28	0
W014a,b,c	PSS1/PUBH	Low (28)	0.19	0
W015	PSS1/PUBH	Low (27)	0.1	0
W016	PFO1E	Low (29)	0.04	0.04
W017/ W002a-AR36 W002b-AR36 W002c-AR36	PFO1E	Moderate (42)	0.08	0.08
	PEM/SS1/PFOE		0.4 0.08 0.02	0 (temporary)
W018	PFO1E	Moderate (43)	0.03	0.03
W019	PFO1E	Moderate (46)	0.5	0.5
W020	PFO1E	High (62)	0.16	0.16
W021a	PFO1E	High (83)	0.09	0.09
W021b	PFO1E		0.32	0.32
W021c	PEM/PSS1E		0.11	0
W021d	PEM/PSS1E		0.47	0
W021e	PFO1E		0.77	0.77
W022	PFO1E	Moderate (56)	0.04	0.04
W023/ W003-AR43	PFO1E	Moderate (56)	0.6	0.6
	PEM/PSS/PFO		0.22	0 (temporary)
W024	PFO1E	Low (17)	0.05	0.05
W025	PFO1E	Moderate (44.5)	0.12	0.12
W026	PFO1E	Moderate (43)	0.06	0.06
W027	PFO1E	Moderate (43)	0.08	0.08
W028	PFO1E	Moderate (43)	0.13	0.13

Wetland Identifier	Wetland Type[1]	TVARAM[2] Existing Functional Capacity (Score)	Wetland Acreage within the Project Footprint	Impacted Wetland Acreage
W029/ W004-AR62	PFO1E	Moderate (36)	0.45	0.45
	PEM1E		0.1	0 (temporary)
W030	PSS1	Low (25)	0.01	0
W005-AR67	PSS/PFO/PUB	Moderate (45.5)	0 (adjacent)	0
W031	PFO1E	Moderate (48)	0.15	0.15
W032a	PFO1E	Moderate (46)	0.03	0.03
W032b	PEM1E		0.01	0
W033	PEM1E	Moderate (36)	0.05	0
W034	PFO1E	Moderate (42)	0.13	0.13
W035	PFO1E	Moderate (45)	0.14	0.14
W036	PFO1E	Moderate (46)	0.08	0.08
W037a	PFO1E/H	Moderate (54)	0.54	0.54
W037b	PSS1E		0.23	0
W038	PEM1E	Low (18)	0.06	0
W039a	PFO1H	Moderate (36.5)	0.1	0.1
W039b	PEM1E		0.03	0
W040	PSS1E	Low (23)	0.03	0
W041	PFO1E	Moderate (37)	0.09	0.09
W042	PFO1E	Moderate (37)	0.06	0.06
W043	PFO1E	Moderate (42)	0.03	0.03
W044	PFO1E	Moderate (52)	0.38	0.38
W045	PFO1E	Moderate (38)	0.4	0.4
W046	PFO1E	Moderate (41)	0.11	0.11
W047	PEM1E	Low (26)	0.11	0
W048a	PFO1E	Moderate (37)	0.08	0.08
W048b	PEM1E		0.03	0
W049	PSS1E	Moderate (35)	0.27	0
W050	PSS1E	Low (27)	0.03	0
W051	PEM1E	Low (18)	0.05	0
W052	PEM1E	Low (14)	0.03	0
W053	PEM1E	Low (17)	0.65	0
		Total Acres	**15.19**	**8.1**

[1]Classification codes as defined in Cowardin et al. (1979): E = Seasonally flooded/saturated; H = Permanently flooded; PEM1 = Palustrine emergent, persistent vegetation; PFO1 = Palustrine forested, broadleaf deciduous vegetation; PSS1 = Palustrine, scrub-shrub, broadleaf deciduous vegetation; UB=unconsolidated bottom (pond).

[2]TVARAM = A TVA Rapid Assessment Method that categorizes wetland quality by their functions, sensitivity to disturbance, rarity, and ability to be replaced.

[3]AR = Access road #.

3.9 Aesthetics

3.9.1 Visual Resources

The physical, biological, and cultural features of an area combine to make the visual landscape character both identifiable and unique. Scenic integrity indicates the degree of unity or wholeness of the visual character. Scenic attractiveness is the evaluation of outstanding or unique natural features, scenic variety, seasonal change, and strategic

location. Where and how the landscape is viewed affects the more subjective perceptions of its aesthetic quality and sense of place. Views of a landscape are described in terms of what is seen in foreground, middle ground, and background distances.

In the foreground, defined as an area within 0.5 miles of the observer, details of objects are easily distinguished in the landscape. In the middle ground, normally between 0.5 and 4 miles from an observer, objects may be distinguishable, but their details are weak and they tend to merge into larger patterns. Details and colors of objects in the background, the distant part of the landscape, are not normally discernable unless they are especially large and standing alone. The impressions of an area's visual character can have a significant influence on how it is appreciated, protected, and used.

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

The proposed TL would travel through predominantly undeveloped areas of Panola, Tallahatchie, and Yalobusha counties in northwestern Mississippi for approximately 41 miles and would utilize new ROW for the proposed TL and would require the construction of a new substation. The 161-kV TL would travel through a mixture of pastures, agricultural fields, and partially forested lands with relatively flat topography throughout the entire project area. The proposed TL would be visible from three state highways in several locations, one U.S. highway, and various local roads along the route. The highest visibility of the proposed TL would likely occur along MS 35 and MS 32 due to heavier volumes of traffic and the location of the proposed TL along the road.

Certain facilities, such as churches, schools, and outdoor recreation sites can be vulnerable to visual modifications in the surrounding landscape. As shown in Figure 3-1, there are several churches, cemeteries, schools, and recreational facilities within the potential area of effect for visibility (0.5-mile radius). However, most facilities occur within the proposed TL's middle ground. The proposed TL would be less visible and obtrusive to the facilities located within the middle ground, as it would largely fall into an observer's view where objects are less distinguishable.

There are seven churches, eight cemeteries, two recreational sites, and one school located within the proposed TL's foreground. These facilities are dispersed along the corridor of the proposed TL and range in distance from 300 feet to 0.5 mile from the proposed ROW, as described in Table 3-5. The facilities closest to the proposed TL include West Camp Church, Jordan Hill Cemetery, Olvis Grove Church and Cemetery, and Paris Grove Church.

Table 3-5 Facilities with the Foreground of the Proposed Transmission Line and Substation

Facilities in Foreground (less than 0.5 mile)	Resource Location	Distance from Proposed Right-of-way (ROW)
West Camp Church	North of MS 6/US 278	Approximately 300 feet
North Delta Christian School	North of MS 6/US 278	Approximately 0.5 mile
North Delta Christian School Outdoor Sports Fields	North of MS 6/US 278	Approximately 0.5 mile
Independence Church	South of MS 35	Approximately 0.5 mile
Whitten Cemetery	North side of Whitten Road	Approximately 0.3 mile
Jackson Cemetery	North side of Bonner Road	Approximately 0.5 mile
Mount Zion Church	East side of MS 35	Approximately 0.4 mile
Bethlehem Church	East side of MS 35	Approximately 0.4 mile
City of Charleston Playground	East side of Railroad Street in the city of Charleston	Approximately 0.4 mile
Jordan Hill Cemetery	East of MS 35, just south of MS 32	Approximately 500 feet
Saint John Baptist Church	North of MS 32 in the city of Charleston	Approximately 0.4 mile
Saint Johns Cemetery	North side of Oak Grove Road	Approximately 0.4 mile
New Town Cemetery	South side of Oak Grove Road	Approximately 0.3 mile
Tallahatchie Country Club	North of MS 32 at Country Club Road	Approximately 0.2 mile
Womble Cemetery	North side of Oak Grove Road	Approximately 0.5 mile
Olvis Grove Church and Cemetery	North side of Pine Hill Road	Approximately 300 feet
Parrish Henderson Cemetery	West side of US 51	Approximately 0.2 mile
Paris Grove Church	West side of US 51	Approximately 300 feet

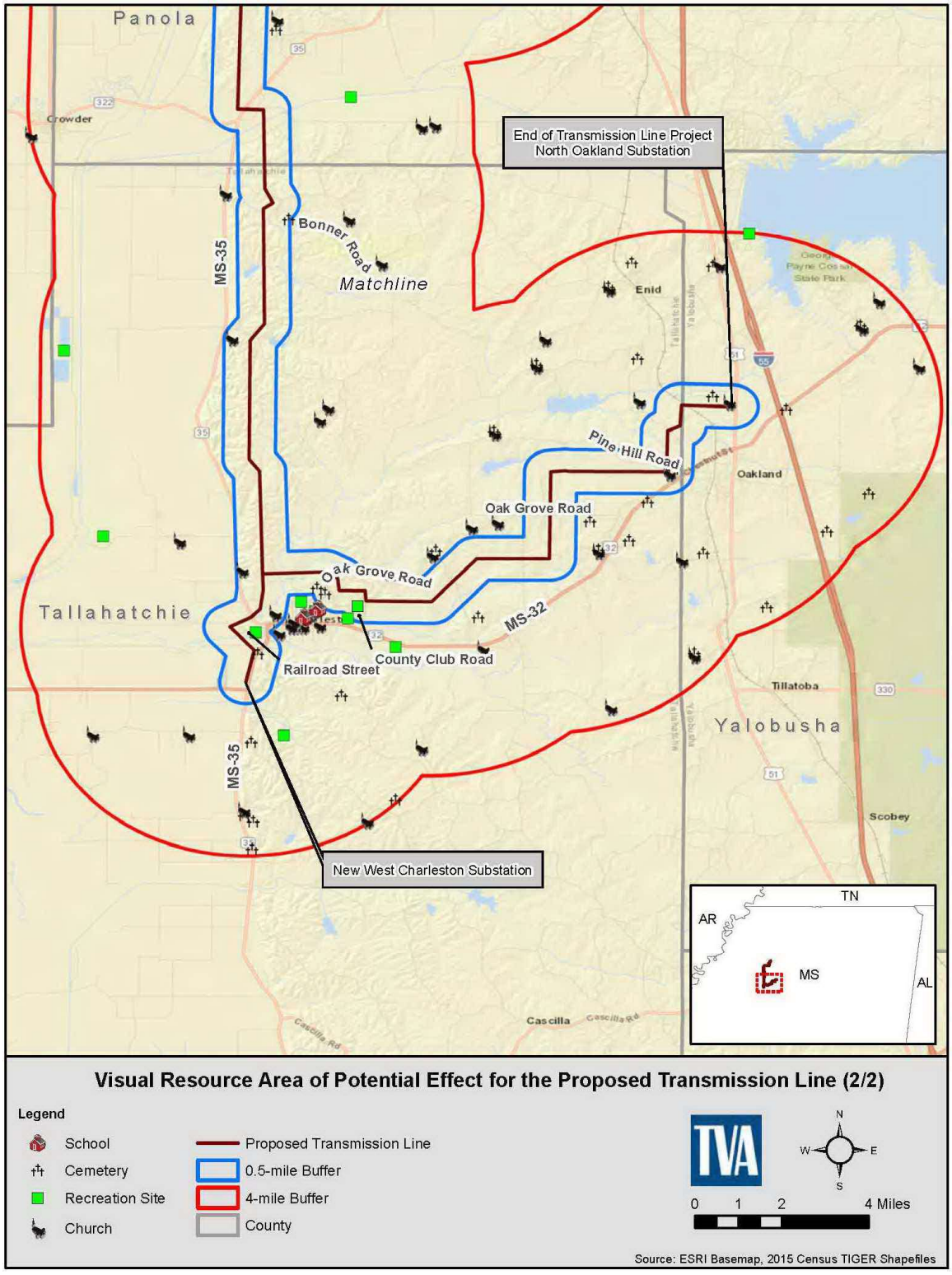

Figure 3-1 Visual Resources Area of Potential Effect for the Proposed Transmission Line

3.9.2 Noise and Odors

The Charleston Municipal Airport, located just southwest of Charleston, Mississippi, is a major source of noise along the proposed TL route. The proposed West Charleston substation is located just east of the airport. There is some traffic noise generated along MS 35 and MS 32, and from the City of Charleston, which are also in close proximity to the proposed TL route. The traffic and airport noise has become part of the ambient noise and thus is not noticeable.

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

3.10 Archaeological and Historic Resources

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

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

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

During the Section 106 process, the agency must consult with the Mississippi SHPO, federally recognized tribes that have an interest in the undertaking, and any other party with a vested interest in the undertaking. TVA is coordinating its Section 106 compliance with NEPA’s requirement to assess adverse impacts on cultural or historical resources.

TVA determined that the archaeological APE consists of the two proposed TL corridors totaling 41 miles with a 100-foot ROW, approximately 36 miles of access roads to be used during construction and maintenance, and six locations of approximately 12,000 square feet each in which guy wire anchors would be required outside, and adjacent to, the ROW. Laydown and staging areas would be located within the ROW. For historic architectural resources, the APE is defined as areas within a 0.5-mile radius surrounding the project centerline that would have a direct line of sight to the proposed new TL. Areas within the historic architectural resources survey radius that were determined not to be within view of the planned TL due to terrain, vegetation, and/or modern built environments were not considered part of the architectural APE.

TVA conducted three Phase I cultural resources surveys of the APE to identify any historic properties that may be impacted by the undertaking. The investigation included an archaeological survey and a survey for historic aboveground (architectural) resources.

Background research conducted prior to the surveys revealed that three previously recorded archaeological sites (22PA972, 22TL643, and 22TL648) are located within the APE. The surveys included an examination of these sites within the APE. No artifacts were recovered from 22PA972 or 22TL648 within the APE. Based on this result, TVA has determined that the portions of these two sites extending into the APE should not be considered as contributing to their NRHP eligibility. The surveys resulted in an expansion of the previously recorded boundary of 22TL643, and based on the content of the site, TVA proposes that the eligibility of this site for inclusion in the NRHP be considered "undetermined." Although the site may contain significant data pertaining to important archaeological research questions, the scope of the survey was insufficient to definitely determine whether the site does in fact contain such data.

In addition to the site revisits described above, the surveys also identified 52 previously unrecorded archaeological sites, two linear resources, and 14 isolated finds of archaeological material (small numbers of artifacts not meeting the state's definition of "archaeological site"). No archaeological sites were identified in the survey for the off-ROW guy wire anchor locations. Based on the data collected during the survey, TVA finds that eight of these sites (22PA1208, 22PA1231, 22TL1449, 22TL1453, 22TL1454, 22TL1455, 22TL1457, 22TL1458) have the potential to significantly contribute to research concerning the prehistory and/or history of the region and merit an NRHP eligibility status of undetermined. The remaining 44 newly recorded sites, two linear resources, and all 14 isolated finds lack the potential to significantly contribute to research concerning the prehistory and/or history of the region. TVA determined that these resources are ineligible for inclusion in the NRHP.

The survey of architectural resources located within the project APE was carried out between December 2015 and March 2016. The survey resulted in the identification of 51 previously undocumented architectural resources (designated IS-1 to IS-51). TVA has determined that all 51 of these resources are ineligible for inclusion in the NRHP due to a lack of architectural distinction and loss of integrity caused by modern alterations. The survey also included an examination of 10 previously recorded architectural resources located in the APE (107-BAT-0312, 107-BAT-5037, 107-BAT-5039, 107-BAT-5042, 107-BAT-5002, 135-CHA-004, 135-CHA-0011, 135-CHA-5006, 135-CHA-5007, and 161-OAK-6002). Based on the results of its survey, TVA determined that 135-CHA-0011 (Old Masonic Cemetery) is eligible for the NRHP under Criterion C for its architectural significance. With respect to the remaining previously recorded properties, architectural resource 135-CHA-5007 is extant, but located outside the viewshed to the project area due to rolling terrain combined with mature tree growth located between the resource and the project area. TVA determined that properties 107-BAT-0312, 107-BAT-5037, 107-BAT-5042, and 161-OAK-6002 are ineligible for the NRHP due to their lack of architectural distinction and/or loss of integrity resulting from modern alterations. Finally, the survey documented that previously recorded architectural resources 107-BAT-5039, 107-BAT-5002, 135-CHA-5006, and 135-CHA-004 have been destroyed since their initial recordation.

TVA has consulted with the Mississippi SHPO, Alabama Coushatta Tribe of Texas, Choctaw Nation of Oklahoma, Jena Band of Choctaw Indians, Mississippi Band of Choctaw, and the Chickasaw Nation concerning these determinations, pursuant to 36 CFR § 800.4. The SHPO agreed with TVA's eligibility determinations concerning all identified resources. TVA received a written response from the Choctaw Nation, which expressed disagreement with TVA's determination that the portions of sites 22PA1239, 22PA1241,

and 22PA1244-1248 in the ROW are ineligible, because NHPA "does not provide guidance on partial eligibility determinations." The SHPO and tribal comments on TVA's finding that the off-ROW guy wire anchor locations contain no NRHP-eligible archaeological sites are pending.

TVA conducted Phase II testing investigations at five of the eight archaeological sites with undetermined NRHP eligibility (22PA1208, 22PA1231, 22TL1453, 22TL1454, and 22TL1457). The purpose of the Phase II testing was to furnish sufficient data for a full determination of eligibility for each of the five sites. Based on these investigations, TVA determined that sites 22PA1208, 22PA1231, 22TL1454, and 22TL1457 are ineligible for the NRHP, and site 22TL1453 is eligible. The Mississippi SHPO responded by agreeing with all these determinations (Appendix A). No consulted tribe objected to TVA's determinations of eligibility for these five sites. Therefore, based on TVA's cultural resources surveys, Phase II investigations, and Section 106 consultation, the APE contains one NRHP-eligible aboveground resource (135-CHA-0011, Old Masonic Cemetery) and one NRHP-eligible archaeological site (22TL1453).

3.11 Recreation, Parks, and Natural Areas

This section describes recreational opportunities and natural areas near the proposed TL, ROW, and access roads. Natural areas include ecologically significant sites; federal, state, or local park lands; national or state forests; wilderness areas; scenic areas; wildlife management areas (WMAs); recreational areas; greenways; trails; Nationwide Rivers Inventory streams; and Wild and Scenic Rivers.

A review of data from the TVA Natural Heritage Project database indicated there are no natural areas within the proposed project area. There are two natural areas within 5 miles of the proposed project: Holly Springs National Forest (2.5 miles away) and Coldwater River National Wildlife Refuge (3.4 miles away).

There are no developed outdoor recreation areas or parks within the pathway or in the immediate vicinity of the proposed TL project. However, the proposed TL does pass in close proximity to the Tallahatchie Country Club. Some dispersed recreational activity such as hunting, nature observation, hiking, and walking for pleasure may occur on some of the lands within or near the proposed TL corridor and project related access routes.

3.12 Socioeconomics and Environmental Justice

The proposed TL is located in Panola, Tallahatchie, and Yalobusha counties in Mississippi and would fall within three census tracts that consist of six block groups as shown in Figure 3-2. The population of Panola, Tallahatchie, and Yalobusha counties is 34,507; 15,124; and 12,433, respectively (USCB 2016). The combined population of the six block groups within the project area is 6,913. The estimated percentage of black or African American populations vary widely in the project area from 11.7 percent in Block Group 2 (Census Tract 9501) located in the city of Charleston, to 84.6 percent in Block Group 2 (Census Tract 9503) directly east in Yalobusha County. Block Group 2 (Census Tract 9503) also has a higher percentage of Hispanic or Latino individuals than both the state and Yalobusha County.

The economic conditions for the block groups and counties vary in comparison to the overall population in the state of Mississippi (Table 3-6). Based on the 2010–2014 five-year

estimates, Panola, Tallahatchie, and Yalobusha counties have lower per capita income, lower median household income, and higher poverty levels than other block groups and counties in Mississippi. Block Group 1 (Census Tract 9501) and Block Group 3 (Census Tract 9501), located in Tallahatchie County, have lower per capita income, lower median household income, and significantly higher poverty levels than surrounding block groups in the project area. Block Group 2 (Census Tract 9505), located in Panola County in the northeastern quadrant of the project area, has the lowest poverty level amongst surrounding block groups, counties, and the state.

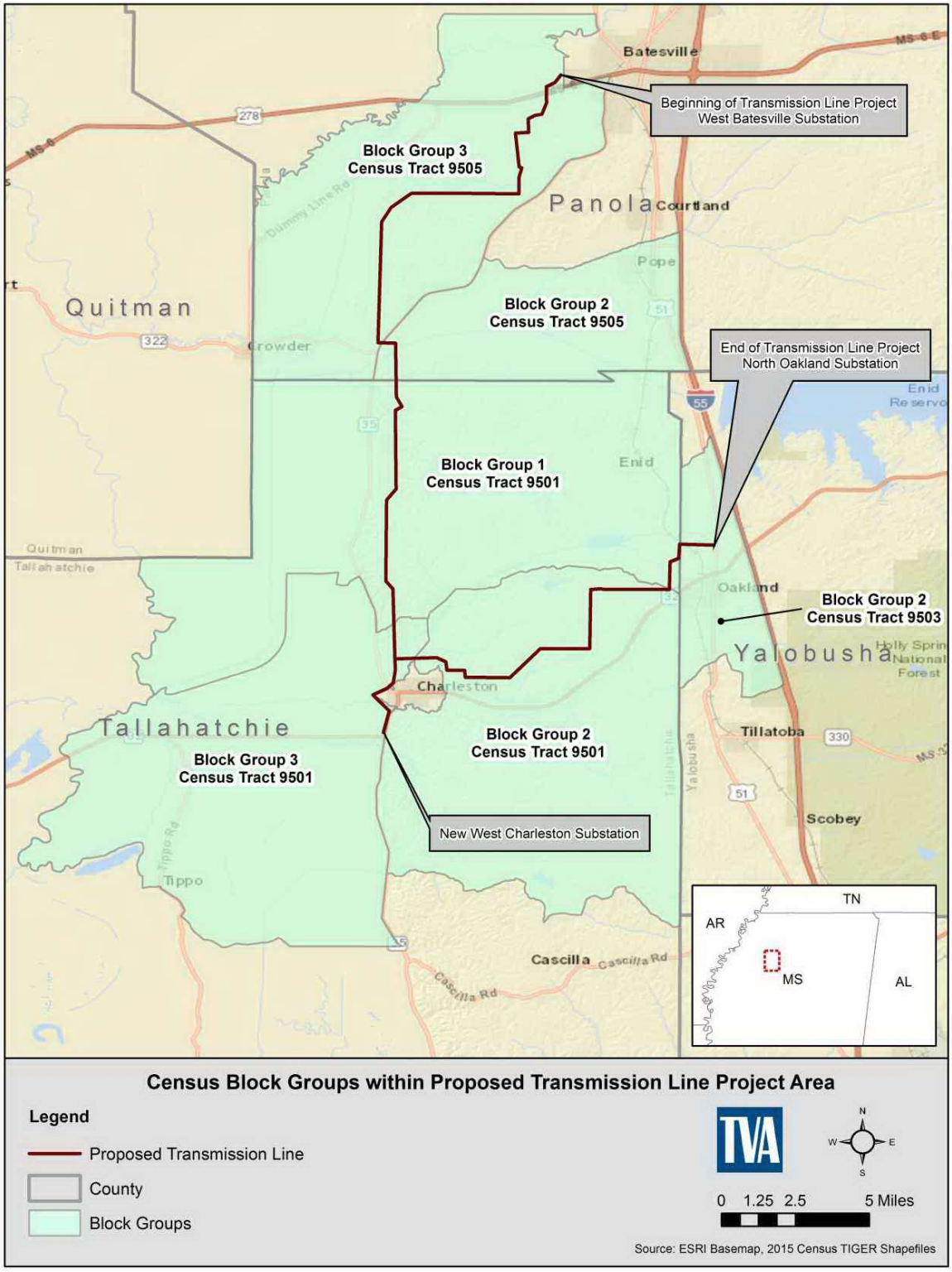

Figure 3-2 Census Block Groups within Proposed Transmission Line Project Area

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Table 3-6 Socioeconomic and Demographic Conditions in Panola, Tallahatchie, Yalobusha Counties, Mississippi

Demographic Characteristic	Block Group 1, Census Tract 9501	Block Group 2, Census Tract 9501	Block Group 3, Census Tract 9501	Block Group 2, Census Tract 9503	Block Group 2, Census Tract 9505	Block Group 3, Census Tract 9505	Panola County	Tallahatchie County	Yalobusha County	Mississippi
Estimated 2014 population	1,281	1,400	1,048	1,016	686	1,482	34,507	15,124	12,433	2,984,345
Black or African American population (2014)	33.3%	11.7%	53.2%	84.6%	18.5%	28.7%	50.1%	47.7%	39.3%	37.3%
Hispanic or Latino (2014)	1.2%	-	-	7.9%	-	-	1.6%	13.9%	1.5%	2.8%
White (excluding Hispanic or Latino) 2014	66.6%	87.4%	46.8%	14.8%	81.5%	71.3%	48.6%	43.4%	59.7%	59.3%
Per capita income (2010-2014)	$16,323	$22,016	$22,335	$17,673	$20,143	$24,845	$19,319	$13,460	$18,727	$20,956
Median household income (2010-2014)	$31,932	$42,619	$37,321	$30,000	$36,473	$40,438	$36,651	$31,860	$33,900	$39,464
Below poverty level (2010-2014)	31.3%	13.7%	17.4%	31.3%	6.6%	22.7%	24.6%	28.5%	22.2%	22.6%

Source: USCB 2016

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CHAPTER 4

4.0 ENVIRONMENTAL CONSEQUENCES

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

4.1 No Action Alternative

As stated in Section 2.1.1, under the No Action Alternative, TVA would not construct the proposed TL to power a new TVEPA substation in Charleston, Mississippi. As a result, no property easements for locating the proposed TL would be purchased by TVA, and the proposed transmission facilities would not be built. TVA would continue to supply power to the Charleston service area under the current conditions.

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

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

4.2 Action Alternative

4.2.1 Groundwater and Geology

Under this alternative, the proposed TL construction activities have the potential to impact groundwater. Site clearing and grading for structures and access roads could cause erosion, resulting in the movement of sediment into springs or groundwater infiltration zones. The contractor would follow all applicable regulations regarding storm water permitting and utilize applicable BMPs to minimize and control erosion during construction. The use of petroleum fuels, lubricants, and hydraulic fluids in construction and maintenance vehicles could result in the potential for small onsite spills. However, the use of BMPs to properly maintain vehicles to avoid leaks and spills and procedures to immediately address any spills that did occur would minimize the potential for adverse impacts to groundwater. Contractors would implement and utilize control methods to contain and properly dispose of all wastes and accidental spills to prevent the discharge of potential contaminants to groundwater.

Herbicides used during clearing and subsequent maintenance activities have the potential to enter groundwater. Although some herbicides break down quickly, others may persist in groundwater. Use of fertilizers and herbicides would be considered with caution before application and applied according to the manufacturer's label. BMPs dealing with herbicide application would also be used to prevent impacts to groundwater.

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

4.2.2 Surface Water

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

To minimize such impacts, appropriate soil erosion prevention BMPs would be followed, all proposed project activities would be conducted in a manner to ensure that waste materials are contained, and the introduction of foreign materials to the receiving waters would be minimized. Coverage under the large construction storm water general permit would be required if the project disturbs more than five acres. This permit also requires the development and implementation of a storm water pollution prevention plan (SWPPP). This SWPPP would identify specific BMPs to address construction-related activities that would be adopted to minimize storm water impacts. BMPs, as described in TVA's 2017 BMP manual, would be used to avoid contamination of surface water in the project area (TVA 2017b). Additionally, a USACE Section 404 and State 401 water quality certification would be obtained, as necessary, for stream alterations or crossings located within the project area. See Appendix B for stream crossing details.

TVA routinely includes precautions in the design, construction, and maintenance of its TL projects to minimize these potential impacts. Permanent stream crossings that cannot be avoided are designed to not impede runoff patterns and the natural movement of aquatic fauna. Temporary stream crossings and other construction and maintenance activities would comply with appropriate state permit requirements and TVA requirements as described in TVA's 2017 BMP manual. ROW maintenance would employ manual and low-impact methods wherever possible. Proper implementation of these controls is expected to result in only minor temporary impacts to surface waters. No cumulative impacts are anticipated.

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

Portable toilets would be provided for the construction workforce as needed. These toilets would be pumped out regularly, and the sewage would be transported by tanker truck to a

publicly owned wastewater treatment works that accepts pump-out. Equipment washing and dust control discharges would be handled in accordance with BMPs described in the SWPPP for water-only cleaning.

Improper use of herbicides to control vegetation could result in runoff to streams and subsequent aquatic impacts. Therefore, any pesticide/herbicide use as part of construction or maintenance activities would have to comply with the MDEQ general permit for application of pesticides, which also requires a pesticide discharge management plan. In areas requiring chemical treatment, only USEPA-registered and TVA-approved herbicides would be used in accordance with label directions designed in part to restrict applications near receiving waters and to prevent unacceptable aquatic impacts. Proper implementation and application of these products would be expected to have no significant impacts to surface waters. No cumulative impacts are anticipated.

4.2.3 Aquatic Ecology

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

Potential impacts from removal of streamside vegetation within the riparian zone may include: increased erosion and siltation, loss of instream habitat, and increased stream temperatures. Other potential effects resulting from construction and maintenance include alteration of stream banks and stream bottoms by heavy equipment and by herbicide runoff into streams. Siltation has a detrimental effect on many aquatic animals adapted to riverine environments. Turbidity caused by suspended sediment can negatively impact spawning and feeding success of fish and mussel species (Brim Box and Mossa 1999; Sutherland et al. 2002).

Watercourses that convey only surface water during storm events (such as ephemeral streams) and that could be affected by the proposed TL route would be protected by standard BMPs (TVA 2017b) and/or standard storm water permit requirements. These BMPs are designed in part to minimize disturbance of riparian areas and subsequent erosion and sedimentation that can be carried to streams.

TVA also provides additional categories of protection to watercourses directly affected by the Action Alternative based on the variety of species and habitats that exist in the streams, as well as the state and federal requirements to avoid harming certain species. The width of the SMZs is determined by the type of watercourse, primary use of the water resource, topography, or other physical barriers. (TVA 2017b)

USACE Section 404 and 401 permits would be obtained, as necessary, for stream alterations located within the project area, and the terms and conditions of these permits would be followed in addition to guidelines outlined in TVA's 2017 BMP manual. A total of 40 streams were assigned Category A (standard stream protection) SMZs, as defined in TVA's 2017 BMP manual (see Appendix B). This standard (basic) level of protection for streams and the habitats around them is designed to minimize the amount and length of disturbance to the water bodies without causing adverse impacts on the construction work. The aquatic community within these streams would potentially be negatively impacted from increased overland flow, changes in water temperatures, and potentially short-term destabilization of the stream banks due to removal of forest canopy and streamside

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

4.2.4 Vegetation

Implementation of the proposed Action Alternative would require the clearing of approximately 315 acres of forest. Such ground-disturbing activities would directly affect the existing plant communities in these areas. Additionally, ongoing vegetation management along the ROW is necessary to prevent tall, woody vegetation from becoming established within the ROW. Therefore, the type of vegetative cover that occurs on the ROW would be directly affected.

Converting forested land to managed ROW for construction of the proposed TL would be long term in duration, but insignificant. As of 2015, there were at least 1.59 million acres of forest land in Panola, Tallahatchie, and Yalobusha counties and the surrounding Mississippi counties (USFS 2016). Cumulatively, project-related effects to forest resources would be negligible when compared to the total amount of forest land occurring in the region. Also, project-related work would temporarily affect herbaceous plant communities, but these areas would likely recover to their pre-project condition in less than one year.

The majority of the project area currently has a substantial component of invasive terrestrial plants. The adoption of the Action Alternative would not significantly affect the extent or abundance of these species at the county, regional, or state level. The use of TVA's standard operating procedure of revegetating with noninvasive species (TVA 2017b) would, however, serve to minimize the potential introduction and spread of invasive species in the project area.

Plant communities found within the proposed ROW are common and well represented throughout the region. No unique plant habitats possessing conservation value would be negatively impacted by construction, operation, and maintenance of the new TL. Potential impacts to the state-listed plants located in the deciduous forest habitat within the ROW are discussed in Section 4.2.6. Adoption of the proposed Action Alternative would not significantly affect the terrestrial ecology of the region. Cumulative effects of the project on common plant communities are expected to be negligible.

4.2.5 Wildlife

Under the proposed Action Alternative, TVA would construct the TL and would clear some or all of the 180.8 acres of early successional, herbaceous habitat (pastures, cultivated fields, and residential areas). In many areas, the TL would span agricultural and developed areas. Impacts to wildlife habitat would thus be limited to locations where the structures would be established. Ground disturbance would occur in these areas. Any wildlife (primarily common, habituated species) currently using these heavily disturbed areas may be displaced by increased levels of disturbance during construction actions, but it is expected that they would return to the project area upon completion of these actions.

Approximately 315 acres of forest would be removed and maintained as early successional habitat for the life of the TL. Direct effects to some individuals that may be immobile during the time of construction may occur, particularly if construction activities take place during breeding/nesting seasons. However, the actions are not likely to affect populations of

species common to the area, as similar forested and herbaceous habitat exists in the surrounding landscape.

Construction-associated disturbances and habitat removal likely would disperse wildlife into surrounding areas in an attempt to find new food and shelter sources and to reestablish territories, potentially resulting in added stress or energy use to these individuals. In the event that surrounding areas are already overpopulated, further stress to wildlife populations could occur to those individuals presently utilizing these areas, as well as those attempting to relocate. The landscape on which the project occurs is already highly fragmented and impacted by human activity (i.e. forestry practices, agricultural fields, residential homes, farm ponds, and roads). Thus, it is unlikely that species currently occupying adjacent habitat would be negatively impacted by the influx of new residents. Further, it is expected that over time those species that utilize early successional habitat would return to the project area upon completion of construction.

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

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

4.2.6 Endangered and Threatened Species

Aquatic Animals

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

However, the watercourses that could be affected by the proposed project would be protected by implementing standard BMPs and Category A stream protection measures as defined in TVA's 2017 BMP manual or as required by standard storm water permit conditions. These BMPs are designed in part to minimize disturbance of riparian areas and subsequent erosion and sedimentation that can be carried to streams.

No federally listed aquatic species have been collected within the proposed project area. Impacts to the state-listed endangered southern redbelly dace could potentially occur.

However, with proper implementation of BMPs designed to protect aquatic habitats, and adherence to SMZ guidelines outlined in TVA's 2017 BMP manual, direct, indirect and cumulative impacts to would be minor and insignificant.

Plants

Implementation of the proposed Action Alternative would not affect federally listed plant species or designated critical habitat because neither occurs in the proposed ROW, access roads or proposed substation site. However, adoption of the Action Alternative would negatively impact state-listed Allegheny spurge, longstyle sweet cicely, sharp-scale sedge, and yellowwood.

Allegheny spurge has been previously documented from 21 counties across Mississippi. The TVA Natural Heritage Database contains 22 records from seven of the Mississippi counties where the species is known to occur. While some of the records are historical (not recently observed), 11 have been observed since the 1980s. One population was last observed in 2006 "in flower over 2 acres," but most observations were of less than 100 individual plants. Allegheny spurge requires rich forested habitat and would not likely survive in on open ROW. However, given the relative abundance of the species across the state, loss of a single occurrence would not result in significant impacts to the species.

Sharp-scale sedge has been previously reported from two Mississippi counties. Though this sedge is listed by the Mississippi Natural Heritage Program, there is doubt the individuals treated as the rarer variety pubescens are actually distinct from the much more common species *Carex oxylepis* (Ball and Reznicek 2002). Regardless of whether or not it is a distinct entity worthy of conservation, sharp-scale sedge was observed as a regular component in the understory along several miles of the proposed TL ROW. Hundreds of flowering clumps were observed both in and outside of the ROW. While TL clearing and construction would likely remove the majority of clumps found on the ROW, the species and its habitat are common off the ROW. In addition, there appeared to be many acres of similar, suitable habitat off the ROW that was not searched. Therefore, although adoption of the Action Alternative would negatively impact sharp-scale sedge, the impacts would be insignificant.

Yellowwood is a small- to medium-sized tree, and the continued presence of the species on ROW is incompatible with operation of a TL. The TVA Natural Heritage Database contains four records of the species from two of the counties where it occurs in Mississippi; data indicate the species was observed since the year 2000. These records indicate relatively larger population sizes (more than 45 trees) over two acres. Therefore, although removal of the two trees present in the ROW would negatively impact the species, the impacts would be insignificant.

Longstyle sweet cicely occurs in a variety of habitats and has been previously reported from 17 counties in Mississippi. The TVA Natural Heritage Database contains 24 records of the species from 10 Mississippi counties where it occurs. Longstyle sweet cicely can be found in open environments and therefore may not be wholly incompatible with TL construction and ROW maintenance if damage to the soil profile and root system of the plants can be avoided. Future ROW vegetation maintenance could also negatively affect longstyle sweet cicely if herbicide is applied indiscriminately, but this outcome can be avoided using TVA's computer-based sensitive area review process to record the location the species along the ROW. This process will trigger coordination between TVA ROW foresters and biologists when the proposed TL requires vegetation maintenance. The resulting vegetation

management would use targeted application of herbicide and/or mowing to control woody species while avoiding impacts to longstyle sweet cicely.

With the mitigation measures listed below, adoption of the Action Alternative would not significantly impact longstyle sweet cicely.

- The location of the longstyle sweet cicely would be included in TVA's sensitive area review database.
- Construction personnel would consult with a TVA botanist before clearing and construction activities to coordinate avoidance measures and access in the portions of the ROW where longstyle sweet cicely occurs.
- In areas where the species occurs, forest clearing would be conducted with a feller-buncher (or other similar piece of machinery) that can clear forest without intentionally disturbing the soil profile.

Terrestrial Animals

One federally protected terrestrial animal species (bald eagle) was assessed based on documented presence within Panola County, Mississippi. Two additional federally listed species (northern long-eared bat and wood stork) were addressed based on the potential for these species to occur in the project footprint. All three of these federally listed species have the potential to utilize the project area.

Suitable nesting and foraging habitat for bald eagle and suitable foraging habitat for wood stork exists within the project area. One bald eagle nest is known approximately 11 miles from the project area, but has not been observed since 2007. No additional nests or individuals are known from the project footprint and none was observed during field surveys in December 2015 or April 2016. The use of vehicles and equipment across wetlands and within SMZs would be conducted using BMPs to minimize impacts to water bodies within the affected area (TVA 2017b). With BMPs in place, the existing functionality of wetlands and water bodies within the project footprint would be retained post-construction, and thus neither bald eagle nor wood stork foraging habitat would be impacted by the proposed actions. Impacts to the bald eagle and wood stork are not anticipated to occur under the proposed Action Alternative.

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

Summer roosting habitat surveys were performed in December 2015 and April 2016. During these surveys, 520 suitable roost trees were identified across 34 forest fragments along the proposed ROW. Suitability was determined based on the high number of white oaks, shagbark hickories, and snags with exfoliating bark, cavities, and crevices and their proximity to water sources. A total of 80.2 acres of suitable summer roosting habitat for northern long-eared bat would be removed for the proposed ROW. TVA would refrain from

clearing these areas of potentially suitable summer roosting bat habitat between June 1 and July 31 to remove any potential for direct effects to northern long-eared bat during bat pup season. Therefore, TVA has determined that while removal of suitable roosting habitat could have indirect adverse effects on the northern long-eared bat and result in "take" as defined in the ESA, this "take" is excepted from ESA Section 9 take prohibitions. Determinations regarding potential effects on northern long-eared bat were made per the "Key to Northern Long-Eared Bat 4(d) Rule for Federal Actions that May Affect Northern Long-Eared Bats" (USFWS 2016a) and the "Programmatic Biological Opinion on Final 4(d) Rule for the Northern Long-Eared Bat and Activities Excepted from Take Prohibitions" (USFWS 2016b). In a letter dated November 2, 2016, the USFWS concurred with TVA's determination (Appendix A).

4.2.7 Floodplains

As a federal agency, TVA is subject to the requirements of EO 11988 (Floodplain Management). The objective of EO 11988 is "…to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative" (USWRC 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.

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

Consistent with EO 11988, overhead TLs and related support structures are considered to be repetitive actions in the 100-year floodplain that should result in minor impacts (46 FR 22845). The conducting wires of the TL would be located well above the 100-year flood elevation. The switches would be located inside the existing West Charleston substation, outside of 100-year floodplains, which would be consistent with EO 11988.

The support structures for the TL would not be expected to result in any increase in flood hazard, either as a result of increased flood elevations or changes in flow-carrying capacity of the streams being crossed. Construction in the floodplain would be consistent with EO 11988 provided the TVA subclass review criteria for TL location in floodplains are followed.

Based upon a review of Panola and Tallahatchie counties, Mississippi, flood insurance rate maps, portions of access roads could be located within 100-year floodplains. Consistent with EO 11988, the building of access roads is also considered to be a repetitive action in the 100-year floodplain (46 FR 22845). To minimize adverse impacts, any road construction or improvements would be done in such a manner that upstream flood elevations would not be increased.

To minimize adverse impacts on natural and beneficial floodplain values, the following standard mitigation measures would be implemented:

- BMPs would be used during construction activities.
- Construction would adhere to the TVA subclass review criteria for TL location in floodplains.
- Construction or improvement of access roads would be done in such a manner that upstream flood elevations would not be increased.

The proposed substation, to be built by TVEPA would be located well outside 100-year floodplains, which would be consistent with EO 11988. Based upon implementation of these mitigation measures, the proposed TL and access roads would have no significant impact on floodplains.

4.2.8 Wetlands

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

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

A total of 15.19 acres of wetlands are located within the proposed ROW, of which 8.1 acres are forested. As described in Section 2.2.2.2, establishing a TL corridor requires tree clearing within the full extent of the ROW, and future maintenance of low-stature vegetation to accommodate clearance and abate interference with overhead wires. As such, emergent and scrub-shrub wetlands typically experience temporary impacts during construction, but recover relatively quickly. The trees comprising forested wetland areas within the proposed ROW are cleared, and the habitat is permanently converted to emergent-scrub shrub for the perpetuity of the TL's existence. Therefore, a total of 8.1 acres of wetland vegetation would be permanently converted to emergent scrub-shrub wetlands during ROW and TL construction.

Forested wetlands, in general have deeper root systems and contain greater biomass (quantity of living matter) per area than do emergent and scrub-shrub wetlands which do not grow as tall. As a result, forested wetlands tend to be able to provide higher levels of "wetland functions," such as sediment retention, carbon storage, and pollutant retention and transformation (detoxification), all of which support better water quality. Consequently, the clearing and conversion of forested wetlands to lower-growing wetlands reduces some wetland functions that support healthier or improved downstream water quality (Ainslie et al.

1999; Scott et al. 1990; Wilder and Roberts 2002). Although these forested wetland areas would be converted to emergent and scrub-shrub wetland communities providing the same suite of functions, it would be at a reduced level.

Forested wetland conversion for this project would take place across eight watersheds within three larger river basins. Approximately 90 percent (7.32 acres) of the proposed forested wetland clearing would occur across five watersheds, which feed the Tallahatchie River. This includes 0.16 acre within the Running Slough watershed, 2.10 acres within the O'Brien Creek watershed, 2.21 acres within the Buntyn Creek watershed, 1.40 acres within the Lower Tillatoba Creek watershed, and 1.45 acres within the North Fork Tillatoba Creek watershed. Total forested wetland clearing proposed across these watersheds would reduce forested wetland by less than 0.01 percent of the larger Tallahatchie River basin. Likewise, 0.65 acre of forested wetland conversion would take place within the Shelton Creek watershed, comprising less than 0.01 percent of mapped forested wetland within this watershed and tributary to the larger Yocona River Basin. Similarly, 0.13 acre of forested wetland conversion would take place within the Planter Bayou watershed, comprising less than 0.001 percent of mapped forested wetland within this watershed and tributary to the larger Tippo Bayou basin. Therefore, due to the minimal wetland conversion proposed relative to forested wetland present at a watershed scale, no significant wetland impacts are anticipated to result from this project.

The remaining 7.09 acres of emergent and scrub-shrub wetland habitat is of low enough stature that little clearing would be required for TL corridor construction. All wetland areas located within the ROW would be subject to periodic vegetation management to maintain low stature habitat and accommodate TL clearance.

TVA would minimize wetland disturbance during construction by performing no mechanized clearing in wetlands, using low ground pressure equipment, or using mats during clearing and construction activities to minimize rutting to less than 12 inches to reduce soil disturbance. TVA would also adhere to wetland BMPs (TVA 2017b) for any and all other work necessary within the delineated wetland boundaries. Wetland habitat within the ROW located in areas proposed for heavy equipment travel would experience minor and temporary impacts during TL construction. Vehicular traffic would be limited to narrowed access corridors along the ROW for structure and conductor placement. Similarly, potential structure placement in wetlands would be conducted within the parameters and meet the conditions approved by MDEQ/USACE Vicksburg for utility line construction in wetlands, such that no significant wetland impacts would occur.

Cumulative impact analysis of wetland effects takes into account wetland loss and conversion at a watershed scale currently and within the reasonable and foreseeable future. The proposed wetland impacts would be insignificant on a cumulative scale due to the avoidance and minimization measures in place, under the CWA and the directives of USEPA and USACE, which are designed to ensure no net loss of wetland resources. Similarly, future construction within the watershed would be subject to CWA, USEPA, USACE, and MDEQ regulations, such that any potential future impacts to wetlands would not result in cumulative a loss. Therefore, in accordance with the CWA no-net-loss of wetland resources mandate, no cumulative wetland impacts are anticipated as a result of the proposed new TL construction project.

In compliance with the CWA and EO 11990, TVA's siting procedure and alternative selection, as stated in Section 2.1, has identified no practicable alternative to the proposed

Action Alternative and its associated wetland impacts. As a result of avoidance and minimization of mapped wetland resources, compliance with all federal and state wetland regulations, and the proposed BMPs in place during construction, maintenance, and operation, the project would have no significant adverse direct, indirect, or cumulative impacts to wetland areas or to the associated wetland functions and values provided within the general watershed.

4.2.9 Aesthetics

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

Visual Resources

The visual attributes of existing scenery, along with the anticipated attributes resulting from the proposed action, are reviewed and classified in the visual analysis process. The classification criteria are adapted from a scenic management system developed by the USFS and integrated with planning methods used by TVA. The classifications are based on methodology and descriptions from the U.S. Department of Agriculture (USDA 1995) and TVA (2003). Sensitivity of viewing points available to the general public, their viewing distances, and visibility of proposed changes are also considered during the analysis. Scenic integrity indicates the degree of intactness or wholeness of the landscape character. These measures help identify changes in visual character based on commonly held perceptions of landscape beauty, and the aesthetic sense of place. The foreground, middle ground, and background viewing distance parameters were previously described in Section 3.9.1.

Transmission structures tend to be the most visible element of the electric transmission system. The addition of lines on or near existing structures or ROW increases compatibility with the landscape and minimizes impacts. The proposed TL would be visible to motorists on MS 6/US 278, MS 35, and MS 23 at the locations where the line crosses and runs parallel to the roads. Along most of the TL route, the view from local highways and roads would be limited by the natural density of the tree growth near the road alignments. The proposed TL would largely avoid disruptions to the scenery and landscape for local residents and facilities by traveling through forested, undeveloped land for roughly 85 percent of the project's length. The proposed TL would be the most visible to nearby residents in the city of Charleston, just north of the new West Charleston substation. The proposed TL would border a neighborhood directly to the west, where residences may be impacted due to proximity and absence of visual barriers.

Although the fourteen vulnerable resources identified in Section 3.9.1 are located within the foreground viewing distance of the project ROW, the visual impact caused by the proposed TL would be minor due to the existing characteristics of the surrounding landscape. The presence of existing TLs and substations increases the visual compatibility for the construction of a new TL and prevents significant changes to the viewshed, particularly for West Camp Church and Paris Grove Church, as both facilities are located approximately 300 feet from existing substations at the beginning and end of the proposed project. Similarly, the remaining 13 facilities are located on swaths of forested land or are surrounded by trees, which provides a natural, visual barrier from any potential landscape modifications that occur as a result of the proposed TL.

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

Noise and Odors

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

4.2.10 Archaeological and Historic Resources

For NRHP-listed or eligible archaeological resources located in the APE, project effects could result from vegetation clearing, construction, maintenance, and operation of the proposed TL. These effects could include compaction from heavy equipment, the mixing of stratigraphic layers, displacement and removal of artifacts and features due to ground disturbance, and looting or vandalism stemming from the increased exposure of archaeological deposits due to vegetation clearing. For NRHP-listed or eligible aboveground resources located in the APE, the proposed project could introduce visual changes that could result in a loss of integrity of setting, feeling, or association.

Based on the results of the Phase I surveys, TVA found that the project, as currently planned, had the potential to affect one previously recorded archaeological site (22TL643) and eight newly recorded archaeological sites (22PA1208, 22PA1231, 22TL1449, 22TL1453, 22TL1454, 22TL1455, 22TL1457, and 22TL1458). Per consultation with the Mississippi SHPO, the portion of site 22TL643 within the APE does not contribute to the site's eligibility and would therefore not require avoidance or minimization (Appendix A). TVA proposed measures that would avoid or minimize the undertaking's effects on three of these sites (22TL1449, 22TL1455, and 22TL1458). These measures include creating a 10-meter sensitive area buffer surrounding each site. TVA would place restrictions on any work that would take place within the buffers, including that no transmission structures (poles or guy wires) will be installed within the buffers. The sensitive areas will be marked, and the restrictions noted, on all plans and designs to be used during the undertaking. Vegetation clearing will be conducted during times of dry and firm ground, or using low ground pressure equipment, or with wetland mats placed within the sensitive areas. No heavy equipment will be operated within the boundaries of the two linear features. TVA finds that, with these measures in place, the undertaking would have no potential adverse effects on archaeological sites 22TL1449, 22TL1455, and 22TL1458.

TVA found that the undertaking would result in adverse effects on sites 22PA1208, 22PA1231, 22TL1453, 22TL1454, and 22TL1457 due to the installation of transmission structures within the site boundaries, should those sites be determined NRHP-eligible. After completing the Phase II investigations, TVA determined sites 22PA1208, 22PA1231, 22TL1454, and 22TL1457 to be ineligible for the NRHP. TVA found further that site 22TL1453 is eligible for inclusion in the NRHP.

The Mississippi SHPO agreed with TVA's NRHP eligibility determinations for sites 22PA1208, 22PA1231, 22TL1453, 22TL1454, and 22TL1457 (Appendix A). None of the consulted tribes objected to TVA's determinations. Therefore, TVA has found after consultation that the undertaking would result in an adverse effect on one NRHP-eligible archaeological site, 22TL1453. TVA proposes to enter into a MOA with the Mississippi SHPO and with any of the consulted federally recognized Indian tribes who agree to participate as a concurring party, for the resolution of the undertaking's adverse effect on site 22TL1453. The MOA will stipulate that TVA shall mitigate the adverse effect by completing a Phase III data recovery investigation of 22TL1453, which will furnish data that can be used to address important research questions. The Mississippi SHPO agreed that the MOA and mitigation are appropriate courses of action to resolve the adverse effect (Appendix A).

TVA finds that the proposed undertaking would have a visual effect on the sole NRHP-eligible architectural property located in the APE, 135-CHA-0011 (Old Masonic Cemetery). However, TVA also finds that the effect would not be adverse due to modern development that has compromised the historic setting of the resource. The Mississippi SHPO has concurred with TVA's determination and findings for this architectural property (Appendix A). None of the consulted tribes objected to this finding.

4.2.11 Recreation, Parks, and Natural Areas

There are no natural areas within the proposed project footprint and two natural areas within 5 miles of the proposed project. The two natural areas are located greater than one mile away, which is of sufficient distance such that there would be no direct or indirect impacts from the construction or operation of the proposed TL and substation. Under the Action Alternative, construction of the proposed TL, associated access roads, and substation could cause some minor shifts in any dispersed outdoor recreation use patterns in the immediate vicinity of the TL ROW corridor. However, the extent of any such impacts should be minor and insignificant. Also, the proposed TL does not cross over the boundary of the Tallahatchie Country Club; therefore, there would be no impacts on this recreation area.

4.2.12 Socioeconomics and Environmental Justice

Under the proposed Action Alternative, TVA would purchase easements from property owners to construct the proposed TL. Those easements would give TVA the right to locate, operate, and maintain the TL across the property owner's land (see Section 2.2.1.1). Current landowners would be compensated for the value of such rights. The direct local economic effect from the purchase of any ROW easements would be minor as there would only be a few tracts and any benefit would only be to the individual landowners.

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

Implementing the proposed Action Alternative would increase power reliability for TVEPA. Therefore, there could be long-term indirect economic benefits to jurisdictions within the TVEPA service area. As shown in Table 3-6, Panola, Tallahatchie, and Yalobusha counties have lower per capita income, lower median household income, and higher poverty levels than the state average. Block Group 2 (Census Tract 9503), located at the project terminus in Yalobusha County, also has a significantly larger population of black or African American individuals than surrounding block groups and the state. Nonetheless, undertaking the

proposed actions, including the construction, operation, and maintenance of the proposed TL is not expected to disproportionately affect any economically disadvantaged or minority populations.

4.2.13 Post-construction Effects

Electric and Magnetic Fields

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

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

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

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

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

Other public interests and concerns related to EMFs include potential interference with A.M.-band radio reception, television reception, satellite television, and implanted medical devices. Interference with radio or television reception is typically due to unusual failures of power line insulators or poor alignment of the radio or television antenna and the signal source. Both conditions are readily preventable and correctable.

Older implanted medical devices historically had a potential for power equipment strong-field interference when they came within the influence of low-frequency, high-energy

workplace exposure. However, these older devices and designs (i.e., those beyond five to ten years old) have been replaced with different designs and different shielding that prevent potential for interference from external field sources up to and including the most powerful magnetic resonance imaging medical scanners. Unlike high-energy radio frequency devices that can still interfere with implanted medical devices, low-frequency and low-energy powered electric or magnetic devices, such as the proposed TL, no longer interfere (JAMA 2007).

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

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

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

TVA follows medical and health research related to EMFs, and thus far, no controlled laboratory research has demonstrated a cause-and-effect relationship between low-frequency electric or magnetic fields and health effects or adverse health effects even when using field strengths many times higher than those generated by power TLs. Statistical studies of overall populations and increased use of low-frequency electric power have found no associations (WHO 2007b).

TVA also follows media reports which suggest such associations, but these reports do not undergo the same scientific or medical peer review that medical research does. Neither medical specialists nor physicists have been able to form a testable concept of how these low-frequency, low-energy power fields could cause health effects in the human body where natural processes produce much higher fields. To date, there is no agreement in the scientific or medical research communities as to what, if any, electric or magnetic field parameters might be associated with a potential health effect in a human or animal. There are no scientifically or medically defined safe or unsafe field strengths for low-frequency, low-energy power substation or line fields.

The current and continuing position of the scientific and medical communities regarding the research and any potential for health effects from low-frequency power equipment or line fields is that there are no reproducible or conclusive data demonstrating an effect or an

adverse health effect from such fields (WHO 2007c). In the United States, national organizations of scientists and medical personnel have recommended no further research on the potential for adverse health effects from such fields (AMA 1994; DOE 1996; NIEHS 1998).

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

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

Lightning Strike Hazard

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

Transmission Structure Stability

The structures that would be used on the proposed TL are similar to those shown in Section 2.2.1.4 and are the result of detailed engineering design. They have been used by TVA, with minor technological upgrades over time, for over 70 years with an exceptional safety record. They are not prone to rot or crack like wooden poles, nor are they subject to substantial storm damage due to their low cross-section in the wind.

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

4.3 Long-term and Cumulative Impacts

The presence of the TL would present long-term visual effects to the mostly rural character of the local area. However, because the route of the proposed TL would traverse mainly undeveloped portions of Panola, Tallahatchie, and Yalobusha counties with few residences, the TL would not be especially prominent in the local landscape. Likewise, the establishment of easements with local landowners for the proposed ROW would not foreclose long-term productive uses of the affected properties. Various agricultural land uses could be practiced within the ROW, but any timber production within the ROW would be foregone for the life of the TL.

The increase in power supply is one factor in improving the overall infrastructure in the local TVEPA area, which over time could attract future commercial and residential development,

benefitting the local area in an economic capacity. However, the extent and degree of such development depends on a variety of factors and cannot be predicted. Therefore, residential and commercial growth in this predominantly rural area would be minor, long-term, and a cumulative consequence of the proposed transmission system improvements.

4.4 Unavoidable Adverse Environmental Impacts

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

- Clearing associated with construction of the proposed TL could result in a small amount of localized siltation.
- Clearing and construction would result in the removal of trees, but due to the amount of acres of forested land in the surrounding area, the impact on forest resources is minimal.
- No trees would be permitted to grow within the TL ROW and TVA would remove "danger trees" (as described in Section 2.2.1) adjacent to the ROW. In areas where the ROW would traverse forested areas, this would cause a change in the visual character of the immediate area and would segment some forested areas.
- Clearing and construction would result in the disruption and/or loss of some plants and wildlife, and the loss of about 315 acres of forested habitat for the life of the TL.
- Any burning of cleared material would result in some short-term air pollution, but would be in compliance with Mississippi's air permit program.
- ROW construction would involve tree clearing and conversion of 8.1 acres of forested wetland to emergent or scrub-shrub habitat, and maintenance of a total of 15.19 acres of wetland habitat as scrub-shrub habitat for the life of the TL.
- The proposed TL would result in minor long-term visual effects on the landscape in the immediate local area.
- The proposed TL would adversely affect archaeological site 22TL1453. TVA would enter into a MOA with the state to mitigate these impacts, which will include the completion of a Phase III data recovery plan.

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

Land within the ROW of the proposed TL would be committed to use for electrical system needs for the foreseeable future. Approximately 497 acres of ROW would be utilized for the proposed project (as described in Sections 1.1 and 2.2.1). Some of this acreage would be converted from its current use as pasture, agricultural fields, and forest to use as an ROW. The proposed ROW would support the 161-kV TL (see Figure 1-1) and there would be use of existing access roads outside the ROW. Agricultural uses of the ROW could and would likely continue. However, routine re-clearing of the ROW would preclude forest management within the ROW for the operational life of the TL. These losses of long-term productivity with respect to timber production are minor both locally and regionally.

4.6 Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those uses of resources that cannot be undone. An example of an irreversible commitment is the mining and use of an ore, which once

mined, cannot be replaced. Irretrievable commitments of resources are those that may occur over a period of time, but that may be recovered. For example, filling a wetland area for a parking lot would irretrievably commit the property for as long as the parking lot remains.

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

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

CHAPTER 5

5.0 LIST OF PREPARERS

5.1 NEPA Project Management

Anita E. Masters

Position:	NEPA Project 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:	Project coordination, NEPA compliance, document preparation, and technical editor

Loretta A. McNamee

Position:	Contract NEPA Specialist
Education:	B.S., Environmental Biology
Experience:	Nine years in NEPA and environmental compliance
Involvement:	NEPA compliance and document preparation

5.2 Other Contributors

Bonnie Bynum

Position:	Consultant, NEPA and Natural Resources Dpt. Manager
Education:	B.S. Geology
Experience:	20 years
Involvement:	Quality assurance manager, visual resources, socioeconomics and environmental justice

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; four years teaching at university level
Involvement:	Cultural resources compliance

David T. Nestor

Position:	Biologist, Botany
Education:	M.S., Botany; B.S., Aquaculture, Fisheries, & Wildlife Biology
Experience:	Eight years wetland delineation; 21 years field botany; 11 years invasive plant species; 15 years vegetation and threatened and endangered plants
Involvement:	Vegetation; threatened and endangered plants

Patricia B. 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

Britta P. Lees

Position:	Biologist, Wetlands
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

Robert A. Marker

Position:	Contract Recreation Representative
Education:	B.S., Outdoor Recreation Resources Management
Experience:	40 years in recreation planning and management
Involvement:	Recreation

Sara J. McLaughlin

Position:	Biologist, Zoology Contractor
Education:	B.S., Wildlife & Fisheries Science Management, minor in Forestry
Experience:	Four years biological & cultural compliance, two years animal husbandry, two years biological data collection
Involvement:	Wildlife; threatened and endangered terrestrial animals

Todd C. Moore, PE

Position	Siting Engineer
Education	B.S. and M.S. Civil Engineering
Experience	12 years in transmission line siting; seven years in transmission Design
Involvement:	Project and siting alternatives; document review

Jillian Neupauer

Position:	Consultant, NEPA Planner
Education:	B.A. Environmental Studies, M.S. Urban Planning
Experience:	Two years
Involvement:	Socioeconomics and environmental justice; visual resources

Craig L. Phillips

Position:	Biologist, Aquatic Community Ecology
Education:	M.S., and B.S., Wildlife and Fisheries Science
Experience:	10 years sampling and hydrologic determinations for streams and wet-weather conveyances; nine years in environmental reviews
Involvement:	Aquatic ecology; threatened and endangered aquatic animals

Kim Pilarski-Hall

Position:	Specialist, Wetlands and Natural Areas
Education:	M.S., Geography, Minor Ecology
Experience:	17 years in wetlands assessment and delineation
Involvement:	Natural areas

Kevin Ramsey

Position:	Planning Engineer
Education:	B.S., Electrical Engineering
Experience:	Three years bulk planning, one year system protection; four years at TVA
Involvement:	Project and justification, document review

Amos L. Smith, PG

Position:	Solid Waste Specialist
Education:	B.S., Geology
Experience:	29 years in environmental analyses and groundwater evaluations
Involvement:	Geology and groundwater

Jesse C. Troxler

Position:	Biologist, Zoology
Education:	M.S. and B.S., Wildlife Science
Experience:	Eight years in biological data collection, six months in environmental reviews
Involvement:	Wildlife; threatened and endangered terrestrial animals

Carrie C. Williamson, P.E., CFM

Position:	Civil Engineer, Flood Risk
Education:	M.S., Civil Engineering; B.S., Civil Engineering
Experience:	Three years in floodplains and flood risk; 11 years in compliance monitoring; three years in river forecasting
Involvement:	Floodplains

Chevales Williams

Position:	Water Specialist II
Education:	B.S., Environmental Engineering
Experience:	12 years of experience in water quality monitoring and compliance; 11 years in NEPA planning and environmental services
Involvement:	Surface water and soil erosion

Chad H. Worthington

Position:	Contract Biologist, Aquatic Communities
Education:	B.S., Wildlife and Fisheries Science
Experience:	Two years stream assessments and one year hydrologic determinations for streams and wet-weather conveyances
Involvement:	Aquatic ecology; threatened and endangered aquatic animals

CHAPTER 6

6.0 ENVIRONMENTAL ASSESSMENT RECIPIENTS

6.1 Federal Agencies

U.S. Army Corps of Engineers

U.S. Fish and Wildlife Service

6.2 Federally Recognized Tribes

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

Alabama-Coushatta Tribe of Texas

Choctaw Nation of Oklahoma

Jena Band of Choctaw Indians

Mississippi Band of Choctaw Indians

6.3 State Agencies

Mississippi State Historic Preservation Office

Mississippi Department of Environmental Quality

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CHAPTER 7

7.0 LITERATURE CITED

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Appendix A – Correspondence

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MISSISSIPPI DEPARTMENT of ARCHIVES AND HISTORY

MDAH

HISTORIC PRESERVATION
Jim Woodrick, director
PO Box 571 Jackson, MS 39205-0571
601-576-6940 • Fax 601-576-6955
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October 18, 2016

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

RE: Phase I CRS of TVA's West Batesville-North Oakland transmission line,
MDAH Project Log #09-130-16, Report #16-0338,
Panola Tallahatchie, and Yalobusha Counties

Dear Mr. Jones:

We have reviewed the Augus: 2016 cultural resources survey report by Hunter B. Johnson, Principal Investigator, received on September 22, 2016, for the above referenced undertaking, pursuant to our responsibilities under Section 106 of the National Historic Preservation Act and 36 CFR Part 800. After reviewing the information provided, with respect to previously recorded buildings/structures:

107-BAT-0312	Ineligible	Concur
107-BAT 5037	Ineligible	Concur
107-BAT-5039	Nonextant	Concur
107-BAT-5042	Ineligible	Concur
107-BAT-5002	Nonextant	Concur
135-CHA-0004-X	Nonextant	Concur
135-CHA-5006	Nonextant	Concur
135-CHA-5007	Outs de APE	Concur
135-CHA-0011	Masonic Cemetery	Eligible No Adverse Effect - Concur
161-OAK-6002	Ineligible	Concur

Newly identified buildings/structures

IS-2 1040 Hwy 6 West	Ineligible	Do Not Concur
Potentially Eligible under Criteria A & C		Would concur No Adverse Effect
IS-33 1920s Cotton Gin	Ineligible	Do Not Concur
Potentially Eligible under Criteria A & C		Would concur No Adverse Effect
IS-35 637 State Route 35	Ineligible	Do Not Concur
Potentially Eligible under Criteria A & C		Would concur No Adverse Effect

We also concur that none of the remainder of the newly identified buildings are individually eligible for listing in the National Register of Historic Places.

After reviewing the information provided, with respect to newly recorded archaeological sites, we concur the following sites are ineligible for listing in the National Register of Historic Places and require no further investigation:

22PA176	22PA1209	22PA1210	22PA1211	22PA1212
22PA1213	22PA1214	22PA1215	22PA1216	22PA1217
22PA1218	22PA1219	22PA1232	22PA1233	22PA1234
22PA1235	22TL1448	22TL1450	22TL1451	22TL1452
22TL1456	22TL1459	22TL1462	22TL1463	22TL1464
22YA104	22YA926,	22YA927		

We concur the following sites are of unknown eligibility but will are unlikely to be adversely affected provided that (1) no transmission structures are located within site; and (2) the stated minimization measures for clearing and access are followed and during dry conditions only to avoid compaction: 22TL1449, 22TL1455 and 22TL1458, as well as previously identified site 22TL643.

We also concur the following sites are of unknown eligibility and due to the degree of potential impact, should have Phase II archaeological testing before earth-disturbing work begins: 22PA1208, 22PA1231, 22TL1453, 22TL1454 and 22TL1457.

After reviewing the information provided, with respect to previously recorded archaeological sites, we concur that the portions of the sites 22PA972 and 22TL648 that are within the project APE do not contribute to an eligible or unknown NRHP determination. As such, we agree that the project will not have an impact on these two sites, provided that the potentially significant parts of these sites are avoided and protected during construction.

Before we can complete our comments on sites 22TL1460 and 22TL1461, we will need their status clarified. The site cards for these sites were marked as unknown eligibility, but the report describes them as ineligible. We look forward to receiving a clarification on these two sites and finalizing our comments.

Please provide a copy of this letter to Mr. Johnson. Please contact me or Patty Miller Beech at (601) 576-6940, if you have any questions, or if there may be any errors in our accounting of the sites.

Sincerely,

Greg Williamson
Review and Compliance Officer

FOR: Katie Blount
State Historic Preservation Officer

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mississippi Ecological Services Field Office
6578 Dogwood View Parkway, Suite A
Jackson, Mississippi 39213
Phone: (601)965-4900 Fax: (601)965-4340

November 2, 2016

IN REPLY REFER TO:
20174-070

Mr. John Baxter
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, Tennessee 37902

Dear Mr. Baxter:

The Fish and Wildlife Service (Service) has reviewed the information in your letter dated October 26, 2016, regarding Tennessee Valley Authority's proposed West Batesville-North Oakland 161kv Transmission Line Project in Panola, Tallahatchie, and Yalobusha Counties, Mississippi. Our comments are submitted in accordance with the Endangered Species Act (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.).

There are no known northern long-eared bat hibernacula or maternity roost trees in Panola, Tallahatchie or Yalobusha Counties, therefore, the proposed project may affect the northern long-eared bat but will not result in prohibited incidental take pursuant to the final 4(d) rule. In an effort to further minimize potential effects to this species, you have committed to conduct tree removal outside of June 1-July 31 when NLEB pups could be present in maternity roosts. The Service appreciates TVA's willingness to adopt conservation measures that further minimize potential adverse effects to this species.

No further consultation under the ESA is required with this office unless there are changes in the scope or location of the proposed project. If you have any questions, please contact David Felder in our office, telephone: (601) 321-1131.

Sincerely,

for Stephen M. Ricks
Field Supervisor
Mississippi Field Office

MISSISSIPPI Department of
MDAH
ARCHIVES & HISTORY

December 20, 2016

Mr. Clinton E. Jones
Manager, Biological and Cultural Compliance
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, Tennessee 37902

RE: Revised Cultural Resources Survey Report of Tennessee Valley Authority's West Batesville-North Oakland Transmission Line, MDAH Project Log #11-158-16 [re: 09-130-16] (Report #16-0338), Panola, Tallahatchie and Yalobusha Counties

Dear Mr. Jones:

We have reviewed the revised cultural resources report by Hunter B. Johnson, Principal Investigator, received on November 30, 2016, for the above referenced undertaking, pursuant to our responsibilities under Section 106 of the National Historic Preservation Act and 36 CFR Part 800. After review, we concur that with TVA's determinations concerning sites 22TL643, 22TL1460 and 22TL1461.

There remains the possibility that unrecorded cultural resources may be encountered during the project. Should this occur, we would appreciate your contacting this office immediately in order that we may offer appropriate comments under 36 CFR 800.13. If you need further information concerning archaeolcgical sites, please contact Patty Miller-Beech, MDAH Staff Archaeologist, at 601-576-6944 or for historic structures Bill Gatlin, National Register Coordinator, at 601-576-6951.

Sincerely,

Jim Woodrick
Acting Review and Compliance Officer

FOR: Katie Blount
State Historic Preservation Officer

MISSISSIPPI DEPARTMENT of ARCHIVES AND HISTORY

MDAH

HISTORIC PRESERVATION
Jim Woodrick, director
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February 14, 2017

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

RE: Phase I Cultural Resources Survey of access roads associated with TVA's West Batesville-North Oakland transmission line project, (TVA) MDAH Project Log #02-038-17, Report #17-0047, Panola, Tallahatchie and Yalobusha Counties

Dear Ms. Shuler:

We have reviewed the November, 2016, cultural resources survey report by Hunter Thompson, Principal Investigator, with Tennessee Valley Archaeological Research, received on February 8, for the above referenced undertaking, pursuant to our responsibilities under Section 106 of the National Historic Preservation Act and 36 CFR Part 800. After reviewing the information provided, we concur that no archaeological resources eligible for listing in the National Register of Historic Places were identified within the project's area of potential effects. We do not concur that no sites eligible for listing in the NRHP are located in the off-ROW access roads portion of the APE. All sites outside of the APE listed as unknown NRHP eligibility are pending further investigation. It is our determination that there will be no effect to cultural resources. Therefore, we have no objection with the undertaking. We would appreciate receiving GIS shapefiles for the surveyed areas to assist us in plotting the survey.

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

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

Sincerely,

Hal Bell

Hal Bell
Review and Compliance Officer

FOR: Katie Blount
State Historic Preservation Officer

MISSISSIPPI DEPARTMENT of ARCHIVES AND HISTORY

MDAH

HISTORIC PRESERVATION DIVISION
P. O. BOX 571
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Phone 601-576-6940 Fax 601-576-6955
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August 10, 2017

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

RE: Phase II Archaeological Testing of Five Sites on the West Batesville-North Oakland Transmission Line, (TVA) MDAH Project Log #07-075-17, Report #17-0231, Panola and Tallahatchie Counties

Dear Ms. Shuler:

We have reviewed the June 26, 2017, cultural resources survey report by Shawn Patch, with New South Associates, received on July 20, 2017, for the above referenced undertaking, pursuant to our responsibilities under Section 106 of the National Historic Preservation Act and 36 CFR Part 800. Before we can concur, we will need the following corrections:

1. Remove the examined areas from the parameter of original site delineation and;
2. Submit revisit cards with this change; Provided this is done, we would concur that the project will have no effect on sites 22PA1208, 22PA1231, 22TL1454 and 22TL1457. The NRHP status of uninvestigated areas will remain undetermined until additional investigations can be performed. We also concur that site 22TL1453 is eligible for listing in the NRHP and we concur that the project will have an adverse effect on the resource and should be avoided. If the site cannot be avoided, we would recommend a Phase III recovery.

If you need more information, please let me know.

Sincerely,

Hal Bell

Hal Bell
Review and Compliance Officer

FOR: Katie Blount
State Historic Preservation Officer

MISSISSIPPI DEPARTMENT of ARCHIVES AND HISTORY

MDAH

HISTORIC PRESERVATION DIVISION
P. O. BOX 571
Jackson, MS 39205-0571
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Website: mdah.ms.gov

October 4, 2017

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

RE: Phase II Archaeological Testing of Five Sites on the West Batesville-North Oakland Transmission Line, (TVA) MDAH Project Log #07-075-17 (02-089-17) (01-105-17), Report # 17-0231, Panola and Tallahatchie Counties

Dear Ms. Shuler:

We have reviewed the September 5, 2017, Phase II survey report, by Shawn Patch, Principal Investigator, with New South Associates, received on September 11, 2017, for the above referenced undertaking, pursuant to our responsibilities under Section 106 of the National Historic Preservation Act and 36 CFR Part 800. After reviewing the information provided, we concur that site 22TL1453 is eligible for listing in the National Register of Historic Places under Criterion D and the project as currently proposed would have an Adverse Effect under Criteria I (physical destruction of all or part of the historic property). We also concur that a Memorandum of Agreement for the undertaking's effects on 22TL1453, which will include a Phase III data recovery plan, shall be developed with MDAH. We also concur that sites 22PA1208, 1231, 1454 and 1457 are ineligible for listing in the NRHP.

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

If you need further information, please let me know.

Sincerely,

Hal Bell

Hal Bell
Review and Compliance Officer

FOR: Katie Blount
State Historic Preservation Officer

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

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Stream Crossings along the Proposed West Batesville – North Oakland 161-kV Transmission Line Right-of-Way in Tallahatchie, Panola, and Yalobusha Counties, Mississippi

Stream ID	Stream Type	Streamside Management Zone Category	Stream Name	Field Notes
001	Perennial	Category A 50ft	Running Slough	8-15' wide; 1-3' deep; sand/gravel substrate
002	Intermittent	Category A 50ft	Johnson Creek	crosses ROW adjacent to Farrish Gravel Rd; 6-15' wide; 1/2 - 2' deep; sand/gravel substrate
003	Other	Category A 50ft	NA	Pond in ROW
004	Perennial	Category A 50ft	Unnamed tributary. Goes underground	8-12' wide; 1-2' deep
005	Intermittent	Category A 50ft	Unnamed tributary to Johnson Creek	Headcut spring with running water, Gambusia present, most likely intermittent, Width-10', Depth-8', Substrate-Clay, Forested
006	Intermittent	Category A 50ft	Unnamed tributary to Johnson Creek	Medium intermittent, Width-20', Depth-5', Substrate-Clay with gravel in riffles, Forested
007	Other	Category A 50ft	NA	Pond
008	Other	Category A 50ft	NA	Pond
009	Intermittent	Category A 50ft	O'Brien Creek	sand/gravel substrate; 5-6' wide; 1/2' deep;
010	Intermittent	Category A 50ft	Unnamed tributary to O'Brien Creek	stream=8-10' wide; 1' deep; sand/gravel substrate; channel=15-20' deep
011	Other	Category A 50ft	NA	Pond
012	Intermittent	Category A 50ft	Unnamed tributary to O'Brien Creek	6-10' wide; 1' deep; channel = 10-15' deep
013	Intermittent	Category A 50ft	Unnamed tributary to O'Brien Creek	intermittent stream running through ROW; sand/gravel substrate; 6-12' wide
014	Intermittent	Category A 50ft	Unnamed tributary to O'Brien Creek	intermittent stream in ROW; 6-10' wide
015	Perennial	Category A 50ft	Unnamed tributary to O'Brien Creek	Medium perennial, Width-30', Depth-8', Substrate-Sand/Gravel, Forested, Confluence with small intermittent, Centrachid sp.

Stream ID	Stream Type	Streamside Management Zone Category	Stream Name	Field Notes
				observed in mainstem
016	Intermittent	Category A 50ft	Unnamed tributary to O'Brien Creek	Small intermittent, Width-5', Depth-6', Substrate-Clay, Forested
017	Intermittent	Category A 50ft	Unnamed tributary to O'Brien Creek	Deep, eroded intermittent, Width-25', Depth-20', Substrate-Sand/Gravel, Forested
018	Perennial	Category A 50ft	Unnamed tributary to Little Tallahatchie	perennial stream crossing ROW, adjacent to Tocowah Road; 12-20' wide; 1-3' deep; sand/gravel/cobble
019	Intermittent	Category A 50ft	Unnamed tributary to Little Tallahatchie	intermittent stream in ROW
020	Other	Category A 50ft	NA	Pond in ROW
021	Perennial	Category A 50ft	Old Yocona River	perennial stream in ROW; 10-15' wide; cross via existing ford
022	Perennial	Category A 50ft	Yocona River	Large perennial (Yocona River), Width-200', Depth-20', Substrate-Clay, Agricultural field
023	Perennial	Category A 50ft	Unnamed tributary to Yocona River	Small perennial, W-12', Depth-3', Substrate-Sand/Gravel, Thicket
024	Other	Category A 50ft	NA	Pond
025	Intermittent	Category A 50ft	Unnamed tributary to Yocona River	Bridge. Intermittent Stream 3'w 2'd
026	Intermittent	Category A 50ft	Unnamed tributary to Yocona River	
027	Perennial	Category A 50ft	Unnamed tributary to Yocona River	Medium perennial, Width-20', Depth-6', Substrate-Sand/Gravel, Forested
028	Intermittent	Category A 50ft	Unnamed tributary to Shelton Creek	Small intermittent, Width-4', Depth-3', Substrate-Clay, Forested
029	Perennial	Category A 50ft	Unnamed tributary to Shelton Creek	Small perennial, Width-6', Depth-4', Substrate-Clay/Sand, Forested
030	Perennial	Category A 50ft	Shelton Creek	Large perennial, Width-20', Depth-6', Substrate-Sand/Gravel, Forested
031	Perennial	Category A 50ft	Shelton Creek	Medium perennial, Width-10', Depth-5', Substrate-Clay, Forested

Stream ID	Stream Type	Streamside Management Zone Category	Stream Name	Field Notes
032	Perennial	Category A 50ft	Unnamed tributary to “Lake” Martha	Perennial, Width-6', Depth-2', Forested, ROW crosses stream several times throughout
033	Intermittent	Category A 50ft	Unnamed tributary to “Lake” Martha	Intermittent, Width-8', Depth-1', Substrate-Sand, Forested
034	Other	Category A 50ft	NA	Pond
035	Intermittent	Category A 50ft	Unnamed tributary to Sherman Creek	WWC/Intermittent?, Width-20', Depth-6', Substrate-Clay, Forested
036	Intermittent	Category A 50ft	Unnamed tributary to Sherman Creek	Intermittent, width-6', Depth-0.5', Substrate-Clay/Gravel, Forested
037	Perennial	Category A 50ft	Sherman Creek	Perennial, gravel/boulder substrate 5'w 3'd fish present
038	Intermittent	Category A 50ft	Unnamed tributary to Sherman Creek	Intermittent, gravel/sand substrate, well defined bed and bank, aquatic insects present 3'w 1.5'd
039	Intermittent	Category A 50ft	Unnamed tributary to Sherman Creek	Intermittent, sand/gravel substrate 12'w 3'd strong bed/bank
040	Intermittent	Category A 50ft	Unnamed tributary to Sherman Creek	Intermittent 7'w 4'd gravel/sand strong bed and bank. Aquatic insects observed
041	Intermittent	Category A 50ft	Unnamed tributary to Sherman Creek	Intermittent 3'w 2'd strong bed/bank gravel/sand as substrate some flowing water
042	Intermittent	Category A 50ft	Unnamed tributary to Sherman Creek	Intermittent 6'w 4'd gravel/sand substrate aquatic insects present
043	Intermittent	Category A 50ft	Unnamed tributary to Sherman Creek	Intermittent 2'w 5'd strong bed/bank aquatic insects present. Sand/silt substrate
044	Intermittent	Category A 50ft	Unnamed tributary to Sherman Creek	Intermitting 4'w 4'd sand/gravel substrate. Aquatic insects
045	Intermittent	Category A 50ft	Unnamed tributary to Sherman Creek	Intermittent 20'w 5'd gravel sand, running next to center line

Stream ID	Stream Type	Streamside Management Zone Category	Stream Name	Field Notes
046	Intermittent	Category A 50ft	Unnamed tributary to North Fork Tillatoba Creek	Intermittent stream with 3’w x 2’d channel. Sand/gravel substrate. Steep slope on both banks.
047	Other	Category A 50ft	NA	Pond
048	Other	Category A 50ft	NA	Pond
049	Perennial	Category A 50ft	Tillatoba Creek	Stream banks appear unstable with recent signs of severe erosion.
050	Intermittent	Category A 50ft	Unnamed tributary to North Fork Tillatoba Creek	3’w x 3’d channel with gravel/sand/clay substrate.
051	Perennial	Category A 50ft	North Fork Tillatoba Creek	Perennial stream with large sand bars.
052	Perennial	Category A 50ft	Bellamy Creek	10'w x 1'd gravel/sand substrate flowing water
053	Intermittent	Category A 50ft	Unnamed tributary to Hunter Creek	3’w x 3’d channel with sand/ gravel/ silt substrate.
054	Other	Category A 50ft	NA	Pond/ wetland.
055	Intermittent	Category A 50ft	Unnamed tributary to Hunter Creek	10’w x 6’d channel with clay substrate.
056	Perennial	Category A 50’	Unnamed tributary to Hunter Creek	6’w x 1’d channel with mud substrate.
057	Perennial	Category A 50’	Unnamed tributary to Hunter Creek	12’w x 6’d channel with gravel/ clay substrate.
058	Intermittent	Category A 50’	Unnamed tributary to Hunter Creek	4’w x 2’d channel with clay/ silt substrate.
059	Intermittent	Category A 50’	Unnamed tributary to Hunter Creek	Intermittent 3.5'w 1.5'd strong bed/bank water flowing gravel/silt substrate
060	Perennial	Category A 50’	Unnamed tributary to Hunter Creek	Large Perennial 50'w 15'd gravel/boulders. Fish observed
061	Other	Category A 50’	NA	Pond
062	Perennial	Category A 50’	Unnamed tributary to Hunter Creek	Perennial 20'w x 7'd gravel substrate flowing water with aquatic insects and fish

Stream ID	Stream Type	Streamside Management Zone Category	Stream Name	Field Notes
063	Intermittent	Category A 50’	Unnamed tributary to Hunter Creek	Intermittent 10'w 20'd strong bed/bank gravel substrate
064	Perennial	Category A 50’	Unnamed tributary to Little Creek	Perennial 50'w 20'd gravel/sand substrate flowing water
065	Intermittent	Category A 50’	Unnamed tributary to Little Creek	3'w 1’d gravel substrate blue line on topo aquatic insects observed
066	Perennial	Category A 50’	Unnamed tributary of Little Creek	20'w 20'd sand/gravel large bed and bank with flowing water
067	Perennial	Category A 50’	Little Creek	20'w 5'd large bed and bank with flowing water. gravel/sand substrate
068	Other	Category A 50’	NA	Pond
069	Intermittent	Category A 50’	Unnamed tributary to North Fork Tillatoba Creek	Intermittent, large bed/bank 8'w 8'd gravel/sand substrate

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Appendix C – Detailed Wetland Descriptions

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Wetlands Within the Proposed W Batesville – Oakland 161-kV Transmission Line ROW and Access Roads

Several wetlands encountered along the ROW contained emergent wetland habitat within cattle pastures, hay pastures, or fields used for other agricultural purposes. These types of wetland total 3.76 acres on the proposed ROW and were identified as W002, W003, W004, W009, W033, W038, W039b, W047, W048b, W051, W052, and W053. These wetlands contained indicators of wetland hydrology influencing soil physiology such that coloration indicative of wetland conditions was evident in the soil profile. Emergent wetland vegetation dominated these wetland areas. Typical wetland sedges, grasses, and rushes were present, in addition to wetland forbs such as cornsalad (*Valerianella radiata*), day flower (*Murdannia keisak*), and field buttercups (*Ranunculus sardous*). Condition and functional capacity of these wetlands ranged from low to moderately low quality, largely due to or dependent on size, landscape position, and degree of impacts evident (grazing, animal waste, soil compaction, mowing, irrigation, invasive species, etc.).

Unlike the others, one emergent wetland area, W032b, was identified within an emergent portion of a wide wetland drain, surrounded by a kudzu (*Pueraria montana*) dominated upland. This wetland area totaled 0.01 acre within the ROW and exhibited similar wetland parameters to the other emergent wetland areas on the ROW. This wetland provides moderate function to the surrounding watershed due to its association with adjacent wetland area of higher quality.

Access roads traverse 0.92 acre of emergent wetland within the project footprint. The roads crossing wetland habitat were found to be existing, with evidence of current or historical use. Use of these roads occurs to an extent for which wetland area has remained intact while facilitating access. W002/W001-AR7 is an extension of W002, mapped as the first wetland encountered in sequential order with access roads. This wetland comprises 0.1 acre of emergent wetland field on access road 7. W017/W002a, b, c-AR36 is part of the larger wetland complex mapped as W017 on the ROW, but crossing access road 36 in 3 separate locations. The roadbed itself contains emergent wetland within the mapped boundaries; however, forested wetland was present to the north and scrub-shrub wetland present to the south within these wetland areas along access road 36. W002a, b, c-AR36 totals 0.5 acre along access road 36. W023/W003-AR43 is an extension of W023 as it crosses access road 43. W003-AR43 contains a ford across the creek and passes through the wetland area on either side, comprising 0.22 acre of wetland within this access road. While this roadbed is emergent, it is overtopped by the wetland canopy trees comprising the extended wetland area described as W023. Either side of this roadbed consists of the forested wetland complex associated with a riparian bottomland. Similarly, W029/W004-AR62 is an extension of W029 as it is crossed by access road 62 outside the ROW, totaling 0.01 acre of emergent wetland on this access road. These wetland areas contained similar wetland hydrology, hydric soil indicators, and hydrophyte dominance as their associated wetland identified on the ROW. W005-AR62 is the last wetland area identified during the access road review. This wetland consists of a large shallow pond, vegetated with trees and shrubs, and located adjacent to access road 62, in need of improvement.

Scrub-shrub wetland area consisted of the smallest wetland habitat type identified within the ROW. These scrub-shrub wetlands were generally evident where recent or on-going disturbance has resulted in young saplings of low stature or opportunistic shrubs due to the post-disturbance successional stage of the habitat. W008, W014a-b-c, and W015 total 0.30 acre of scrub-shrub habitat. These wetlands consist of low-stature woody vegetation within shallow shorelines of excavated ponds. Given their position and condition, they were assessed as providing low wetland function to the surrounding landscape. Other scrub-shrub wetland habitat was identified within wide wetland drains, where vegetation disturbance has resulted in current scrub-shrub vegetation conditions. These wetland areas include W010, W012, W013,

W030, W037b, W040, W049, and W050, totaling 1.52 acres within the ROW. These scrub-shrub habitats were assessed as having low to moderate functional capacity, depending on their size, position in the landscape, and relative disturbance. All scrub-shrub wetland habitat exhibited wetland hydrology indicators and hydric soil coloration within the soil profile. Hydrophygic saplings, such as water oak (*Quercus nigra*), sweetgum (*Liquidambar styraciflua*), and black willow (*Salix nigra*), and shrubs such as wax myrtle (*Morella cerifera*), baccharis (*Baccharis halimifolia),* and elderberry (*Sambucus nigra*) comprise the dominant species within this habitat type.

Forested wetland of low and moderate quality totaled 6.76 acres along the ROW. This includes 0.3 acre within man-made depressions across W001, W005, W016, and W039; the first three constituting old mining depression, and the fourth a cattle pond. Pond hydrology has influenced soil physiology such that hydric soil coloration is evident within these wetland areas. Dominant hydrophytic forested species vegetating these depressions included sugarberry (*Celtis laevigata*), slippery elm (*Ulmus rubra*), cherrybark oak (*Quercus pagoda*), sweetgum, and black willow. W022 consists of a vernal pool containing one large sweetgum tree, totaling 0.04 acre, adjacent to an ephemeral drain. The remaining 6.42 acres of low to moderate quality forested wetland within the ROW occurred in wide, flat, linear, riparian drainage systems. W006 and W007 constitute floodplain wetland habitat associated with an unnamed tributary of O'Brien Creek, which feeds the Panola-Quitman Floodway, along with W011. W017, W018, and W019 consist of forested wetland drainages feeding Shelton Creek, tributary to the Yocona River. W023 comprises a portion of the forested wetland inlet to a man-made pond; with W024, W025, and W026, these wetlands feed Sherman Creek and the Panola-Quitman Floodway. W027, W029, W031, W032a, W034-W037a, W041-W046, and W048a all comprise moderate quality forested wetland habitat associated with drainage features feeding Tillatoba Creek, a tributary of the Panola Quitman Floodway. W028 consists of a forested linear drain within the Platner Bayou/Tippo Bayou watershed. All these low to moderate forested wetland areas contained indicators of wetland hydrology and supporting evidence of hydric soil. Dominant canopy vegetation across these forested wetland drains consisted of common species including swamp white oak (*Quercus michauxii*), sweetgum, sycamore, sugarberry, red maple, box elder (*Acer negundo),* silver maple (*Acer saccharinum*), American elm (*ulmus Americana*), willow oak (*Quercus phellos*), and black willow.

The remaining emergent, scrub-shrub, forested wetland area located within the proposed ROW consists of W020 and W021a,b,c,d,e. Combined, this wetland area totals 1.92 acres, and consists of the Buntyn Creek embayment crossing at Martha Lake. W020 is a 0.16 acre forested wetland located between two drains feeding W021a and W021b. W021a and W021b, totaling 0.41 acre, are part of the same forested wetland flat fed by W020 within the floodplain of Martha Lake. As duration of inundation increases with proximity to the lake, forested wetland transitions to the scrub-shrub and emergent wetland habitat mapped as W021c and W021d and totaling 0.58 acre. Emergent wetland was located within the floodplain flat along the lake and along a man-made berm center to the ROW and separating the lake into two large open water areas. Further south, the wetland complex again becomes forested and is mapped as W021e with 0.77 acre along the ROW. This wetland complex scored as high quality due to size, landscape position, hydrologic influence, habitat diversity, features, and condition habitats present. All portions on the wetland complex exhibited wetland hydrology indicators, which have influenced soil physiology such that hydric soil coloration was evident throughout. Forested portions of the wetland complex were dominated by sycamore, sweetgum, black willow, red maple, and slippery elm; whereas the scrub-shrub counterpart contained similar species but younger and lower stature, overtopping emergent hydrophytic vegetation such as soft pathrush (*Juncus effusus*), bulrush (*Scirpus cyperinus*), and seedbox (*Ludwigia alternifolia*).

Appendix D – Noise During Transmission Line Construction and Operation

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Noise During Transmission Line Construction and Operation

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

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

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

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

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

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

Construction Noise

Construction noise impacts would vary with the number and specific types of equipment on the job, the construction methods, the scheduling of the work, and the distance to sensitive noise receptors such as houses. Typical construction activities for a transmission line are described in Section 2.2. Maximum noise levels generated by the various pieces of construction equipment typically range from about 70 to 85 dBA at 50 feet (Bolt et al. 1971). An exception would be the use of track drills for building roads and installing foundations in rocky areas; track

drills have a typical maximum noise level of 98 dBA at 50 feet. Use of track drills is not expected to be widespread.

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

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

Operational Noise

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

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

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

Literature Cited

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