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MEMPHIS REGIONAL MEGASITE POWER SUPPLY

# DRAFT ENVIRONMENTAL ASSESSMENT

**Fayette and Haywood Counties, Tennessee**

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# ACRONYMS, ABBREVIATIONS, AND GLOSSARY OF TERMS USED

| | |
|---|---|
| **Acre** | A unit measure of land area equal to 43,560 square feet |
| **access road** | A dirt, gravel, or paved road that is either temporary or permanent, and is used to access the right-of-way and transmission line structures for construction, maintenance, or decommissioning activities |
| **APE** | Area of potential effect |
| **BMP** | Best management practice or accepted construction practice designed to reduce environmental effects |
| **circuit** | A section of conductors (three conductors per circuit) capable of carrying electricity to various points |
| **conductors** | Cables that carry electrical current |
| **CWA** | Clean Water Act |
| **danger tree** | A tree located outside the right-of-way that could pose a threat of grounding a line if allowed to fall near a transmission line or a structure |
| **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 |
| **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 |
| **FPPA** | Farmland Protection Policy Act |
| **GIS** | Geographic Information System |
| **groundwater** | Water located beneath the ground surface in the soil pore spaces or in the pores and crevices of rock formations |
| **guy** | A cable connecting a structure to an anchor that helps support the structure |
| **hydric soil** | A soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop conditions of having no free oxygen available in the upper part |
| **hydrophytic vegetation** | Aquatic and wetland plants that have developed physiological adaptations allowing a greater tolerance to saturated soil conditions including with limited or absence of oxygen |

| | |
|---|---|
| **I-** | Interstate |
| **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 |
| **loop line** | A transmission line connection made by “looping” or routing the line through the substation or switching station by building two circuits to the station from two tap points in an existing line and removing the line between the two tap points. A loop normally would connect into two new breakers at the station. |
| **LPC** | Local power company |
| **MSC** | McCallum-Sweeney’s Consulting |
| **NEPA** | National Environmental Policy Act |
| **NESC** | National Electric Safety Code |
| **NHPA** | National Historic Preservation Act |
| **NRHP** | National Register of Historic Places |
| **outage** | An interruption of the electric power supply to a user |
| **PI** | Point of intersection at which two straight transmission line sections intersect to form an angle |
| **riparian** | Related to or located on the banks of a river or stream |
| **ROW** | Right-of-way, a corridor containing a transmission line |
| **runoff** | That portion of total precipitation that eventually enters a stream or river |
| **SHPO** | State Historic Preservation Officer |
| **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 |
| **TDEC** | Tennessee Department of Environment and Conservation |
| **TDEC** | Tennessee Department of Transportation |
| **threatened species** | A species likely to become endangered within the foreseeable future |
| **TL** | Transmission line |
| **TNBWG** | Tennessee Bat Working Group |
| **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 |
| **US** | United States Highway |
| **USACE** | United States Army Corps of Engineers |

| | |
|---|---|
| **USEPA** | United States Environmental Protection Agency |
| **USFWS** | United States Fish and Wildlife Service |
| **USGS** | United States 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 |

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# CHAPTER 1

## 1.0 PURPOSE OF AND NEED FOR ACTION

### 1.1 Proposed Action – Improve Power Supply

The Tennessee Valley Authority (TVA) proposes to build a transmission line loop (referred to hereinafter as "TL") to supply power to the Memphis Regional Megasite (referred to hereinafter as "Megasite") located in Haywood County, Tennessee. The state of Tennessee requested TVA plan for and provide a power supply to the state-owned Megasite that would facilitate the future development of that site. The exact power needs for the Megasite have not been identified at this time pending the future recruitment of customers/corporations (referred to hereinafter as "tenant") for the use of the Megasite.

TVA proposes to site and plan for routes capable of supporting both a 6.5-mile 161-kilovolt (kV) TL and a 3.4-mile 500-kV TL power supply option (Figure 1-1). Planning for both potential voltages would reduce the normal process time for siting, constructing, and placing a TL into operation. As a result, the State would be able to attract potential industrial tenants ready to find placement for their operations. TVA would purchase right-of-way (ROW) easements that provide the necessary rights to construct, operate, and maintain the proposed TL route. These easements would accommodate various widths to allow TVA the flexibility to provide the voltage needed at the Megasite. TVA would only construct *either* a 161-kV *or* a 500-kV double-circuit[1] "loop" TL.

The ROW TVA proposes to acquire totals approximately 158 acres. The in-service date for the TL would be determined once the need for the TL has been identified by an industrial company locating at the Megasite.

### 1.2 Need for the Proposed Action

The state of Tennessee owns 1,720 acres in the Stanton, Tennessee, area between Memphis and Jackson. The State-prepared property was certified as a Megasite in 2006 by McCallum-Sweeney Consulting (MSC) (McCallum Sweeney 2015). MSC is a site selection firm specializing in the certification of properties as ready for development by large-scale manufacturing (TVA 2015a). The Megasite property is zoned for industrial use and is now being marketed by the State to major corporations with the intent of promoting jobs, developing property, and creating a tax base for the State. Advantages of the Megasite location include easy access to the CSX Railroad, U.S. Route (US) 70/79, and State Routes (SR) 179 and 222. Additionally, Interstate (I-) 40 lies about 5 miles southeast of the site converging with SRs 179 and 222 at Exits 47 and 42, respectively.

The current electric supply available in the vicinity of the Megasite, however, is not capable of supporting a large industrial load. To meet the foreseeable power demand for an industrial tenant to locate on the Megasite, TVA would need to provide electric service to the area. The power supply to the area would serve the new tenant with a reliable source of power. While TVA would build the TL to supply power to the Megasite, TVA has no

[1] A circuit is a section of conductors capable of carrying electricity to various points. There are three conductors per circuit.

property interest within the boundaries of the Megasite nor any other Federal control or jurisdiction over that area.

Although the local power company (LPC) could request additional power needs following the identification of an industrial tenant locating on the Megasite property, the necessary time needed for the TL siting, environmental review, and ROW acquisition process could delay occupancy or limit the number and type of industries/corporations that are ready to locate and commence operation at the site.

In anticipation of an industrial tenant occupying the Megasite, the state of Tennessee requested TVA begin the process to provide power to serve the Megasite. Because no tenant for the Megasite has yet been identified, the voltage that would be needed to support the Megasite has not yet been determined. The state of Tennessee indicated that the industrial tenants occupying the Megasite would require either a 161-kV or a 500-kV TL. To reduce the time frame typically necessary to construct a TL to serve the Megasite, TVA would address the anticipated need for power to the Megasite by having both a 161-kV and a 500-kV route. This would allow TVA the flexibility to meet a shorter, more reasonable in-service date to provide power to the Megasite, thereby making the Megasite more attractive to a greater number of potential industrial tenants.

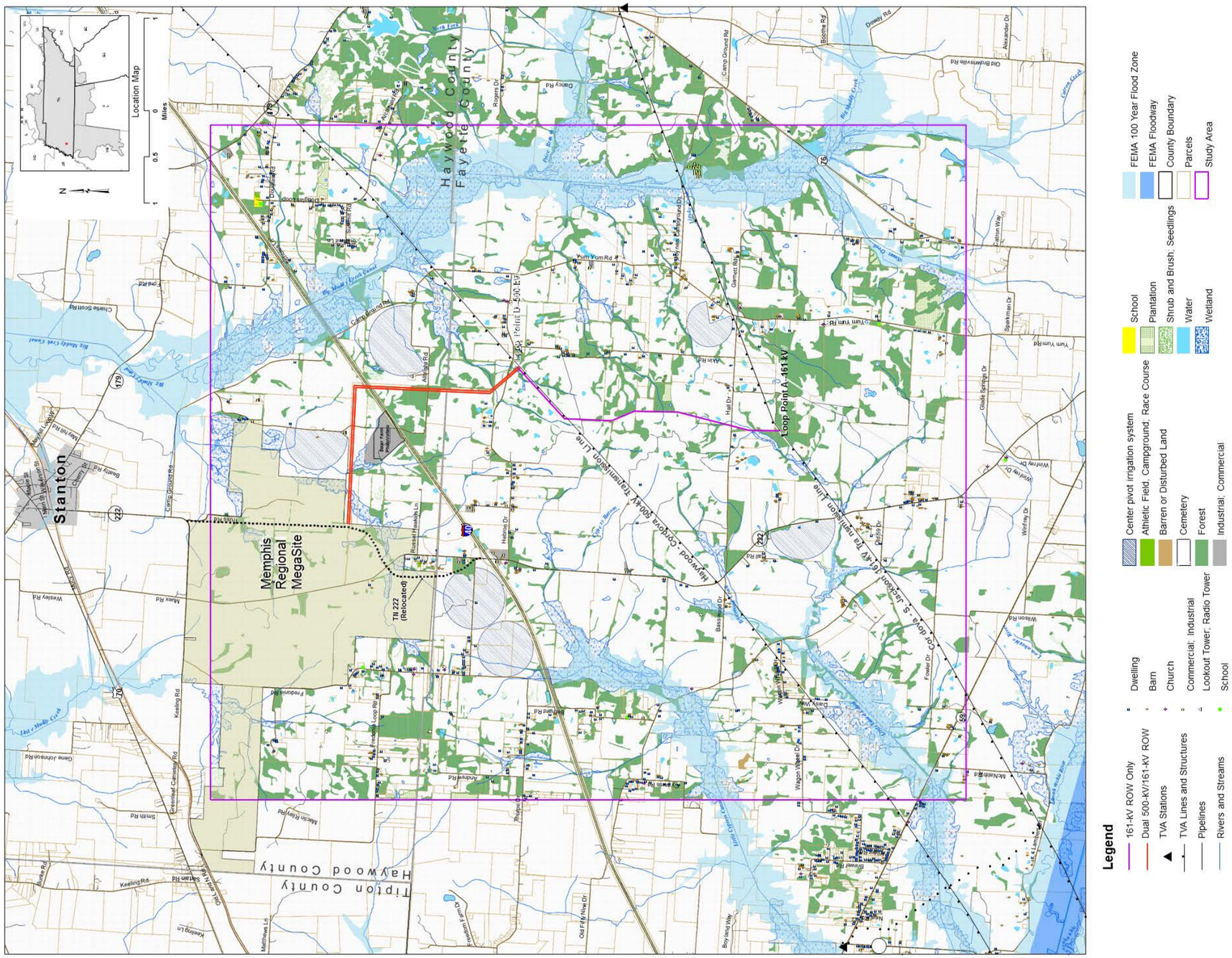
## 1.3 Decisions to be Made

The primary decision before TVA is whether to provide a new 161-kV or 500-kV power supply to the Megasite to support an industrial load[2]. Considerations involved in the building of the proposed TL are listed below. A detailed description of the alternatives is provided in Section 2.1.

- Timing of the proposed improvements;
- Most suitable route for the proposed 161-kV TL;
- Most suitable route for the proposed 500-kV TL;
- Optimal power supply for an identified industrial tenant; and
- Determination of any necessary mitigation and/or monitoring to meet TVA standards and to minimize the potential for damage to environmental resources.

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

Figure 1-1. Proposed Transmission Line Routes to the Memphis Regional Megasite in Haywood and Fayette Counties, Tennessee



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## 1.4 Related Environmental Reviews and Documentation

In 2006, TVA entered into a contract with MSC for services involving the evaluation and certification of sites suitable for industrial development in the TVA Services area. This TVA action was covered under Categorical Exclusions 5.2.2, 5.2.4, and 5.2.27. The certification of sites provides a prospective industry to understand, on the front end of choosing a site, the potential benefits or risks associated with a site.

In 2015, TVA completed the Integrated Resource Plan (TVA 2015b) 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 2015c).

## 1.5 Scoping Process and Public Involvement

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

- Chickasaw Nation
- Tennessee State Historic Preservation Officer (SHPO)
- United Keetoowah Band of Cherokee Indians in Oklahoma

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

TVA developed a public communication plan that included a website with information about the project, a map of the alternative routes, and feedback mechanisms. The 94 property owners who could potentially be affected by any of the route alternatives or had property near the route alternatives, along with 30 public officials, were asked for comments and invited to a project open house. TVA used local news outlets and notices placed in the local newspapers to notify other interested members of the public of the open house. TVA held the open house on April 24, 2014, at the Old National Guard Armory, 100 Boyd Avenue, Brownsville, Tennessee. The open house was attended by 72 people.

At the open house, TVA presented maps with a network of alternative TL routes, comprised of 20 different line segments to the public for comment (see Figure 1-2)

The primary concerns expressed by the public were the effects of the proposed TL on farmland in the area (including impacts to existing and planned pivot irrigation systems), and on property values, and the need for the TL as well as the increased urbanization of the area possibly caused by the Megasite. Owners also voiced concerns relative to health issues and impacts of the proposed TL on visual quality and natural, historical, and cultural resources.

A 30-day public review and comment period was provided following the open house, during which TVA accepted public comments on the project including alternative TL routes. 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.

In response to information received at the open house, comments submitted during the comment period and a resolution sent to TVA from the Fayette County Commission, TVA eliminated certain segments and made adjustments to the other proposed segments. The resulting network of alternatives was considered in TVA's analysis and is shown in Figure 1-3. TVA addressed the resolution received from the Fayette County Commission and this process is described in Section 2.3.6. Following the analysis, TVA announced a preferred ROW route that would be purchased to the public in October 2014. This ROW would support the construction, operation, and maintenance of either a 161-kV or 500-kV TL. Letters were sent to affected property owners. The public communication plan on the website was updated to reflect the preferred route information.

Following the announcement of the preferred route, TVA made additional adjustments to the preferred route (Figure 1-1). These adjustments were a result of information obtained from field surveys or at the request of affected property owners (described in Section 2.4.3). The Draft environmental assessment (EA) assesses the environmental impacts of the preferred TL route. TVA is providing an additional 21 days for public comments on this Draft EA.

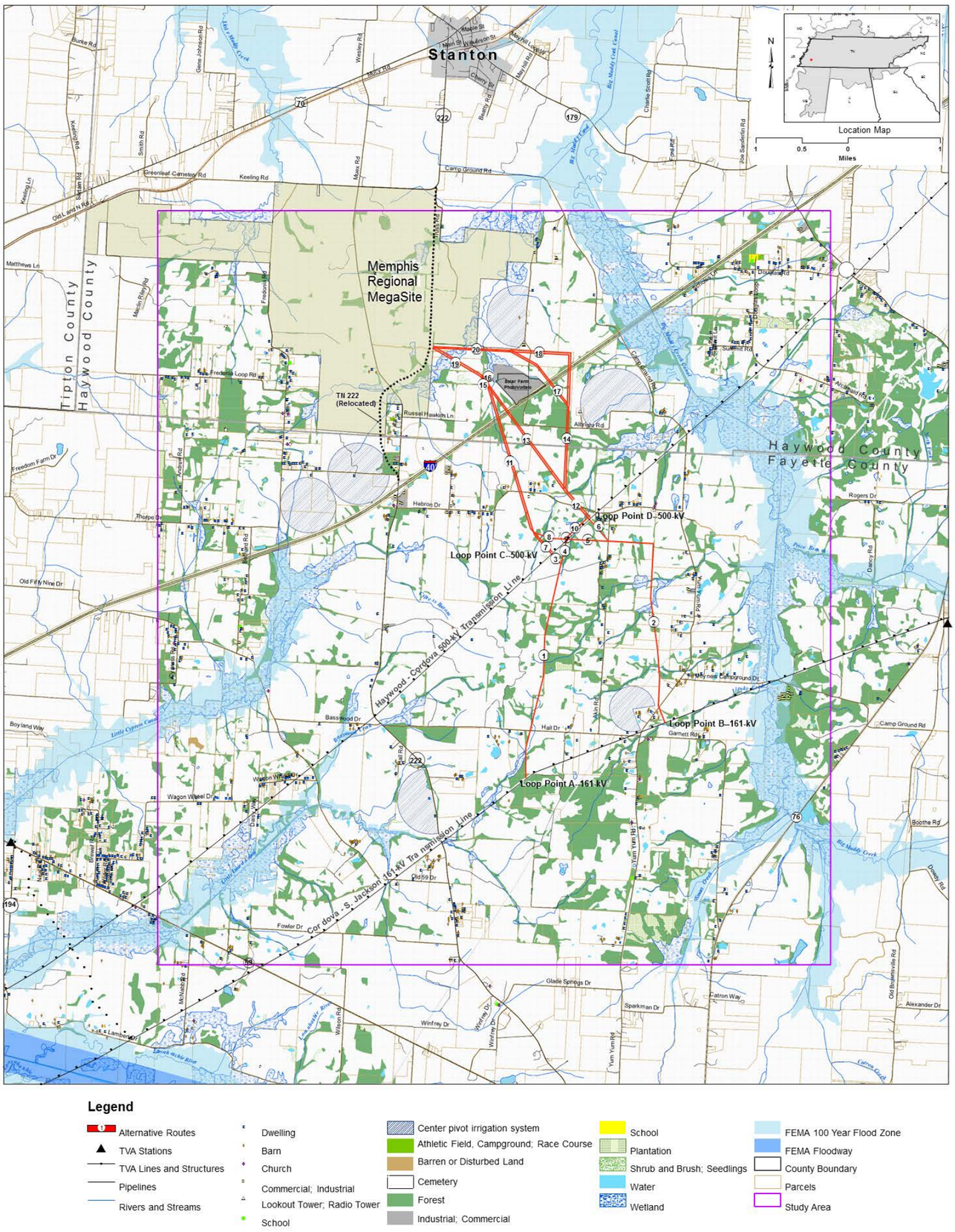
## 1.6 Issues to be Addressed

TVA identified resources that could potentially be affected by the construction, operation, and maintenance of the proposed TL through an early internal scoping process. Based on these deliberations, potential impacts to the following environmental resources are addressed in this EA.

- 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 and prime farmland
- Recreation, parks, and managed areas
- Socioeconomics and environmental justice

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.

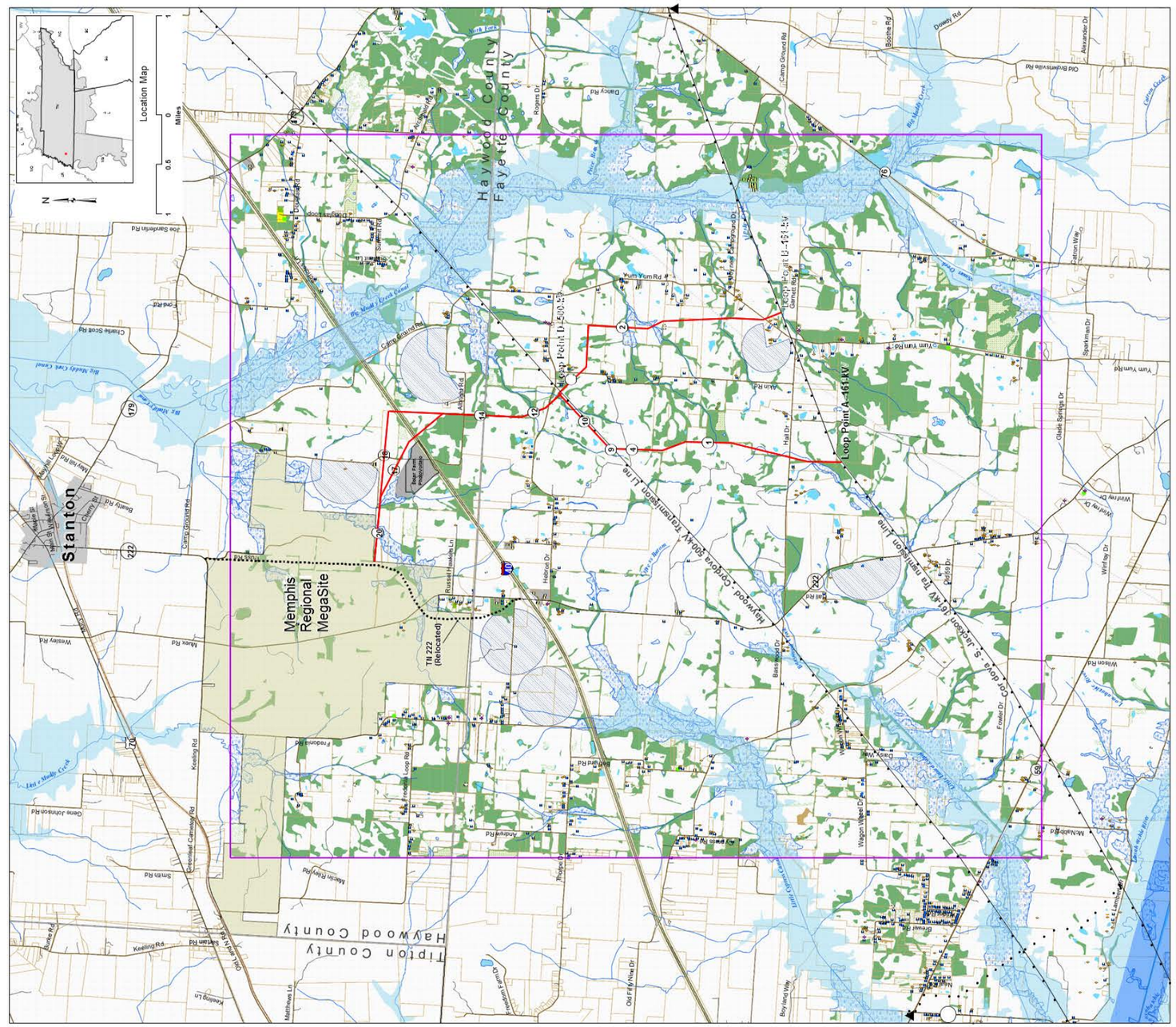
**Figure 1-2. Proposed Alternate Route Segments for the Transmission Line Loop into the Memphis Regional Megasite in Haywood and Fayette Counties, Tennessee**




**Legend**

- Alternative Routes
- TVA Stations
- TVA Lines and Structures
- Pipelines
- Rivers and Streams
- Dwelling
- Barn
- Church
- Commercial; Industrial
- Lookout Tower; Radio Tower
- School
- Center pivot irrigation system
- Athletic Field, Campground; Race Course
- Barren or Disturbed Land
- Cemetery
- Forest
- Industrial; Commercial
- School
- Plantation
- Shrub and Brush; Seedlings
- Water
- Wetland
- FEMA 100 Year Flood Zone
- FEMA Floodway
- County Boundary
- Parcels
- Study Area

**Figure 1-3 Alternative Route Segments Included in TVA's Analysis for the Proposed Transmission Line Loop into the Memphis Regional Megasite in Haywood and Fayette Counties, Tennessee**



## 1.7 Necessary Federal Permits and Licenses

Prior to construction, a permit would be required from the Tennessee Department of Environment and Conservation (TDEC) 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 for burning trees and other combustible materials removed during construction of the proposed TL. A Section 401 Water Quality Certification or an Aquatic Resource Alteration Permit would be obtained as required for physical alterations to waters of the State. A Section 404 Nationwide Permit would be obtained from the United States Army Corps of Engineers (USACE) if construction activities would result in the discharge of dredge or fill into waters of the United States. A permit would be obtained from the Tennessee Department of Transportation (TDOT) for crossing state highways or federal interstates during TL construction.

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# CHAPTER 2

## 2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

As described in Chapter 1, TVA proposes to provide a power supply to the state-owned Megasite in Haywood County, Tennessee. A description of the proposed Action Alternative is provided below in Section 2.1.2. Additional background information about construction, operation, and maintenance of a TL is also provided.

This chapter has seven major sections:

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

### 2.1 Alternatives

Two alternatives (i.e., the No Action Alternative and the Action Alternative) are addressed in this EA. Under the No Action Alternative, TVA would not implement the proposed action. The Action Alternative involves the purchase of easements for ROW, use of access roads, and the construction, operation, and maintenance of a proposed TL located between an existing TVA TL and the Megasite property boundary.

#### 2.1.1 The No Action Alternative – TVA Does Not Provide a Power Supply to the Megasite

Under the No Action Alternative, TVA would not provide a power supply to serve the Megasite located in southern Haywood County, contrary to its mission to support economic development across the valley. In this case, the state would seek receiving the appropriate power supply from other sources

Should the state of Tennessee independently provide transmission service by constructing a new TL, the potential environmental effects of implementing the No Action Alternative would likely be comparable to those of the Action Alternative described in Chapter 4. Likewise, the potential impacts for a TL constructed by anyone else would be similar to the impacts assessed in the proposed Action Alternative. However, some variability of impacts could occur as effects of the construction would be dependent upon various factors, such as the route chosen and the construction methods used.

If the project were cancelled, no direct environmental effects are anticipated, as environmental conditions on the site would remain essentially unchanged from current conditions.

### 2.1.2 Action Alternative – TVA Provides a Power Supply to the Megasite

Under the Action Alternative, TVA would purchase the preferred ROW route. This preferred ROW would allow the construction and operation of *either* a 161-kV *or* a 500-kV TL to supply power to the state-owned Megasite. The proposed TL would provide power to the Megasite utilizing a TL "loop" from either the Cordova-South Jackson 161-kV TL or the Haywood Switching Station-Cordova 500-kV TL.

Under the Action Alternative, TVA would identify and purchase a preferred ROW route that could be utilized for either the option of a 161-kV TL or the option of a 500-kV TL (Figure 1-1). The selection of the appropriate voltage and construction of the line would not occur until one or more megasite tenants are identified. Planning for both potential voltages would allow for the siting, environmental review, and ROW easement acquisition to be completed so constructing and placing a TL into operation can begin upon determining the required power voltage. As a result, the State should be able to attract a greater number of potential industrial tenants to occupy the Megasite.

TVA would purchase ROW easements giving it the rights to construct, operate, and maintain a TL loop along the route to provide a power supply to serve the Megasite. These easements would be of various widths to allow TVA the flexibility to provide either voltage needed at the Megasite.

The 161-kV TL power supply option would require two 161-kV circuits be installed on steel-pole, double-circuit structures. The 6.5-mile route would begin between existing Structures 205 and 206 on TVA's Cordova-South Jackson 161-kV TL and would end at the Megasite. The proposed 161-kV TL ROW would require about 2.4 miles of new 100-foot-wide ROW, from the beginning point to the route interception with TVA's Haywood Switching Station-Cordova 500-kV TL ROW. At this junction, the 161-kV route would turn and run parallel with the existing Haywood Switching Station-Cordova 500-kV TL for about 0.7 mile, sharing 40-foot-wide ROW. TVA would purchase an additional 60-foot-wide ROW along this section. The 161-kV route would then turn northwest and continue for 3.4 miles on a 300-foot-wide ROW that could be utilized for either the 161-kV or 500-kV TL circuits.

The 500-kV TL power supply option would require two 500-kV circuits be installed as separate circuits. Lattice-type steel structures would be used for this loop separated by 125 feet between the circuit centerlines. The 500-kV TL power supply option would begin between existing Structures 428 and 427 on TVA's Haywood Switching Station-Cordova 500-kV TL and end at the Megasite. The easement would be 300-foot-wide for this power supply option.

To facilitate the operation of the proposed TL, TVA would modify the TVA system map boards to include the names and numbers of the new TLs.

Additional information describing implementation of the 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 other alternatives were not feasible for the reasons provided below.

#### *2.1.3.1 Provide a Power Supply into the Megasite from Other TVA Source Lines*

During the evaluation of how to serve the Megasite, TVA considered other nearby TLs that could provide a reliable power supply. TVA could supply power from one of three other TVA TLs in the area: the Shelby-Lagoon Creek 500-kV TL, the Covington-Brownsville 161-kV TL, or the Shelby-Covington #2 161-kV TL. Providing a power supply utilizing any of these power sources would result in a significant increase in route length (two to four times longer than proposed routes) and land use impacts, and a potential for greater environmental impacts. Additionally, these increases have higher costs resulting from design and construction of the TL. For these reasons, these alternative source connection points were eliminated from further consideration.

#### *2.1.3.2 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 buried TLs.

Power lines can be buried. However, most buried lines 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 lines require armor casings for safety reasons. Burying higher voltage lines in the 69-kV, 161-kV, and 500-kV range requires extensive excavation as these lines must be encased in special conduits or tunnels. Additionally, measures to ensure proper cooling and to provide adequate access are required. Usually, a road along or within the ROW for buried lines must be maintained for routine inspection and maintenance.

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

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

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

### 2.2.1 Transmission Line Construction

#### *2.2.1.1 Right-of-Way Acquisition and Clearing*

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

TVA would purchase easements from landowners for the new ROW. These easements would give TVA the rights 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 that are located beyond the cleared ROW, but that are tall enough to pass within 5 feet of a conductor or strike a structure should it 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[3]. Marketable timber would be salvaged where feasible; otherwise, woody debris and other vegetation would be piled and burned, chipped, or taken off site. In some instances, vegetation may be windrowed along the edge of the ROW to serve as sediment barriers.

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

*TVA ROW Clearing Specifications, Environmental Quality Protection Specifications for Transmission Line Construction*, *Transmission Construction Guidelines Near Streams* (Appendices B, C, and D), and *Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities* (Muncy 2012) would provide guidance for clearing and construction activities. The emission of criteria pollutants or their precursors would not exceed de minimis levels specified in 40 CFR § 93.153(b). Thus, consistent with Section 176(c) of the Clean Air Act, project activities would be in conformity with the requirements under the State Implementation Plan for attaining air quality standards.

Following clearing and construction, vegetative cover on the ROW would be restored to its condition prior to construction, to the extent practicable. TVA would utilize appropriate seed mixtures as described in Muncy (2012) or work with property owners with impacted crop land to ensure restoration supports or minimizes impacts to production. Erosion controls would remain in place until the plant communities become fully established. Streamside areas would be revegetated as described in Appendices B, C, and D, and in Muncy (2012). 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.

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

#### *2.2.1.2 Access Roads*

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

Culverts and other drainage devices, fences, and gates would be installed as necessary. Culverts installed in any permanent streams would be removed following construction. However, in ephemeral[4]streams the culverts would be left or removed, depending on the wishes of the landowner or any permit conditions that might apply. If desired by the property owner, TVA would restore new temporary access roads to previous conditions. Additional applicable ROW clearing and environmental quality protection specifications are listed in Appendices B and C.

#### *2.2.1.3 Construction Assembly Areas*

A construction assembly area (or “laydown” area) would be required for worker assembly, vehicle parking, and material storage. This area may be on existing substation property or may be leased from a private landowner for the duration of the construction period. The property is typically leased by TVA about a month before construction begins. Properties such as existing parking lots or areas used previously as car lots are ideal laydown areas because site preparation is minimal. Selection criteria used for locating potential laydown areas include an area typically 5 acres in size; relatively flat; well drained; previously cleared; preferably graveled and fenced; preferably wide access points with appropriate culverts; sufficiently distant from streams, wetlands, or sensitive environmental features; and located adjacent to an existing paved road near the 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.

#### *2.2.1.4 Structures and Conductors*

The proposed TL would utilize steel-pole, double-circuit structures for the 161-kV TL loop or laced-steel transmission towers for the 500-kV TL loop. Examples of these structure types are shown in Figures 2-1 and 2-2. Structure heights would vary according to the terrain but would average about 88 feet above ground for the 161-kV poles and 112 feet above ground for 500-kV towers.

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

**Figure 2-1. Typical Steel-Pole, Double-Circuit 161-kV Transmission Line**

**Figure 2-2. Typical 500-kV Laced-Steel Transmission Tower**

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

Poles at angles (angle points) in the TL may require supporting screw, rock, or log-anchored guys. Some angle structures may be self-supporting poles or steel towers, which would require concrete foundations. Most poles would be directly imbedded in holes augured into the ground to a depth equal to 10 percent of the pole's length plus an additional 2 feet. Normally, the holes would be backfilled with the excavated material, but, in some cases, gravel or a concrete-and-gravel mixture would be used, depending on local soil conditions.

For a 500-kV TL, three conductors are bundled to make a single phase. As the TL would need three phases to make up a single 500-kV circuit, these conductors are assembled as shown in Figure 2-2. Each bundled set of conductors making up one phase is attached to porcelain insulators and then suspended from the structure. Again, small overhead ground wires are attached to the top of the structure, to protect the phase conductors from lightning strikes. The foundations of these lattice-steel type structures are usually grillage steel (i.e., a steel network or frame serving as a foundation for supporting a heavy structural load), which is embedded into the ground at various depths. Also, concrete foundations may be used where design conditions dictate or proper soil parameters do not exist for the utilization of the grillage steel.

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

#### *2.2.1.5 Conductor and Ground Wire Installation*

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

### 2.2.2 Operation and Maintenance

#### *2.2.2.1 Inspection*

Periodic inspections of both 161-kV and 500-kV TLs are performed by helicopter aerial surveillance after operation begins. Foot patrols or climbing inspections are performed in order to locate damaged conductors, insulators, or structures, and to discover any abnormal conditions that might hamper the normal operation of the line or adversely affect the surrounding area. During these inspections, the condition of vegetation within the ROW, as well as that immediately adjoining the ROW, is noted. These observations are then used to plan corrective maintenance and routine vegetation management.

#### *2.2.2.2 Vegetation Management*

Management of vegetation along the ROW 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 National Electrical Safety Code (NESC) requirements. TVA uses minimum ground clearance of 24 feet for a 161-kV TL and 30-feet for a 500-kV TL at the maximum line operating temperature. Vegetation management along the ROW would consist of two different

activities: felling of danger trees adjacent to the cleared ROW (as described in Section 2.2.1.1), and vegetation control within the cleared ROW total width. These activities occur on approximately 3- to 5-year cycles.

Management of vegetation within the cleared ROW would include an integrated vegetation management approach designed to encourage the low-growing plant species and discourage tall-growing plant species. A vegetation re-clearing plan would be developed for each 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, or, in rare cases, by helicopter.

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

#### *2.2.2.3 Structure Replacement*

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

## 2.3 Siting Process

The process of siting the proposed TL followed the basic steps listed below.

- Determine the potential existing power sources to supply the TL;
- Define the study area;
- Collect data to minimize potential impacts to cultural and natural features;
- Locate potential loop points;
- Identify general route segments producing potential routes;
- Gather public input; and
- 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 most optimal 161-kV and 500-kV power sources that could supply power to the Megasite. The State indicated a preference for potential power sources that could be routed to the eastern side of the Megasite. The closest 161-kV power source to the Megasite is the Cordova-South Jackson 161-kV TL and the closest 500-kV power source to the Megasite is the Haywood Switching Station-Cordova 500-kV TL. Both TLs run roughly southwest to northeast and are located south-

southeast-east of the Megasite (Figure 1-1). As mentioned in Section 2.1.3.1, additional potential sources in the area were eliminated due to their respective distances from the Megasite.

The study area, which lies in Haywood and Fayette counties, Tennessee, was chosen to allow for the establishment of routes between the most practical power sources and the Megasite. Various characteristics of the surrounding area were also taken into consideration. The study area is approximately 60 square miles as shown in Figure 1-2. The boundaries of the detailed study area were defined by the following:

The northern boundary of the study area is roughly defined by the northern property boundary of the Megasite. As described in Section 2.1.3.1, potential sources north of the Megasite would result in much longer route alternatives and were eliminated from consideration. The northern boundary is located in the southwest portion of Haywood County and is roughly defined by the northern property boundary of the Megasite.

The eastern part of the study area is drained by the Big Muddy Creek, a north-flowing tributary of the Hatchie River that has been canalled in some areas, and commands an extensive wetland area. The eastern boundary of the study area runs in a straight north-south line beginning roughly 4.5 miles east of the Megasite. The boundary crosses the Fayette/Haywood county line before ending south-east of the TL considered as the 161-kV power source.

The western part of the study area is drained by the Little Cypress Canal and Little Laurel Canal—both west-flowing tributaries of the Loosahatchie River. Both tributary systems have associated large wetlands, but the central parts of the study area have higher elevations and better drained, with only a few smaller wetlands and small headwaters streams. The study area is defined on the west as a straight north-south line located approximately two miles west of the approximate center of the Megasite. The western boundary crosses the Fayette-Haywood county line and I-40. A heavily concentrated housing development is located just outside the southwestern corner of the study area.

The southern boundary of the study area is located in Fayette County, about 7 miles south of the State's desired connection point location at the Megasite. Given the location of the TL sources, expansion of the study area further south would result in longer routes involving more land and land use and potential environmental impacts.

### 2.3.2 Characterization of the Study Area

#### *2.3.2.1 Natural and Cultural Features*

The topography in the study area is slightly rolling, although no terrain in the study area is steep enough to raise serious erosion concerns. Soils in the study area are highly erodible alluvium, ideal for crops. This area is defined as coastal plain and as such has little topography change and rich deposits of fertile soil. The Hatchie River and Big Muddy Creek constitute the small amount of open water in the counties. Large areas of wetlands surround both these waterways. Both counties are on the southeastern edge of the New Madrid Seismic Zone, an area susceptible to earthquakes. There are a few churches and cemeteries in the study area.

#### *2.3.2.2 Land Use*

Properties are mostly rectilinear with an east-west and north-south orientation. The area between the Megasite and the existing TLs proposed for use as a power source is a farming community with large agricultural fields and sparse homes located mostly along the small roads. Given the relatively flat land and abundance of rich, fertile soil, the main land use is agricultural. Cotton and soybeans are common crops. Some fields are irrigated with pivot irrigation systems, with more planned for the future. Very few acres are used as tree farming in this study area. The primary industrial plants are cotton gins. The towns of Brownsville, Nutbush, Stanton, and Somerville all support the area agricultural business. Small restaurants, businesses and other establishments make up the towns. A large state-owned solar photo-voltaic "farm" is located nearby on the north side of the interstate southeast of the Megasite. It is operated by the University of Tennessee and would not have any connection to the proposed TLs. The area near the SR 222 and I-40 interchange has a motel, truck stop, and a few other small businesses. There are cell towers near the solar farm approximately 0.5 mile from I-40 on both the north and south sides of the interstate.

#### *2.3.2.3 Transportation*

Most roads through the area mostly follow a rectilinear pattern around farms. TDOT recently rebuilt the I-40 interchange at SR 222. I-40 crosses the study area from northeast to southwest. US 70/79 roughly parallels I-40 to the north and US 64 to the south. Multiple smaller Tennessee state highways are in the study area. No navigable waterways exist in the area. The airports in the area are of a smaller scale and support only local flights.

### 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, and Fayette and Haywood county tax maps. Also used were various proprietary data maintained by TVA in a corporate geo-referenced database (i.e., TVA Regional Natural Heritage file data on sensitive plants and animals and archaeological and historical resources).

Additionally, TVA obtained 2008 orthophotographic imagery of the study area from the state of Tennessee. Although this imagery is several years old, it was deemed sufficient given the relatively unchanged land within study area, and because the imagery was supplemented with field reviews. 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.

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

Calculations from aerial photographs, tax maps, and other sources included 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, including a TL siting engineer and environmental staff.

### 2.3.4 Establishment and Application of Siting Criteria

TVA uses a set of evaluation criteria that represent opportunities and constraints for development of TL routes. These criteria include engineering, social, and environmental. Each of the criteria has several factors that are evaluated in the process. Factors include 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. Application of these constraints is flexible, and TVA can, and does, deviate from them. Identifying feasible TL routes involves weighing and balancing these criteria and making adjustments to them as specific conditions dictate.

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

- **Engineering and Constructability Criteria** include considerations such as terrain (steeper slopes can present major challenges for design and construction), total length of the transmission route, pivot irrigation systems (existing and planned), number of primary and secondary road crossings, the presence of pipeline and TL crossings, and total line 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, and sensitive stream crossings (i.e., those supporting endangered or threatened species), and the number of perennial and intermittent stream crossings, and presence of archaeological and historic sites, churches, and cemeteries..

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

These rankings made it possible to recognize which routes would have the lowest and the highest impacts 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.

The straight-line distances from the nearest 161-kV TVA source, the Cordova-South Jackson 161-kV TL to the Megasite is about 5 miles. That distance, along with the location of I-40, the presence of large agricultural tracts utilizing or planning pivot irrigation, and existing or planned residential development, limited the number of practicable alternative routes that could be identified for the project. Using information gathered during the system studies and data development phases, four potential TL loop points were identified that could be utilized on the existing Haywood Switching Station-Cordova 500-kV and the Cordova-South Jackson 161-kV TLs. The two potential loop points in each TVA source line are as follows:

<u>Cordova-South Jackson 161-kV TL</u>

Loop Point A is located south of Hall Road in Fayette County, between Structures 205 and 206. Loop Point B is located between existing Structures 213 and 214, north of Garnett Road and southeast of Yum Yum Road.

<u>Haywood Switching Station-Cordova 500-kV TL</u>

Loop Point C is between existing Structures 430 and 431 and Loop Point D is between existing Structures 428 and 427. Both 500-kV loop points are south of Hebron Road.

Utilizing the siting criteria identified in 2.3.4 and the identified loop points, twenty route segments, as shown in Figure 1-2, were developed.

#### *2.3.5.1 Changes Made to Route Segments Following Open House*

As mentioned in Section 1.5, TVA received information during and following the open house regarding the current use of land in the area. The majority of the comments pertained to existing and planned pivot irrigation. This information allowed TVA to make changes to the proposed route segments to minimize impacts to the area.

These changes led to the modification of some route segments and the elimination of others. As a result, Loop Point C was eliminated from further consideration to avoid planned pivot irrigation near this loop point. Loop Points A and B (161-kV TL loop points) and Loop Point D (500-kV TL loop) remain unchanged and were included in the analysis. Further changes to the segments were made to address other planned and existing land use. In Table 2-1, the original segments (shown in Figure 1-2) are compared and any modification and/or elimination of the segments, or changes to the segment numbers are described. These changes are reflected in Figure 1-3.

**Table 2-1. Original Segments and Status Following Open House**

| Original Segment Identification (Figure 1-2) | Change Status | Original Voltage Designation | Loop Point |
|---|---|---|---|
| 1 | Modified to allow for existing and planned pivot irrigation. | 161 | A (161-kV) |
| 2 | Modified to allow for existing and planned pivot irrigation. | 161 | B (161-kV) |
| 3 | Eliminated due to existing and planned land use. | 161 | N/A |
| 4 | Modified to allow for existing and planned pivot irrigation. | 161 | N/A |
| 5 | Eliminated due to existing and planned land use. | 161 | N/A |
| 6 | Stayed as originally routed | 161 | N/A |
| 7 | Eliminated due to existing and planned land use. | Shared 161 and 500 | C (500-kV) |
| 8 | Eliminated due to existing and planned land use. | 161 | N/A |
| 9 | Modified to allow for existing and planned pivot irrigation. | 161 | N/A |
| 10 | Modified to allow for existing and planned pivot irrigation. | 161 | N/A |
| 11 | Eliminated due to existing and planned land use. | Shared 161 and 500 | N/A |
| 12 | Modified to allow for existing and planned pivot irrigation. | Shared 161 and 500 | D (500-kV) |
| 13 | Eliminated due to existing and planned land use. | Shared 161 and 500 | N/A |
| 14 | Stayed as originally routed | Shared 161 and 500 | N/A |
| 15 | Eliminated due to existing and planned land use, segment eliminated. | Shared 161 and 500 | N/A |
| 16 | Eliminated due to existing and planned land use, segment eliminated. | Shared 161 and 500 | N/A |
| 17 | Stayed as originally routed. | Shared 161 and 500 | N/A |
| 18 | Stayed as originally routed. | Shared 161 and 500 | N/A |
| 19 | Eliminated due to existing and planned land use. | Shared 161 and 500 | N/A |
| 20 | Stayed as originally routed. | Shared 161 and 500 | N/A |

#### *2.3.5.2 TVA Response to Fayette County Commission Resolution*

Following the open house, TVA received a resolution from the Fayette County Commission asking TVA to explore additional routes located further east than those presented at the open house (Appendix A). The Fayette County Commission believed that eastern routes would impact county residents less and potentially reduce the overall route lengths.

To address the Fayette County Commission's request, another review of the area east of the original proposed segments was conducted and found the following:

- Increased line lengths would be needed;
- Substantial environmental impacts to wetlands and Big Muddy Creek drainage areas would occur;
- More stream crossings would be needed and could result in greater stream bank erosion issues;
- Possible increased impacts could occur to planned pivot irrigation systems.

Any routes developed to the east of the original proposed route segments would result in much higher impacts in the environmental and engineering criteria. Potential routes would cross substantially greater areas of forested wetlands and floodplains, mostly in the vicinity of Big Muddy Creek. As a result, routes to the east were then eliminated from further consideration.

#### *2.3.5.3 Potential Transmission Line Routes*

Four alternative TL routes consisting of a combination of the 11 remaining constituent segments (see Figure 1-3 and Table 2-1) were developed. Routes developed are shown below in Table 2-2.

**Table 2-2. Alternative Routes with Constituent Segments**

| Alternative Route | Constituent Segments | 161-kV Loop Point | 500-kV Loop Point |
|---|---|---|---|
| 1 | 1, 4, 9, 10, 12, 14, 17, 20 | A | D |
| 2 | 1, 4, 9, 10, 12, 14, 18, 20 | A | D |
| 3 | 2, 6, 12, 14, 17, 20 | B | D |
| 4 | 2, 6, 12, 14, 18, 20 | B | D |

### 2.3.6 Route Identification and Evaluation

Each of the four alternative routes offer different opportunities and constraints and are summarized below by engineering, social, and environmental criteria.

<u>Engineering</u>

The existing and planned center pivot irrigation system locations were a major constraint to all routes. In addition, all four routes cross I-40. Routes 3 and 4 cross Yum Yum Road, a heavily traveled local road. Routes 3 and 4 cross multiple natural gas pipelines, resulting in worse engineering scores for those routes. The relatively flat terrain for all routes reduced the number of engineering inputs. The opportunities presented by the engineering category are mostly a result of the topography of the study area. The slope components of this project are nonexistent.

Social

Two residential dwellings are located close to Routes 3 and 4. Additional contributing negative social factors are the amount of new ROW and the number of affected landowners. The ROW acreage for all routes is similar due to the relatively small difference in route lengths. The number of owners along each route was similar and therefore was not a factor.

Public input was strongly considered in the final route selection as well as during field survey of the preferred route to minimize overall impacts to the extent practical.

Environmental

Overall, the environmental analysis for all 4 routes did not provide much separation in environmental effects or scores. Crossings of major streams and forested wetlands were similar for all routes. Additionally, forested acreage that would need to be cleared was very similar for all routes. The only large separation in the analysis data was for minor stream crossings where Routes 1 and 2 had more crossings than Routes 3 and 4. Overall, however, Routes 1 and 2 performed better in the environmental analysis due to slightly better scores in the majority of categories.

Upon completion of the analysis of the criteria described in Section 2.3.4, there was a logical spread in the overall scores of the alternative routes (Table 2-3). Routes 1 and 2 had much lower (better) overall scores than the other two routes because they scored well in all analysis categories. Routes 3 and 4 ranked third and fourth, respectively, in all categories and in the overall rankings.

The scores ranking the alternative routes, shown in Table 2-3 below, ranged from 18.25 for Route 1 to 32.75 for Route 4.

**Table 2-3. Alternative Route Scores**

| Route Rankings | Total Score Based on Criteria Analysis | Alternative Route | Constituent Segments |
|---|---|---|---|
| 1 | 18.25 | 1 | 1, 4, 9, 10, 12, 14, 17, 20 |
| 2 | 21.57 | 2 | 1, 4, 9, 10, 12, 14, 18, 20 |
| 3 | 28.43 | 3 | 2, 6, 12, 14, 17, 20 |
| 4 | 32.75 | 4 | 2, 6, 12, 14, 18, 20 |

## 2.4 Comparison of Alternative Transmission Line Routes

From the three possible alternative loop points and based on eleven possible alternative TL segments (as shown in Figure 1-3), TVA established and considered four alternative routes that ranged between 5.75 and 6.50 miles in length. This section provides analysis of the route segments and their relation to alternative routes.

Segments 1 and 2 represent the two alternative 161-kV loop points. Both segments are located in Fayette County and would require new 100-foot-wide ROW for a 161-kV TL. Both segments were modified to accommodate existing and planned land use. Segments 1 and 2 travel through mostly planted fields or pastures, with some forested areas

interspersed. Some small stream crossings and road crossings are found along these segments. Segment 2 crosses Yum Yum Road.

Segment 3, as noted in Table 2-1, was eliminated from analysis.

Segment 4 remained, but was routed further to the west to accommodate existing and planned land use. Segment 4 is located in Fayette County and would require new 100-foot-wide ROW for a 161-kV TL. This segment crosses mostly open farmland.

Segment 5, as noted in Table 2-1, was eliminated from analysis.

Segment 6 remained as originally routed. Segment 6 is located in Fayette County and would require new 100-foot-wide ROW for a 161-kV TL. This segment crosses mostly open farmland.

Segments 7 and 8, as noted in Table 2-1, were eliminated from analysis.

Segment 9, like segment 4, remained, but was routed further to the west to accommodate existing and planned land use. Segment 4 is located in Fayette County and would require new 100-foot-wide ROW for a 161-kV TL. This segment crosses a soybean field.

Segment 10 requires a 100-foot-wide ROW, but would share 40 feet of this with the existing Haywood Switching Station-Cordova 500-kV TL ROW. Therefore, only 60 feet of new ROW would be required. This segment crosses farmland currently planted in soybeans.

Segment 11, as noted in Table 2-1, was eliminated from analysis.

Segment 12 was slightly modified to allow for land use, both current and planned. This segment requires a new 300-foot-wide ROW designed to serve either dual 161-kV or 500-kV circuits. The segment crosses through pasture and woodlands, along with some small streams and minor roads. Segment 12 would also serve as the loop point for the dual 500-kV power source if this segment is used and a 500-kV power source is needed.

Segment 13, as noted in Table 2-1, was eliminated from analysis.

Segment 14 stayed as originally proposed. This route is a new 300-foot-wide ROW that would support either voltage option. This segment crosses over open pasture and woodlands and also crosses over the Fayette County – Haywood County line.

Segments 15 and 16, as noted in Table 2-1, were eliminated from analysis.

Segments 17 and 18 cross I-40. Each segment would require a new 300-foot-wide ROW designed to serve either dual 161-kV or 500-kV circuits. Both of these segments cross farmland, woodlands and pastures. Segments 17 and 18 pass near a solar farm that is under construction by the state of Tennessee on the north side of I-40.

Segment 19, as noted in Table 2-1, was eliminated from analysis.

Segment 20 crosses some minor roads, cultivated land, and woodlands. This segment would require new 300-foot-wide ROW designed to serve either a 161-kV or 500-kV power source.

### 2.4.1 Alternative Transmission Line Routes

Identifying viable TL routes that could support either a 161-kV or a 500-kV TL presented unique challenges, including the need for 300-foot-wide ROW for the possible dual 500-kV feeds. The existing and planned pivot irrigation systems were a major constraint for all routes. The TL structures could interfere with the operation of these systems, and the water sprayed during operation could cause outages in the TL if it were to hit the conductor. Therefore, it was essential for TVA to ensure that each route alternative would result in a safe and reliable operation of a TL. TVA worked with the property owners on the preferred route to support the continued operation of these pivot irrigation systems. The relatively flat terrain and fairly undeveloped land provided a number of routing opportunities. The absence of densely developed residential housing aided the effort, but care was still taken to minimize effects on land use due to the existing and planned pivot irrigation.

Routes 1 and 2 originate from Loop Point A on the Cordova-South Jackson 161-kV TL. These routes cross mostly cultivated fields and pastures as well as some interspersed forested land. Both these routes parallel the Haywood Switching Station-Cordova 500-kV TL for a short segment before continuing on and crossing over I-40 and terminating into the Megasite boundary. The parallel portion of the 161-kV route was necessitated by a large, existing pivot irrigation system. Proposed Routes 1 and 2 “share” their 500-kV route portions with Routes 3 and 4 from the 500-kV portion. These routes run mainly south to north, cross I-40 and then turn west.

Routes 3 and 4 begin at Loop Point B from the Cordova-South Jackson 161-kV TL. Like Routes 1 and 2, these routes cross mostly cultivated fields and pastures, with some forested land. Both existing and planned pivot irrigation systems are prevalent along these proposed routes. These routes share their 500-kV route proposals with Routes 1 and 2. These routes run mostly south to north, with some southeast to northwest portions, before finally crossing I-40 and turning west to terminate into the Megasite property boundary.

All routes connect to the 500-kV TL from Loop Point D.

### 2.4.2 Identification of the Preferred Transmission Line Route

Based solely on the analysis, Alternative Routes 1 and 2 clearly separated themselves from the other routes. Routes 1 and 2 ranked first or second in all categories.

Alternative Routes 1 and 2 scored similarly. The difference in overall scoring of these two resulted from features (route length and total acreage) along Segments 17 and 18, both located on the same property owner. The initial announcement of TVA’s preferred route utilized Alternative Route 1. Following this announcement to the property owners and posted on TVA’s website (October 2014), the owner of the property along Segments 17 and 18 indicated a preference for the proposed TL to follow Segment 18 (Alternative Route 2) rather than Segment 17 (Alternative Route 1). Because there was little scoring difference for these two routes and to accommodate the property owner’s request, TVA changed the preferred TL route for the Action Alternative to Alternative Route 2.

### 2.4.3 Explanation of Changes to the Preferred Transmission Line Route

During the property owner contact and survey activities, the preferred route was modified in a few locations from the original alignment as presented on the website in October 2014. A list of these modifications and explanations are provided in Table 2-4:

**Table 2-4. Changes to the Preferred Route Following the Preferred Route Announcement in October 2014**

| Location | Adjustment | Explanation of adjustment |
|---|---|---|
| Segment 1, various locations | Minor adjustments to the Point of Intersection (PI) locations and alignments. | Made at owners' requests. All very minor and did not change line length or affect additional owners. |
| Segment 10 | Line location adjusted slightly in the section parallel to the Haywood Switching Station-Cordova 500-kV TL. | Made to accommodate the existing pivot irrigation in the vicinity of an existing structure on the Haywood Switching Station-Cordova 500-kV TL. |
| Segment 14 | Adjustment made to eliminate a PI, allowing for one larger angle PI rather than two smaller angle PIs. | Made to eliminate a PI. Change did not result in a larger structure type for the potential 500-kV double circuit TL. |
| Segment 18 | Preferred Route to follow proposed route Segment 18 instead of route Segment 17. | Made at owner's request. This change resulted in a slightly longer route, but was insignificant overall and resulted in one large PI versus four smaller PIs. |

## 2.5 Comparison of Environmental Effects by Alternative

A summary of the anticipated potential effects of implementing the No Action and the Action Alternative is provided in Table 2-5.

**Table 2-5. 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 effects to groundwater quality or quantity are anticipated to be minor. |
| Surface Water | No changes in local surface water quality are anticipated. | Any effects to local surface waters would be minor and temporary. |
| Aquatic Ecology | Aquatic life in local streams would not be affected. | With the implementation of protective measures, effects to aquatic life in local surface waters are expected to be temporary and insignificant. |
| Vegetation | Local vegetation would not be affected. | Site preparation and clearing of the ROW would have a temporary, minor effect on most local vegetation. An insignificant direct long-term effect on approximately 51 acres of forested areas is anticipated. |
| Wildlife | Local wildlife would not be affected. | Wildlife inhabiting onsite forest, early successional, and edge habitats would be displaced to adjacent local habitats. |

| Resource Area | Impacts From Implementing the No Action Alternative | Impacts From Implementing the Action Alternative |
|---|---|---|
| Endangered and Threatened Species | No effects to endangered or threatened species or any designated critical habitats are anticipated. | No effects to any listed aquatic species or plants are anticipated. Implementing the Action Alternative would result in the removal of not more than 9.6 acres of summer roosting habitat for the federally listed as endangered Indiana bat and threatened northern long-eared bat. TVA would consult with the U.S. Fish and Wildlife Service (USFWS) prior to any clearing or construction along the proposed ROW. |
| Floodplains | Local floodplain functions would not be affected. | Local floodplain functions would not be affected. |
| Wetlands | No changes in local wetland extent or function are expected. | A total of 15.43 acres of wetland are located within the proposed ROW, of which, 8.46 are forested. Forested wetlands would be converted to emergent and/or scrub-shrub wetland habitat thus reducing some wetland functions. |
| 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. The proposed TL would present a minor cumulative visual effect. |
| Archaeological and Historic Resources | No effects to archaeological or historic resources are anticipated. | No effects to archaeological or architectural resources listed in or eligible for listing in the National Register of Historic Places, because no such resources are present. |
| Recreation, Parks, and Natural Areas | No changes in local recreation opportunities or natural areas are expected. | Because of the intervening distance, no local managed areas would be affected. No loss of local formal or informal recreational opportunities is expected. |
| Socioeconomics and Environmental Justice | Over time, the lack of reliable power service could have adverse economic effects to local businesses and residents. | Providing the Megasite a power supply would benefit the area and help maintain economic stability and growth in the area. Any adverse social, economic or environmental justice effects of the proposed TL would be minor and would diminish over time. |

## 2.6 Identification of Mitigation Measures

The following 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.

- TVA would utilize standard BMPs, as described by Muncy (2012), 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, consistent with EO 13112 (Invasive Species), TVA would

follow standard operating procedures for revegetating with noninvasive plant species as defined in Muncy (2012).

- Ephemeral streams that could be affected by the proposed construction would be protected by implementing standard best management practices (BMPs) as identified in Muncy (2012).

- Perennial and intermittent streams would be protected by the implementation of Standard Stream Protection (Category A) as defined in Muncy (2012) and Appendices D and F.

- TVA would enter into a Conservation Memorandum of Agreement (MOA) with USFWS to offset potential indirect effects to Indiana bat and/or northern long-eared bat resulting from habitat removal during construction of the transmission line.

## 2.7 The Preferred Alternative

The Action Alternative, i.e. TVA Provides a Power Supply to the Megasite, is TVA's preferred alternative for this proposed project. TVA would purchase ROW easements and utilize access roads to accommodate the construction, operation and maintenance of either a new 161-kV or a new 500-kV TL to supply power for the State's Megasite.

TVA's preferred alternative TL route for the Action Alternative is Alternative Route Option 2. This 6.5-mile TL route is comprised of Alternative Route Segments 1, 4, 9, 10, 12, 14, 18, and 20. Once a voltage for the Megasite power supply has been determined, TVA would utilize either Loop Point A (161-kV TL) or Loop Point D (500-kV TL) to connect the new TL to the Megasite.

# 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 TL is described in this chapter. The descriptions below of the potentially affected environment are based on field surveys conducted between April and May 2015, on published and unpublished reports, and on personal communications with resource experts. This information establishes the baseline conditions against which TVA decision makers and the public can compare the potential effects of implementing the alternatives under consideration.

The analysis of potential effects to endangered and threatened species and their habitats included records of occurrence within a 3-mile radius for terrestrial animals, a 5-mile radius for plants, and a 10-mile radius for aquatic animals. The analysis of potential effects to aquatic resources included the local watershed, but was focused on watercourses within or immediately adjacent to the proposed ROW and associated access roads. The area of potential effect (APE) for architectural resources included all areas within a 0.5-mile radius from the proposed 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.

Potential effects related to air quality, hazardous and nonhazardous wastes were considered. Potential effects on these resources were found to be minimal or absent because of the nature of the action.

### 3.1 Groundwater and Geology

The project area is located in the Coastal Plain Physiographic Province and is underlain by upper units of the Mississippi embayment aquifer[5] system. The geologic units of the Coastal Plain include deposits of Tertiary sedimentary marine rocks. In the project region, the middle Claiborne aquifer consists of the upper part of the Memphis Sand and is a principle source of water in the region (Lloyd and Lyke 1995). Sands which comprise this aquifer were derived from continental sources and are thick and massive with few clay confining layers[6]. This results in an extremely well connected hydraulic unit which allows large quantities of water to be withdrawn from the aquifer. Due to the absence of carbonate rock strata, the area is not prone to the development of karst[7] features.

Recharge for the middle Claiborne aquifer primarily occurs as precipitation falling directly on surface outcrops of the aquifer units and downward migration of water from overlying aquifers. Predominantly, water flows westward from the topographically higher northern and eastern sides of the aquifer. The discharge zone corresponds with an area subject to

[5] An *aquifer* is an underground layer of material that contains groundwater and is capable of yielding water.
[6] A *confining layers* are a relatively impermeable layer of underground material that tends to isolate or “confine” the aquifer beneath it.
[7] *Karst* refers to a landscape formed over soluble rocks such as limestone, dolomite, and gypsum and characterized by underground drainage systems such as caves and sinkholes.

large groundwater withdrawals underlying the Mississippi River Valley alluvial aquifer (Lloyd and Lyke 1995).

According to the USGS, approximately 244 million gallons of water per day were withdrawn from the Tertiary sand aquifers in fifteen counties of West Tennessee in 2000 (USGS 2000). Public supply use accounted for about 52 percent of the total water withdrawn from the aquifer system. Information provided by the TDEC and USEPA indicated groundwater is the primary source of water supply for Fayette and Haywood counties (USEPA 2015). Information published by USGS (2000) indicated groundwater withdrawals for Fayette County totaled approximately 1.55 million gallons per day and 1.89 million gallons per day for Haywood County.

While there are private wells located in the general area, a public water source is available in project area. The source for this system is from wells which withdraw from the middle Claiborne aquifer. The Haywood County Utility District water quality report states that their water supplies meet all of the state and federal requirements for safe drinking water (Haywood County Utility District 2014).

## 3.2 Surface Water

Precipitation in the general area of the proposed project averages about 53.6 inches per year. The wettest month is December with an average of 5.8 inches of precipitation, and the driest month is August at 2.8 inches. The average annual air temperature is 60.7 degrees Fahrenheit, ranging from a monthly average of 38.4 degrees Fahrenheit in January to 80.9 degrees Fahrenheit in July (National Oceanic and Atmospheric Administration 2002). Stream flow varies with rainfall and averages about 19.9 inches of runoff per year, i.e., approximately 1.47 cubic feet per second, per square mile of drainage area (USGS 2008).

The federal CWA requires all states to identify all waters where required pollution controls are not sufficient to attain or maintain applicable water quality standards and to establish priorities for the development of limits based on the severity of the pollution and the sensitivity of the established uses of those waters. States are required to submit reports to the USEPA. The term “303(d) list” refers to the list of impaired and threatened streams and water bodies identified by the state. Tables 3-1 and 3-2 provide a listing of local streams with their state (TDEC) designated uses and 303(d) impairments.

The project area drains to an Unnamed Tributary of Little Laurel Canal in the Loosahatchie River watershed and to an Unnamed Tributary of Big Muddy Creek in the Hatchie River watershed. Both Little Laurel Canal and Big Muddy Creek have been channelized into canals in the past. All of the streams in the project vicinity are classified by the state (TDEC 2013) for “Fish and Aquatic Life, Recreation, Livestock Watering and Wildlife, and Irrigation” (see Table 3-1). The Unnamed Tributary of Big Muddy Creek is on is on the state 303(d) list (TDEC 2014) as impaired (i.e., not fully supporting its designated uses) due to “total phosphorus, physical substrate habitat alterations, and alterations in instream, side, or littoral vegetative cover” from non-irrigated crop production, irrigated crop production, and channelization (see Table 3-2).

**Table 3-1. Uses for Streams in the Vicinity of the Proposed Right-of-Way for the Proposed Transmission Line for the Memphis Regional Megasite**

| Stream | Use Classification[1] | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | DWS | IWS | FAL | REC | LWW | IRR | NAV | HQ |
| **Mississippi River** | | | | | | | | |
| Hatchie River | X | X | X | X | X | X | | |
| Big Muddy Creek Canal | | | X | X | X | X | | |
| Unnamed Trib | | | X | X | X | X | | |
| Loosahatchie River | | | X | X | X | X | | |
| Little Laurel Canal | | | X | X | X | X | | |
| Unnamed Trib | | | X | X | X | X | | |

[1] Codes: DWS=domestic water supply; IWS=industrial water supply; FAL=fish and aquatic life; REC=recreation; LWW=livestock watering and wildlife; IRR=irrigation; NAV=navigation; HQ=Tier 2 high quality

**Table 3-2. TDEC 303(d) Listed Streams in the Vicinity of the Right-of-Way for the Proposed Transmission Line for the Memphis Regional Megasite**

| Stream | 303 (d) Impaired Stream | | |
|---|---|---|---|
| | Use Support | Cause | Source |
| **Mississippi River** | | | |
| Hatchie River | | | |
| Big Muddy Creek Canal | Impaired | Total Phosphorus; Physical Substrate; Habitat Alterations; Alteration in Instream, Side or Littoral Vegetative Cover | Municipal Point Source; Non-Irrigated Crop Production; Channelization |
| Unnamed Tributary | Impaired | Total Phosphorus; Physical Substrate; Habitat Alterations; Alteration in Instream, Side or Littoral Vegetative Cover | Non-Irrigated Crop Production; Channelization |
| Loosahatchie River | | | |
| Little Laurel Canal | Impaired | Total Phosphorus, Low DO, Substrate Habitat Alteration, Loss of Biological Integrity, E. Coli | Non-Irrigated Crop Production; Channelization; Unknown Source |
| Unnamed Tributary | No | | |

## 3.3 Aquatic Ecology

The proposed project area crosses the Big Muddy Creek and Lower Loosahatchie River watersheds. Streams encountered during field surveys were typical of the Mississippi Valley Loess Plains ecoregion, with relatively low gradients and substrates consisting primarily of silt and sand (Griffith et al. 2009). Previous channelization and removal of riparian areas has impacted streams in this region significantly, resulting in habitat loss and increased siltation for aquatic organisms. A May 2015 field survey documented 47 watercourses. These include seven perennial and four intermittent streams, one 2.3-acre pond, and 35 ephemeral streams which are recognized and categorized by TDEC as wet-weather conveyances (WWC).

Because TL construction and maintenance activities primarily affect riparian conditions and instream habitat, TVA evaluated the existing condition of these factors at each stream crossing along the proposed TL route. Hydrologic determinations were made using the Tennessee Division of Water Pollution Control's Version 1.4 field forms by Tennessee qualified hydrologic professionals in training. These forms evaluate the geomorphology[8], hydrology[9], and biology of each stream.

A listing of stream and pond crossings within the proposed ROW, excluding ephemeral streams (WWCs), is provided in Appendix F. Additional information regarding watercourses located in the vicinity of the project area can be found in Section 3.2 Surface Water.

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

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

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

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

**Table 3-3. Riparian Condition of Streams Crossed by the Proposed Transmission Line for the Memphis Regional Megasite and Associated Access Roads**

| Riparian Condition | Perennial Streams Within ROW | Intermittent Streams Within ROW | Total |
|---|---|---|---|
| Forested | 0 | 0 | 0 |
| Partially forested | 7 | 2 | 9 |
| Non-forested | 0 | 2 | 2 |
| **Total** | **7** | **4** | **11** |

TVA then assigns appropriate SMZs and BMPs based on these evaluations and other considerations (i.e., 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.

The Loess Plains are a productive agricultural area where much of the forest cover has been removed resulting in significant watershed impacts. Alterations to stream habitat resulting from soil erosion, channelization, and instream livestock grazing are common in

[8] The branch of geology that studies the form of the earth's surface
[9] The scientific study of the properties, distribution, and effects of water on the earth's surface, in the soil and underlying rocks, and in the atmosphere.

this region, and inevitably impact aquatic communities and habitat quality (Brim Box and Mossa 1999; Wang et al. 2011). The northern half of the proposed TL is drained by the Big Muddy Creek watershed, a tributary of the Hatchie River, which eventually empties into the Mississippi River in northwestern Tennessee. The Lower Loosahatchie River drains the southern portion of the TL, which is also a tributary of the Mississippi River. Since the proposed TL route would not cross the main stem of the Loosahatchie or Hatchie rivers, the majority of the streams observed in the project area were smaller tributary streams. The aforementioned impacts typical to this ecoregion are likely the primary causes for the degraded habitat conditions observed in the majority of the aquatic watercourses intersecting the proposed TL ROW.

## 3.4 Vegetation

The Mississippi Valley Loess Plains are gently rolling, irregular plains, between 250 to 500 feet in elevation, with loess[10] up to 50 feet thick. Oak-hickory and southern floodplain forests are the most common natural communities found in this ecoregion, but most forested land has been converted to an agricultural land use. Bottomland forest and cypress-gum swamp habitats remain in wetlands associated with larger order streams (Griffith et al. 1998).

Vegetation within the proposed TL ROW is characterized by two main types: herbaceous (48 percent) and forest (52 percent).

Herbaceous vegetation is characterized by greater than 75 percent cover of forbs and grasses and less than 25 percent cover of other types of vegetation. Cultivated agricultural fields, pastures, maintained power line ROWs, or disturbed sites in various stages of residential development account for the vast majority herbaceous vegetation in the project area. Most of these areas are dominated by plants indicative of early successional habitats including many non-native species. Common species in the most disturbed areas include the row crops, corn, cotton, soybeans, and winter wheat along with beaked corn salad, clover, dallisgrass, hairy buttercup, Japanese honeysuckle, meadow brome, and Philadelphia fleabane. Several small emergent wetlands support a higher proportion of native species including climbing dogbane, giant goldenrod, prickly bog sedge, squarrose sedge, and rushes.

All forested areas along the proposed ROW and associated access roads are deciduous in composition. Deciduous forest, which is characterized by trees with overlapping crowns where deciduous species account for more than 75 percent of the canopy cover. Deciduous forests are dominated by a variety of tree species including American elm, black cherry, cherrybark oak, green ash, honey locust, mockernut hickory, Osage orange, red maple, slippery elm, shagbark hickory, southern red oak, sweetgum, water oak, white ash, white oak, and winged elm. The understory consists of Chinese privet, common elderberry, devil's walking stick, possum haw, and red buckeye. Herbaceous plants observed included bulbous bitter cress, eastern woodland sedge, green dragon, largeseed forget-me-not, Japanese stiltgrass, mayapple, trumpet creeper, and Virginia creeper. Small, forested wetlands were found in several locations along the proposed ROW. American elm, green ash, slippery elm, and sweetgum were the dominant overstory species on these sites.

[10] Loess is a fine-grained yellowish brown deposit of soil left by the wind which can provide the basis for productive farming.

Additional detail regarding wetlands can be found in Section 3.8. All forested areas encountered are fragmented and the largest contiguous stand covers just eight acres. No forested areas have structural characteristics indicative of old growth forest (Leverett 1996) and most stands have trees that average between 12 and 24 inches diameter at breast height.

Executive Order 13112 (Invasive Species) serves to prevent the introduction of invasive species and provides for their control to minimize the economic, ecological, and human health impacts that those species potentially cause. In this context, invasive species are nonnative species that invade natural areas, displace native species, and degrade ecological communities or ecosystem processes (Miller et al. 2010). No federal-noxious weeds were observed, but populations of five plant species designated by the Tennessee Exotic Plant Pest Council (TN-EPPC) as high priority invasive plants were observed sporadically in the proposed ROW and along access roads. (Table 3-4; TN-EPPC 2010). During field surveys, invasive plants were prevalent in both forest and herbaceous vegetation types.

**Table 3-4. High Priority Invasive Plant Species Observed Along the Proposed Transmission Line Right-of-Way**

| Common Name | Scientific Name |
|---|---|
| Chinese lespedeza | *Lespedeza cuneata* |
| Chinese Privet | *Ligustrum sinense* |
| Japanese honeysuckle | *Lonicera japonica* |
| Japanese stiltgrass | *Microstegium vimineum* |
| Multiflora Rose | *Rosa multiflora* |

## 3.5 Wildlife

Field surveys were conducted for terrestrial animal habitats along the proposed ROW and access roads in April and May 2015. The proposed ROW would cover approximately 158 acres of land. The landscape directly surrounding the TL ROW is a combination of forest, wetlands, early successional (pasture and agricultural) fields, roads, and residential homes. The majority of the proposed TL is routed through agricultural fields or pastures (107 acres) or deciduous forested areas (51 acres) (see Section 3.4 Botany). Approximately 15.43 acres of wetland, one pond equivalent to 2.3 acres, 47 watercourses and developed areas including roads are intersected by the proposed ROW. Each of the varying community types offers suitable habitat for species common to the region both seasonally and year-round.

Deciduous forest provides habitat for an array of terrestrial animal species. Avian species found in this habitat are chuck-will's-widow, downy and hairy woodpecker, eastern screech-owl, eastern wood-pewee, red-tailed hawk, white-breasted nuthatch, wood thrush, and yellow-billed cuckoo (National Geographic Society 2002). This area also provides foraging and roosting habitat for several species of bat, particularly in areas where the forest understory is more open. Some examples of bat species likely found within this habitat are big and little brown, eastern red, evening, hoary, Rafinesque's big-eared, silver-haired, and tricolored bat. Coyote, eastern chipmunk, eastern woodrat, gray fox, North American deermouse, and woodland vole are also likely mammalian species present within this habitat (Kays and Wilson 2002; Reid 2006). Gray rat snake, speckled kingsnake, northern

red-bellied snake, Mississippi ring-necked snake, midland brown snake, red milk snake as well as common ground skinks are all common reptilian residents of this habitat (Conant and Collins 1998; Scott and Redmond 2008). In forests with aquatic features, amphibians likely found in the area include dusky, marbled, mole, and spotted salamanders as well as gray treefrogs, eastern narrowmouth toad, eastern spadefoot toad, Fowler's toad and southern leopard frogs (Scott and Redmond 1996; Conant and Collins 1998; Niemiller and Reynolds 2011).

Pastures and agricultural fields offer habitat to a multitude of species such as brown-headed cowbird, brown thrasher, common grackle, common yellowthroat, dickcissel, eastern bluebird, eastern kingbird, eastern meadowlark, field sparrow, grasshopper sparrow, house finch, and prairie warbler (National Geographic Society 2002). Mammalian species likely present in this habitat include eastern cottontail, eastern harvest mouse, eastern woodrat, hispid cotton rat, red fox, and striped skunk (Kays and Wilson 2002; Reid 2006). Farm ponds within agricultural settings provide habitat for common amphibians and reptiles. Amphibious species likely present include pickerel, and upland chorus frogs as well as spring peepers and mole salamander (Scott and Redmond 1996; Niemiller and Reynolds 2011). Reptilian species with the potential to occur in the project area are red milk, gray rat, smooth earth, and southern black racer snakes, as well as slender glass lizard (Scott and Redmond 2008; Conant and Collins 1998).

Wetland habitat provides resources for such avian species as blue grosbeak, great horned owl, hooded warbler, northern harrier, red-winged blackbird, song sparrow, swamp sparrow, and white-throated sparrow (National Geographic Society 2002). Mammalian species that may utilize this habitat are American beaver, eastern harvest mouse, marsh rice rat, common muskrat, and swamp rabbit (Kays and Wilson 2002; Reid 2006). Speckled kingsnake, eastern ribbon, garter, northern water, Mississippi ring-necked, and gray rat snake are all wetland reptilian species (Conant and Collins 1998; Scott and Redmond 2008). Eastern newt and three-lined salamanders as well as bull frog, bird-voiced treefrog, green frog, northern cricket frog, and pickerel frog are examples of some amphibian species that are likely present (Scott and Redmond 1996; Niemiller and Reynolds 2011).

Disturbed, developed areas are home to an overabundance of common species. American robin, barred owl, Carolina chickadee, blue jay, European starling, house sparrow, mourning dove, northern cardinal, northern mockingbird, and black and turkey vultures are all commonly found in TL ROWs, as well as near roads and neighborhoods. Urbanized mammals found in this community may be eastern gray squirrel, nine-banded armadillo, northern raccoon, and Virginia opossum (Kays and Wilson 2002; Reid 2006). Road-side ditches can be habitat for American toad, upland chorus frog, and spring peeper (Conant and Collins 1998). Reptiles using these urbanized areas can include black rat and gray rat snakes as well as yellow-bellied kingsnake (Conant and Collins 1998; Scott and Redmond 2008).

A review of the TVA Regional Natural Heritage database indicated that no caves occur within three miles of the proposed ROW. No caves were observed during field reviews in April and May 2015. No other unique or important terrestrial habitats exist along the TL ROW or are known within three miles of the proposed route.

According to the TVA Regional Natural Heritage database, no aggregations of migratory birds or colonial wading bird colonies are known within three miles of the proposed route. The nearest known wading bird colony occurs approximately 21.5 miles away.

## 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 Act outlines procedures for federal agencies to follow when taking actions that may jeopardize federally listed species or designated critical habitat. The policy of Congress is that federal agencies must seek to conserve endangered and threatened species and use their authorities in furtherance of the Act's purposes.

The state of Tennessee provides protection for species considered threatened, endangered, or deemed in need of management within the state other than those federally listed under the ESA. The listing is handled by the TDEC; however, the Tennessee Natural Heritage Program and TVA both maintain databases of species that are considered threatened, endangered, special concern, or tracked in Tennessee. A listing of federally and state-listed species that occur near the proposed TL ROW or associated access roads is provided as Table 3-5.

**Table 3-5. Federally and State-listed Species from and/or within Fayette and Haywood Counties, Tennessee[1]**

| Common Name | Scientific Name | Federal Status[2] | State Status[2] | State Rank[3] |
|---|---|---|---|---|
| **Fishes**[4] | | | | |
| Blue Sucker | *Cycleptus elongatus* | | THR | S2 |
| Naked Sand Darter | *Ammocrypta beani* | | NMGT | S2 |
| Piebald Madtom | *Noturus gladiator* | | NMGT | S3 |
| **Mussels**[4] | | | | |
| Fatmucket | *Lampsilis siliquoidea* | | NOST | S2 |
| Sheepnose | *Plethobasus cyphyus* | END | TRKD | S2S3 |
| Southern Hickorynut[5] | *Obovaria jacksoniana* | | TRKD | S1 |
| Southern Rainbow | *Villosa vibex* | | TRKD | S2 |
| **Plants** | | | | |
| Prairie False-foxglove | *Agalinis heterophylla* | | END | S1 |
| Sedge | *Carex reniformis* | | SPCO | S1 |
| **Mammals**[1] | | | | |
| Indiana bat[6] | *Myotis sodalis* | END | END | S1 |
| Northern long-eared bat[6] | *Myotis septentrionalis* | THR | NMGT | S1S2 |

[1] Sources: TVA Regional Natural Heritage Database (accessed April, May, and June 2015); TNBWG 2015a and 2015b (accessed June 2015); USFWS 2015a, 2015b, and 2015c (accessed June 2013).
[2] Status Codes: END = Endangered; NMGT = In Need of Management; NOST = No Status; SPCO = Special Concern; THR = Threatened
[3] State Ranks: S1 = Critically Imperiled; S2 = Imperiled; S3 = Vulnerable
[4] The Big Muddy Creek and Lower Loosahatchie River Watersheds were considered.
[5] Historical record greater than 25 years old.
[6] Federally listed species that the USFWS has determined that have the potential to exist state-wide, though no records are currently known from Fayette or Haywood counties, Tennessee.

### 3.6.1 Aquatic Animals

A review of the TVA Regional Natural Heritage database and available information on the distribution of sensitive aquatic species indicated one federally listed species within the Big Muddy Creek and Lower Loosahatchie River watersheds and/or Fayette and Haywood counties. The federally listed endangered sheepnose has been collected in the Hatchie River within Haywood County (Butler 2002). There is no designated critical habitat for aquatic species within the Hatchie River watershed in Fayette or Haywood counties. Also, six state-listed species (three fishes, three mussels) are known from within Fayette and Haywood counties (Table 3-5). However, these species occur in the Hatchie and Wolf Rivers and are located outside of the potentially affected watersheds of the proposed ROW. Thus, none of the federally or state-listed species listed in Table 3-5 are anticipated to occur in or near the project vicinity.

### 3.6.2 Plants

A review of the TVA Regional Natural Heritage database indicated that no federally listed plant species and two state-listed plant species have been previously reported within a five-mile vicinity of the proposed ROW and associated access roads (Table 3-5). No federally listed plant species or designated critical habitats have been reported from Fayette and Haywood counties. No federally or state-listed plants were observed during field surveys. No designated critical habitat for plants occurs in the project area

### 3.6.3 Terrestrial Animals

A review of the TVA Regional Natural Heritage database indicated there are no known federally or state-listed terrestrial animal species within three miles of the proposed TL ROW. Additionally, no federally listed species are known from Haywood and Fayette counties. However, the USFWS has determined that both the federally listed as endangered Indiana bat and the federally listed as threatened northern long-eared bat have the potential to occur throughout the state of Tennessee. Thus, habitat suitability and potential impacts to these species along the proposed TL ROW were addressed.

Indiana bats hibernate in caves in winter and use areas around them in fall and spring (for swarming[11] and staging) prior to migration back to summer habitat. During the summer, Indiana bats roost under the exfoliating bark of dead and living trees in mature forests with an open understory often near sources of water. Indiana bats are known to change roost trees frequently throughout the season, yet still maintain site fidelity, returning to the same summer roosting areas in subsequent years. This species forages over forest canopies, along forest edges and tree lines, and occasionally over bodies of water (Pruitt and TeWinkel 2007; Kurta et al. 2002). There are no known records of the species occurring in Fayette or Haywood counties (USFWS 2015a and 2015b; TNBWG 2015a). The closest known extant records of Indiana bat are from approximately 37 miles away in Benton County, Mississippi.

The northern long-eared bat overwinters predominantly in large hibernacula[12] such as caves, abandoned mines, and cave-like structures that have high humidity and no air flow. During the fall and spring, the bats utilize entrances of caves and the surrounding forested areas for swarming and staging. In the summer, northern long-eared bats roost individually

[11] *Swarming* is a collective behavior exhibited by animals to describe when they come together “en masse”. In this case, the bats swarm for mating purposes.
[12] *Hibernacula* are areas, such as caves, that are used by bats for hibernating during the winter.

or in colonies beneath exfoliating bark, or in crevices of both live and dead trees. Roost selection by northern long-eared bat is similar to Indiana bat; however it is thought that northern long-eared bats are more opportunistic in roost site selection. This species also is known to roost in abandoned buildings and under bridges. Northern long-eared bats emerge at dusk to forage below the canopy of mature forests on hillsides and roads, and occasionally over forest clearings and along riparian areas (USFWS 2014). No records for this species are known from Fayette or Haywood counties (USFWS 2014 and 2015c; TNBWG 2015b). The closest known record of northern long-eared bat is from approximately 79 miles away in Tishomingo County, Mississippi. However, this record is historical and no longer valid since the mine in which this species was reported to roost as collapsed.

No caves are known to exist within three miles of the TL ROW and none were observed during field reviews in April and May 2015. The nearest known cave occurs approximately 55 miles from the proposed ROW. Foraging habitat for both bat species exists throughout the ROW vicinity in areas such as over forests, streams, fence rows and other corridors. Suitable summer roosting habitat for both bats was found within three forested sections along the proposed ROW and totaled 9.6 acres. Suitability was determined by the presence of trees with exfoliating bark for both species and the presence of a relatively open understory for the Indiana bat and proximity to water for the northern long-eared bat.

The three sections of forest were determined to be either moderate or highly suitable roosting habitat due to a high concentration of white oaks, shag bark hickories and/or snags with exfoliating bark in and around the proposed ROW. Tree species composition within these areas of suitable summer roosting habitat included of mature hardwood stands dominated by oaks (red and white) and other hardwood species such as shagbark hickories and sweetgum. One of the three areas actually lies outside and immediately adjacent to the proposed ROW. Because several tall, suitable trees in this identified area may be considered as danger trees during future construction or maintenance efforts, there is the potential that these trees may need to be removed to maintain the safety and reliability of the proposed TL.

## 3.7 Floodplains

A floodplain is the relatively level land area along a stream or river that is subjected to periodic flooding. The area subject to a one-percent chance of flooding in any given year is normally called the 100-year floodplain. It is necessary to evaluate development in the 100-year floodplain to ensure that the project is consistent with the requirements of EO 11988. The proposed 6.2-mile TL route would cross several floodplain areas associated with streams (see Section 3.2) in Fayette and Haywood counties.

## 3.8 Wetlands

Wetlands are those areas inundated by surface water or groundwater such that vegetation adapted to saturated soil conditions are prevalent. Examples include swamps, marshes, bogs, and wet meadows. Wetland fringe areas also are found along the edges of most watercourses and impounded waters (both natural and man-made). Field surveys were conducted in April 2015 to identify wetland areas within the proposed TL ROW and the associated access roads.

Wetland determinations were performed according to the USACE standards, which require documentation of hydrophytic (wet-site) vegetation, hydric soil, and wetland hydrology (USACE 2010; Environmental Laboratory 1987; Lichvar et al. 2014; U.S. Department of Defense and USEPA 2003). Broader definitions of wetlands, such as those used by the USFWS (Cowardin et al. 1979), the Tennessee definition (Tennessee Code 11-14-401), and the TVA Environmental Review Procedures definition (TVA 1983), were also considered in this review. Using a TVA-developed modification of the Ohio Rapid Assessment Method (Mack 2001) specific to the TVA region (i.e., TVA Rapid Assessment Method or "TVARAM") was used to categorize wetlands by their functions, sensitivity to disturbance, rarity, and ability to be replaced.

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

The proposed TL would occupy approximately 78 acres for the 161-kV option or about 124 acres for the 500-kV option (see Figure 1-1), with use of existing access roads outside the ROW. The proposed route for the TL ROW would traverse a rural landscape. The area is dominated by commercial agriculture and dissected by watercourses that have been generally altered to accommodate the land use of the surrounding area. Intact wetland floodplains, wide wetland drainages, and headwater wetland depressions sporadically cross the proposed ROW. As shown in Table 3-6, twenty-six wetland areas, totaling 15.43 acres, were identified within the proposed TL ROW easement.

**Table 3-6. Wetlands Located Within the Proposed Transmission Line Right-of-Way to the Memphis Regional Megasite**

| Wetland Identifier | Type[1] | TVARAM[2] Wetland Quality Descriptor (score) | Acreage within the Right-of-way | Forested Acreage within the Right-of-way |
|---|---|---|---|---|
| W001 | PEM1E | Low (16) | 0.27 | 0 |
| W002 | PEM1Ef | Low (16) | 0.76 | 0 |
| W003 | PFO1E | Moderate (59) | 0.79 | 0.79 |
| W004 | PSS1E | Moderate (42) | 2.53 | 0 |
| W005 | PEM1Ef | Low (29) | 0.50 | 0 |
| W006a/b | PEM1Ef | Low (16) | 0.72 | 0 |
| W007 | PFO1E | Moderate (58) | 1.35 | 1.35 |
| W008 | PEM1Ef | Low (15) | 0.11 | 0 |
| W009 | PFO1E | Moderate (48) | 0.05 | 0.05 |
| W010 | PEM1Ef | Low (24) | 0.11 | 0 |
| W011 | PSS1E | Moderate (36) | 0.59 | 0 |
| W012 | PEM1Ef | Low (28) | 0.35 | 0 |
| W013 | PFO1E | Moderate (56) | 1.97 | 1.97 |
| W014 | PEM1Ef | Low (20) | 0.50 | 0 |
| W015 | PFO1E | Moderate (59) | 1.69 | 1.69 |
| W016 | PFO1E | Moderate (33) | 0.65 | 0.60 |

| Wetland Identifier | Type[1] | TVARAM[2] Wetland Quality Descriptor (score) | Acreage within the Right-of-way | Forested Acreage within the Right-of-way |
|---|---|---|---|---|
| W017 | PFO1E | Moderate (34) | 0.28 | 0.23 |
| W018 | PFO1E | Low (20) | 0.19 | 0.19 |
| W019 | PFO1E | Low (23) | 0.14 | 0.14 |
| W020 | PFO1E | Moderate (34) | 0.32 | 0.32 |
| W021 | PFO1E | Low (27.5) | 0.16 | 0.16 |
| W022 | PFO1E | Low (18.5) | 0.06 | 0.06 |
| W023 | PFO1E | Moderate (39.5) | 0.86 | 0.86 |
| W024 | PSS1E/PEM1Ef | Moderate (31.5) | 0.33 | 0 |
| W025 | PEM1Ef | Low (10) | 0.10 | 0 |
| W026 | PFO1E | Moderate (43) | 0.05 | 0.5 |
| | **Total Acres** | | **15.43** | **8.46** |

[1]Classification codes as defined in Cowardin et al. (1979): PEM1 = palustrine emergent, persistent vegetation; PFO1 = palustrine forested, broadleaf deciduous vegetation; PSS1 = palustrine, scrub-shrub, broadleaf deciduous; suffix "E" = seasonally flooded/saturated; suffix "f" = farmed.
[2]TVARAM = A TVA Rapid Assessment Method that categorizes wetland quality by their functions, sensitivity to disturbance, rarity, and ability to be replaced.

W01 consists of 0.27 acre of emergent wetland within the ROW. W01 is associated with an ephemeral stream that drains into an unnamed tributary to Little Laurel Canal. W01 exhibited saturated soils containing mottled coloration indicative of hydric soils. W01 was dominated by hydrophytic vegetation that included swamp dock, small-flowered buttercup, elderberry, velvet panic grass, barnyard grass, camphor, and boneset.

W02 consists of 0.76 acre of emergent wetland within the ROW. W02 is associated with an ephemeral stream that drains into an unnamed tributary to Little Laurel Canal. W02 exhibited saturated soils with containing mottled coloration indicative of hydric soils. W02 was dominated by hydrophytic vegetation that included swamp dock and small-flowered buttercup.

W03 is a bottomland forested wetland on the north and south banks of an unnamed tributary to Little Laurel Canal. This wetland contains 0.79 acre on the ROW, but extends outside the ROW to the east and west for an estimated total of five acres. W03 exhibited soils with mottled coloration and water-stained leaves indicating the persistence of wetland hydrology. W03 was dominated by sycamore, American elm, river birch, bitternut hickory, boxelder, false nettle, jewelweed, cinnamon fern, and river oats.

W04 comprises 2.53 acres of scrub-shrub wetland within the ROW. The wetland is located on the east and west side of an unnamed tributary to Little Laurel Canal. W04 exhibited soils with mottled coloration indicative of hydric conditions. W04 was dominated by hydrophytic vegetation including elderberry, velvet panic grass, barnyard grass, camphor and boneset.

W07 is a bottomland forested wetland on the east and west banks of an unnamed tributary to Big Muddy Creek. This wetland contains 1.35 acre within the ROW, but extends outside the ROW to the east for about five acres. W07 exhibited hydric soils with mottled coloration and water-stained leaves indicating the persistence of wetland hydrology. W07 was dominated by sycamore, American elm, river birch, bitternut hickory, boxelder, false nettle, jewelweed, cinnamon fern, and river oats.

W08 consists of 0.11 acre of emergent wetland within the ROW, and is part of the same wetland complex as W07. As indicated in W07, this wetland and extends east of the ROW for approximately five acres. W08 exhibited saturated hydric soils with mottled coloration indicative of saturated conditions. W08 was dominated by hydrophytic vegetation that included swamp dock and small-flowered buttercup.

W09 is a forested wetland at the headwaters of a seep. This wetland contains 0.05 acre on the ROW, but extends outside the ROW to the east for about one acre. W09 exhibited mottled soil coloration indicative of hydric conditions. Water-stained leaves present on the surface indicated the persistence of wetland hydrology. W09 was dominated by sycamore, American elm, river birch, bitternut hickory, boxelder, false nettle, jewelweed, cinnamon fern, and river oats.

W10 comprises 0.11 acres of emergent wetland within the ROW, but extends outside the ROW to the west for about one acre. The wetland is located on the north and south side of an unnamed tributary to Big Muddy Creek. W10 exhibited mottled soil coloration indicative of hydric conditions. W10 was dominated by hydrophytic vegetation including elderberry, velvet panic grass, barnyard grass, camphor, and boneset.

W11 comprises 0.59 acres of emergent/scrub-shrub wetland within the ROW, but extends outside the ROW to the north and south for about one acre. The wetland is located on the east and west side of an unnamed tributary to Big Muddy Creek. W11 exhibited mottled soil coloration indicative of hydric conditions. W11 was dominated by hydrophytic vegetation including elderberry, velvet panic grass, barnyard grass, camphor, and boneset.

W12, W13, and W14 represent different habitat types of the same and connected wetland complex. W12 consists of 0.35 acre of emergent farmed wetland within the ROW; whereas, W13 is an adjacent bottomland forested wetland within the riparian zone of an unnamed tributary to Big Muddy Creek, totaling 1.97 acre within the ROW; and W14 consists of 0.5 acre running along the north side of W13 within the ROW, but is subject to farming practices similar to W12. The entire wetland complex extends outside the ROW for about ten acres. W12, W13, and W14 all exhibited saturated soils with mottled coloration indicative of hydric conditions. W12 and W14 were dominated by hydrophytic vegetation that included swamp dock and small-flowered buttercup. W13 was dominated by sycamore, American elm, river birch, bitternut hickory, box elder, false nettle, jewelweed, cinnamon fern, and river oats.

W15 is a bottomland forested wetland on the north and south banks of an unnamed tributary to Big Muddy Creek. This wetland contains 1.69 acre on the ROW, but extends outside the ROW to the east and west for about five acres. W15 exhibited soils with mottled coloration indicative of hydric conditions. Similarly, the presence of water-stained leaves indicated persistent wetland hydrology. W15 was dominated by sycamore, American elm, river birch, bitternut hickory, boxelder, false nettle, jewelweed, cinnamon fern, and river oats.

W16 and W17 total 0.65 and 0.28 acre, respectively, comprising nearly their entirety within the proposed ROW. These wetland areas are predominantly forested, forming within two wide drainage flats, but include 0.05 acre each of emergent habitat along their southern extent where they fall within an LPC's ROW. W16 and W017 contained surface water, drainage patterns, and crayfish burrows within hydric soils exhibiting mottled coloration. These wetlands were connected via an intermittent unnamed tributary to Big Muddy Creek.

W16 and W17 were dominated by sycamore and sweetgum within the forested portions and soft pathrush and sedges within the emergent portions.

W18 is an isolated forested wetland depression likely formed by historical land disturbance. W18 totals 0.19 acre in size, and is located entirely within the ROW. W018 contained surface water, drift deposits, crayfish burrows, and mottled soil coloration indicative of hydric conditions. This wetland did not exhibit surface water hydrologic connectivity to navigable waters. Dominant hydrophytic wetland vegetation consisted of water oak and green ash.

W19 forms the headwaters of the wide drainage flat. W19 totaled 0.14 acre, entirely within the ROW. This wetland area exhibited surface water, drainage patterns, and drift deposits over mottled soils indicative of hydric conditions. W19 maintains an ephemeral surface water connection to an unnamed tributary of Big Muddy Creek. Dominant hydrophytic vegetation included slippery elm, green ash, and deciduous holly, and boxelder.

W20 consists of 0.32 acre of forested wetland habitat within the ROW, roughly doubling in size as it extends outside the ROW to the west. W20 was inundated at the time of the field surveys, and exhibited saturated soils with mottled coloration indicative of hydric conditions. W20 forms the headwaters of a wide drainage flat, connected to an unnamed tributary of Big Muddy Creek. Dominant hydrophytic species within the wetland include sweetgum, water oak, and slippery elm.

W21 and W22 are forested wetland features within the ROW, totaling 0.16 and 0.06 acre, respectively. W21 extends west of the ROW for about one acre; however, W22 is located entirely within the ROW. These wetlands are connected by an intermittent drain, which dissipates as it enters W22. This wetland drainage system maintains surface water connectivity west of the ROW to an unnamed tributary of Big Muddy Creek. Both W21 and W22 contained standing water and saturated soils, with mottled coloration indicative of hydric conditions. Dominant hydrophytic vegetation in both wetlands consisted of sweetgum, box elder, and sedge species.

W23 is a forested floodplain wetland associated with an unnamed tributary of Big Muddy Creek. This wetland contains 0.86 acre within the ROW, extending south of the ROW for about 10 acres. W23 contained surface water and saturated soils with mottled coloration indicative of hydric conditions. This riparian wetland was dominated by hydrophytic wetland vegetation consisting of sweetgum, green ash, and slippery elm.

W24 consisted of 0.33 acre of scrub-shrub wetland habitat located entirely within the ROW and adjacent to an unnamed tributary of Big Muddy Creek. W24 contained drift deposits and saturated soils with mottled coloration indicative of hydric conditions. Dominant hydrophytic vegetation included sweetgum and boxelder saplings, with an understory predominantly comprised of jewelweed. A small portion of this wetland extends north as farmed wetland area within an agricultural field. Although the farmed portion is tilled regularly, sporadic wetland vegetation and indicators of wetland hydrology and wetland soils were present.

W25 consists of a 0.1 acre farmed wetland located entirely within the ROW. This wetland area is tilled with typical farming practices; however, the suite of wetland parameters required for wetland determination was present at the time of the field survey. W25 contained inundated and saturated soils with mottled coloration indicative of hydric

conditions. An ephemeral surface water drain conveys hydrology from W25 to an unnamed tributary of Big Muddy Creek. Dominant wetland vegetation consisted of panic grass and sedge species.

W26 contains 0.05 acre of forested wetland habitat within the ROW; however, this forested wetland area comprises a sliver of a much larger (approximately 25 to 50 acres) floodplain wetland complex associated with an unnamed tributary of Big Muddy Creek, establishing hydrologic connectivity. At the time of the site visit, surface water, drift deposits, and drainage patterns indicated the presence of wetland hydrology. W26 contained mottled soil coloration indicative of hydric conditions. Dominant hydrophytic vegetation consisted of shellbark hickory, sweetgum, green ash, water oak, and cherry bark oak.

## 3.9 Aesthetics

### 3.9.1 Visual Resources

The physical, biological, and man-made features of an area combine to make the visual landscape character both identifiable and unique. Scenic resources are evaluated based on existing landscape character, distances of available views, sensitivity of viewing points, human perceptions of landscape beauty/sense of place (scenic attractiveness), and the degree of visual unity and wholeness of the natural landscape in the course of human alteration (scenic integrity). The varied combinations of natural features and human alterations that shape landscape character also help define their scenic importance. Where and how the landscape is viewed would affect 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 (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 4.0 miles from the observer), objects may be distinguishable, but their details are weak and they tend to merge into larger patterns. Details and colors of objects in the background (the distant part of the landscape) are not normally discernible unless they are especially large and standing alone. The impressions of the visual character of an area can have a significant influence on how it is appreciated, protected, and used. The general landscape character of the study area is described in this section. The scenic integrity indicates the degree of intactness or wholeness of the landscape character (TVA 2003).

The proposed TL ROW would either be approximately 3.4 miles or 6.5 miles in length, dependent on the need for construction of either the 161- or 500-kV TL. The 161-kV TL would utilize the same path as proposed for the 500-kV TL. Both of the proposed TL routes are located in a rural setting. The topography is gently rolling to level, with pockets of dense forest, and areas of farmland typical of western Tennessee. The area is sparsely populated with very few if any residences or sensitive receptors directly affected by the proposed new TL construction, operation, or maintenance activities.

### 3.9.2 Noise

There are no single, major sources of noise along the proposed TL route. However, some traffic noise is generated along SR 222 and I-40 which are near the northernmost portion of the proposed TL route. Local residents have become acclimated to this recurring noise.

### 3.9.3 Odors

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

## 3.10 Archaeological and Historic Resources

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

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

During the Section 106 process, the agency must consult with the appropriate SHPO, federally-recognized Native American tribes that have an interest in the undertaking, and any other party with a vested interest in the undertaking.

The affected area has the potential to contain archaeological sites from various prehistoric and historic periods. The affected area also has potential for historic architectural resources spanning the historic period.

The APE for archaeological resources consists of about 3.4-miles of proposed 300-foot-wide ROW, about 3.1 miles of proposed 100-foot wide ROW, and about 7.0 miles of associated access roads used to access the ROW for TL construction, operation, and maintenance. The APE for architectural resources consists of areas within a 0.5-mile radius of the centerline of the proposed TL ROW that would have a direct line of sight to the proposed TL.

A Phase I cultural resources survey of the APE was conducted to identify any historic properties that would be affected by the undertaking (Dadiego et al. 2015). This investigation included an archaeological survey and an architectural survey. The archaeological survey, completed between April 13 and May 14, 2015, resulted in the identification of four historic loci (the sites of historic activity that are less than 50 years old) and two isolated finds of cultural material. Based on the results of the survey, TVA determined that all four loci and both isolated finds are ineligible for inclusion in the NRHP. The architectural survey, completed on May 8, 2015, identified six historic architectural resources, of which five had not been previously inventoried. The one previously inventoried resource (HD-329) has been destroyed since its initial recordation. Based on the results of the survey, TVA determined that all five newly recorded architectural resources are ineligible for inclusion in the NRHP.

## 3.11 Recreation, Parks, and Natural Areas

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

There are no developed formal outdoor public recreation facilities in the vicinity of the either proposed TL ROW easements or the proposed access roads. However, some dispersed recreation activities such as hunting, hiking, or wildlife observation may occur in the project area.

A review of the TVA Regional Natural Heritage database indicated that there are no natural areas present within the proposed ROW or within the footprint of the proposed Megasite. There is one natural area, Sanders Woods, within 5 miles of the proposed ROW. This area, in private ownership, is noted for having a relatively intact native bottomland forest.

## 3.12 Socioeconomics and Environmental Justice

The proposed ROW is primarily agricultural property. The route traverses sparsely populated areas, avoiding residential property. The proposed ROW has been routed to minimize impacts to the properties it would cross, generally avoiding populated areas to the extent feasible. The proposed line would cross several minor roadways and a major interstate, and would be located in Census Tract 9305, Block Group 1. In 2014, this individual block group had a total population of 1,071 (U.S. Census Bureau 2015).

As shown in Table 3-7, the estimated 2013 populations of Haywood and Fayette counties are 18,218 and 38,772 respectively (U.S. Census Bureau 2015). The 2013 population of Brownsville, the largest city in Haywood County, was estimated at 10,022. The minority population in the area of Brownsville is approximately 69.4 percent of the total population. The percentage of minority population within the area around the proposed route is approximately 54.2 percent in Haywood County and roughly 30.3 percent in Fayette County. This is more than the minority population of the State of Tennessee (about 21.9 percent) as reported by the U.S. Census Bureau (2015) 2009-2013 American Community Survey.

Poverty data are not available for individual blocks. However, the poverty level in Haywood County is approximately 21.1 percent and for Fayette County, 14 percent (U.S. Census Bureau 2015). In Haywood County, these percentages are higher than both the state of Tennessee and the national poverty levels (13.3 percent and 15.4 percent, respectively).

**Table 3-7. Socioeconomic and Demographic Conditions in Haywood and Fayette Counties, Tennessee**

| Demographic Characteristic | Brownsville (2010) | Haywood County | Fayette County | Tennessee |
|---|---|---|---|---|
| Estimated 2013 population | 10,022 | 18,218 | 38,772 | 6,497,269 |
| Black or African American | 64.7% | 50.1% | 27.8% | 17.0% |
| Hispanic or Latino | 4.7% | 4.1% | 2.5% | 4.9% |
| White (excluding Hispanic or Latino) | 29.7% | 45.1% | 68.1% | 74.9% |
| Per capita income (2009-2013) | $17,975 | $18,714 | $28,201 | $24,409 |
| Median household income (2009-2013) | $30,858 | $34,542 | $56,618 | $44,140 |
| Below poverty level (2009-2013) | 22.5% | 21.1% | 14.0% | 17.6% |

Source: U.S. Census Bureau (2015)

# CHAPTER 4

## 4.0 ENVIRONMENTAL CONSEQUENCES

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

Cumulative effects are discussed, as appropriate and necessary, under the respective resource areas. The analysis of cumulative effects takes into account the State's preparation of the Megasite, including activities such as development of the infrastructure for the Megasite. Effects related to the activities of the industrial tenant would be speculative since tenants have not been identified as this early stage

### 4.1 No Action Alternative

As stated in Section 2.1.1, under the No Action Alternative, TVA would not supply power to serve the Megasite. 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.

Under the No Action Alternative, urbanization and environmental changes within the area would still likely occur; however, it would be gradual and most likely would not be noticed by the general population. Activities occurring as a result of the state of Tennessee's Megasite would likely continue. Likewise, a number of pivot irrigation projects in the area would also continue. The amount of such economic impact resulting from TVA not providing a power supply cannot be quantified accurately due to the speculative nature of future conditions. However, depending on the success of marketing the Megasite the employment opportunities could remain limited and the tax base may not increase.

Under the No Action Alternative, no ROW would be cleared to accommodate the proposed line. No changes in current land uses along the existing or proposed ROW are anticipated within the foreseeable future under the No Action Alternative. Thus, implementation of this alternative is not expected to directly cause any effects to current land uses or to any prime farmlands along the route of the proposed ROW. The Megasite zoning could still accommodate industrial tenants; however, it is speculative as to the sort of tenants that would locate to the site. 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 the potential for development to occur in the area. However, these changes are not expected to be the result of implementing the No Action Alternative.

Because the proposed construction, operation, and maintenance of the proposed new facilities would not occur under the No Action Alternative, no direct effects to those environmental resources listed in Chapter 3 are anticipated.

In the event that TVA chooses not to undertake the proposed Action Alternative, the state could find another way to ensure power is supplied to the site, or delay a request to TVA until an industrial tenant had been identified. A lack of a readily available power source for the Megasite could cause prospective industrial tenants to lose interest due to the long lead time necessary to construct a TL. The State could also decide not to market the Megasite

to a heavy industrial client resulting in a different user or the sale of the property. Should the property be sold, other individuals, a corporation, or the County could decide to pursue similar or different interests including requesting a power supply.

Should the state of Tennessee independently provide transmission service by constructing a new TL, the potential environmental effects of implementing the No Action Alternative would likely be comparable to those of the Action Alternative described in this chapter. Likewise, the potential impacts of a TL constructed by anyone else would likely be similar. The potential impacts would be dependent upon various factors, such as the route chosen and the construction methods used.

## 4.2 Action Alternative

### 4.2.1 Groundwater and Geology

Contamination of groundwater supplies can potentially occur from the introduction of contaminants into areas that serve as recharge areas for groundwater. Contaminants carried by storm water runoff, include soil sediment, spilled fuel, petroleum products, and chemicals.

Under the Action Alternative, BMPs as described in Muncy (2012) would be used during the proposed construction, operation, and maintenance of the proposed TL and associated access roads. ROW clearing, site grading for structures and access roads, and other project construction activity could present a minor potential to impact groundwater through the movement of sediment into groundwater infiltration zones. The utilization of TVA's standard BMPs as described by Muncy (2012) would minimize erosion during construction and operation and reduce the possibility of sediment impacting groundwater.

The use of petroleum fuels, lubricants, and hydraulic fluids in construction and maintenance vehicles could result in the potential for small on-site spills. However, the use of BMPs (Muncy 2012) 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.

During revegetation and maintenance activities, herbicides with groundwater contamination warnings would not be used. Any use of herbicides and fertilizers would be considered before application, and would be applied according to the manufacturer's label. TVA standard BMPs would be used to avoid contamination of groundwater. With the use of BMPs, any effects to groundwater quality from the proposed action would be minor. No cumulative impacts to groundwater resources are anticipated. Similarly, no changes in geological characteristics, such as the creation of sinkholes, are anticipated under the Action Alternative.

### 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.

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 would be 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's BMPs as described in Muncy (2012). ROW maintenance would employ manual and low-impact methods wherever possible. In areas requiring chemical treatment, only USEPA-registered herbicides would be used in accordance with label directions designed in part to restrict applications near receiving waters and to prevent unacceptable aquatic impacts. Proper implementation of these controls is expected to result in only minor temporary impacts to surface waters. Design, construction, and maintenance of the Megasite and all associated structures will have to abide by similar federal and state guidelines for BMPs and direct discharges to the Waters of the U.S. As anticipated actions occurring in the proposed project area will be meeting permit requirements and following BMPs, no significant cumulative impacts are anticipated.

### 4.2.3 Aquatic Ecology

While easement purchase and deed transfer, as is the current project scope, do not directly result in stream impacts, the eventual purpose is to accommodate new transmission. As such, it is foreseeable that ROW clearing and associated stream impacts would take place as a result of the proposed project.

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

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

Watercourses that convey only surface water during storm events (such as ephemeral streams) and that could be affected by the construction, operation, or maintenance of the proposed TL would be protected by TVA's standard BMPs as identified in Muncy (2012) and/or standard permit requirements. These BMPs are designed in part to minimize disturbance of riparian areas and subsequent erosion and sedimentation that can be carried to streams.

TVA also provides additional categories of protection to watercourses directly affected by an Action Alternative based on the variety of species and habitats that exist in the streams, as well as the state and federal requirements to avoid harming certain species (Appendix F). The width of the SMZs is determined by the type of watercourse, primary use of the water resource, topography, or other physical barriers (Muncy 2012).

Applicable permits would be obtained prior to any construction for any stream alterations located within the proposed ROW. The terms and conditions of these permits would be followed including any required mitigation from the proposed activities. All streams within the proposed ROW would be protected by Standard Stream Protection (Category A) as defined in Muncy (2012). This standard (basic) level of protection for streams and the habitats around them is aimed at minimizing the amount and length of disturbance to the water bodies without causing adverse impacts on the construction work.

Appropriate SMZs and BMPs identified in the Muncy manual would minimize the potential for impacts to water quality and instream habitat for aquatic organisms (Muncy 2012). These guidelines outline site preparation standards with emphasis on soil stabilization practices, structural and sediment controls including runoff management, and general stream protection practices associated with construction activities.

Any alterations to perennial or intermittent streams would require BMPs outlined in Muncy (2012) to be implemented. Watercourses that convey only surface water during storm events such as ephemeral streams and that could be affected by the proposed site preparation would be protected by standard BMPs outlined in Muncy (2012) and/or standard permit requirements. These BMPs are designed in part to minimize disturbance of riparian areas, and subsequent erosion and sedimentation that can be carried to streams. Because appropriate BMPs would be implemented during site preparation and during construction, operation, and maintenance activities, any direct or indirect effects to aquatic ecology would be temporary and insignificant as a result of implementing the proposed Action Alternative.

Cumulative impact analysis of the aquatic ecology effects takes into account stream loss at a watershed-level scale and includes current actions or those that would occur within the reasonable and foreseeable future. No stream loss is anticipated as a result of the proposed easement purchase or TL ROW construction. However, development within the larger watershed may result in stream loss. Stream loss associated with the development to the Megasite could be mitigated on-site by the state or other developers of the site, or through compensation via purchase of credits from an approved stream mitigation bank or payment into the In-Lieu-Fee program. Similar requirements would be in place to protect against stream loss within the watershed. With TVA abiding by the same stream regulations, cumulative stream impacts resulting from this project are anticipated to be insignificant.

### 4.2.4 Vegetation

Implementing the Action Alternative would involve clearing the ROW (to accommodate TLs and structures) and access roads. Such ground-disturbing activities would directly affect the existing plant communities in these areas. Additionally, 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.

Adoption of the Action Alternative would have minor effects on the terrestrial life, including vegetation, of the region. The conversion of forested land to managed TL ROW would constitute a long-term change in vegetative cover. However, the overall effect with respect to local vegetation would be minor to the terrestrial ecology of the region. Implementation of this alternative would require clearing approximately 51 acres of forest along the proposed TL ROW. However, these forested communities are common and well

represented throughout the region. Forest stands potentially impacted by the proposed ROW are currently small and heavily fragmented and do not contain plant communities with measurable conservation value. Though agriculture and development in west Tennessee has resulted in conversion of much forest to other land uses, substantial amounts of forest remain. As of 2012, there were over 1,400,000 acres of forest land in Fayette, Haywood, and the surrounding Tennessee and Mississippi counties (U.S. Forest Service 2015). Project-related effects to forest resources would be negligible when compared to the total amount of forested land occurring in the region. TL construction, operation, and maintenance would temporarily affect herbaceous plant communities along the proposed ROW and associated access roads, but with the implementation of TVA standard BMPs (Muncy 2012) these areas would likely recover to their pre-project condition in about one year.

The vast majority of proposed ROW and associated access roads currently have a large component of invasive terrestrial plants. Thus, adoption of the Action Alternative would not significantly affect the extent or abundance of these species at the county, regional, or state level. The use of TVA standard BMPs to revegetate with noninvasive species (Muncy 2012) would serve to minimize the potential introduction and spread of invasive species along the proposed ROW.

Cumulative impacts from the construction and operation of the Megasite and other related developments, would not significantly affect the terrestrial ecology of the region. The state of Tennessee currently owns large tracts that would be the likely location of most Megasite development. Current and historical aerial photography indicates that the vast majority of these state-owned parcels consist of previously cleared, heavily disturbed agricultural land that does not contain natural vegetation (EnSafe 2015). Areas with naturalized vegetation on the Megasite have not been surveyed for plant species richness or diversity, but repeated clearing of forested areas and row crop agriculture prevents establishment of plant communities with conservation value and promotes non-native plants. While development of the Megasite would further disturb the site, the parcels likely currently contain substantial cover of non-native plant species and adoption of the Action Alternative would not change this situation.

### 4.2.5 Wildlife

Under the Action Alternative, TVA would install structures and conductors along the ROW. In many areas, the TLs would span agricultural and developed areas. Thus direct impacts from localized ground disturbance would occur to wildlife habitat at the locations where the structures are to be placed. Any wildlife currently using these heavily disturbed, developed areas (primarily common, habituated species) 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 construction and/or maintenance activities.

As indicated in Section 4.2.4, approximately 51 acres of forested habitat would be removed and maintained as early successional habitat for as long as the TL is in operation. Direct effects of forest removal along the proposed ROW may occur to some individuals that may be immobile or slow moving during the time of construction and maintenance. This could be the case if construction activities took place during breeding/nesting seasons (i.e. juvenile animals or eggs). However, the actions are not likely to affect populations of species common to the area, as similar forested habitat exists in the surrounding landscape.

Construction associated disturbances and habitat removal would force wildlife to move into surrounding areas in an attempt to find new food and/or shelter sources, and to reestablish territories. In the event that the surrounding areas are already overpopulated, further stress to wildlife populations could occur to those species presently utilizing these areas as well as those attempting to relocate. However, the proposed project area and surrounding landscape is highly fragmented and influenced by human activity. It includes fragmented forests, agricultural fields, residential homes, farm ponds, and roads. It is unlikely that the species currently occupying habitat surrounding the proposed ROW area would be negatively impacted by the influx of new residents. It is expected that over time any displaced individuals able to utilize early successional habitat would return to the ROW area upon completion of construction, maintenance, and operational activities.

Cumulative effects of the project on common wildlife species are expected to be negligible. The State's proposed Megasite footprint has previously been heavily impacted by agriculture and residential homes, leaving only small areas of natural vegetation. Proposed actions across the Megasite would permanently remove existing habitat for common wildlife where industrial development occurs. Following completion of the project, landscaping across the industrial site and maintained ROWs would continue to provide habitat for several common wildlife species that utilize early successional fields and urban/developed areas.

### 4.2.6 Endangered and Threatened Species

#### *4.2.6.1 Aquatic Animals*

As discussed in 4.2.2 Surface water and 4.2.3 Aquatic Ecology, changes to water quality resulting from the implementation of the proposed Action Alternative could adversely affect aquatic life. 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 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 documented within the proposed ROW would be protected by implementing standard BMPs as defined in Muncy (2012) or as required by standard permit conditions. BMPs are designed in part to minimize disturbance of riparian areas and the subsequent erosion and sedimentation that can be carried to streams. The categories of stream protection as described in Muncy 2012 are based on the variety of species and habitats that exist in the streams as well as the state and federal requirements to avoid harming certain species.

One federally listed aquatic species (sheepnose mussel) is known from Haywood County. There are no federally listed aquatic species known from Fayette County and no designated critical habitat for aquatic species within Fayette or Haywood counties or the potentially affected watersheds of the proposed TL ROW to the Megasite. There are six state-listed aquatic animal species known from these counties (see Section 3.2); however, these species have not been documented in watersheds affected by the proposed project. Therefore, no direct, indirect, or cumulative impacts to federally or state-listed aquatic species are anticipated to occur under the proposed Action Alternative.

#### *4.2.6.2 Plants*

Adoption and implementation of the Action Alternative would not affect federally listed plant species or designated critical habitat, because neither occurs within the proposed ROW or along the associated access roads. Two state-listed plant species have been previously reported from within a five-mile vicinity of the proposed TL ROW and associated access roads, but no listed species were observed during field surveys of that area. Therefore, adoption of the Action Alternative would have no direct or indirect, impacts on federally or state-listed plant species.

The construction and operation of the Megasite and other related developments is not expected to have a cumulative impact on federally or state-listed plant species. No federally listed plant species have been previously reported from Haywood County where the Megasite would be located. The heavily disturbed nature of the vast majority of the Megasite also precludes the presence of listed plant species. However, aerial photography suggests that small portions of the Megasite contain naturalized vegetation that could theoretically contain state-listed plant species. While development of the Megasite could affect areas with naturalized vegetation, it is unlikely that state-listed plants would be present because historical aerial photography suggests that nearly the entire Megasite has been cleared for agriculture at some point in the past (EnSafe 2015).

#### *4.2.6.3 Terrestrial Animals*

Under the Action Alternative, TVA would proceed with the proposed ROW purchase. Once an industrial tenant for the Megasite is identified by the state of Tennessee, TVA would begin clearing and construction of the new TL ROW and associated access roads (see Section 2.2). In many areas the TL would span across agricultural and developed areas, thus resulting in minimal ground disturbance.

No federally or state-listed terrestrial animal species were documented within three miles of the proposed ROW. Two federally listed species, Indiana bat or northern long-eared bat, were considered during the project review based on the potential for these species to occur throughout Tennessee. No caves or other winter hibernacula for either bat species exist in the vicinity of the proposed ROW or would be impacted by the proposed actions. However, suitable foraging and summer roosting habitat for both bat species exists in the proposed ROW area and would be affected through removal for the creation of the proposed ROW. Three locations, totaling 9.6 acres, were determined to be suitable for summer roosting. These areas along the proposed ROW included a high number of large white oaks, shagbark hickories, and snags.

Prior to the commencement of construction, consultation with the USFWS under Section 7 of the Endangered Species Act would be completed for potential impacts to Indiana bat and northern long-eared bat habitat. TVA would enter into a Conservation MOA with the USFWS to offset indirect impacts to Indiana bat and northern long-eared bat potentially resulting from the removal of suitable habitat for these species. Consultation would be completed prior to any clearing or construction along the proposed ROW. No ground disturbing activities would occur along this proposed ROW until TVA has fulfilled its Section 7 obligations

Any suitable Indiana bat or northern long-eared bat habitat slated for removal on the Megasite footprint would add to potential impacts on these bat species. If habitat is removed in the winter when bats are not active on the landscape, direct effects would be avoided. Indirect and cumulative effects may occur from removal of suitable roosting

and/or foraging habitats. Thus, the State of Tennessee and/or site developers must coordinate with USFWS prior to removal of any potentially suitable Indiana bat or northern long-eared bat habitat on the Megasite.

### 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" (U.S. Water Resources Council 1978). The EO is not intended to prohibit floodplain development in all cases, but rather to create a consistent government policy against such development under most circumstances. The EO requires that agencies avoid the 100-year floodplain unless there is no practicable alternative.

Under the Action Alternative, the TL ROW easements would be obtained and up to 6.5-miles of proposed TL and the associated access roads would be constructed. Portions of the TL would cross several floodplain areas in Fayette and Haywood counties. Consistent with EO 11988, roads, overhead TLs and related support structures are considered to be repetitive actions in the 100-year floodplain. The conductors would be located well above the 100-year floodplain.

The construction of 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.

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

- The ROW would be revegetated where natural vegetation would be removed.
- BMPs would be used during construction activities.
- Road improvements would be done in such a manner that upstream flood elevations would not be increased.
- Construction would adhere to the TVA subclass review criteria for TL location in floodplains.

Reasonably foreseeable actions include the construction of the Megasite, associated infrastructure, and potential urbanization of the area due to increased employment in the vicinity. Fayette and Haywood counties participate in and administer the National Flood Insurance Program, and any activities proposed within the 100-year floodplain must comply with their floodplain ordinances and regulations. As a matter of the building- or construction-permit process, reasonably foreseeable actions that would involve activity within the 100-year floodplain would adhere to the appropriate local floodplain ordinances and regulations. In such reasonably-foreseeable future development, impacts to 100-year floodplains would thereby be minimized.

Based upon implementation of the above standard practices, and by adhering to local floodplain ordinances and regulations, the proposed TL construction, operation, and maintenance would have no significant impact on floodplains.

### 4.2.8 Wetlands

Activities in wetlands are regulated under Section 401 and 404 of the Clean Water Act 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 United States be permitted through a Nationwide General Permit or Individual Permit issued by the USACE. EO 11990 requires federal agencies to minimize wetland destruction, loss, or degradation, and preserve and enhance natural and beneficial wetland values, while carrying out agency responsibilities.

Under the Action Alternative, the proposed ROW easement would be purchased for the future construction of a TL loop supporting the Megasite. Efforts were made during the TL siting process to avoid wetlands. However, because of project and topographic constraints, and because of the goal of minimizing impacts to other environmental resources, no practicable alternative was available that would allow complete avoidance of wetlands.

A total of 15.43 acres of wetlands located within the proposed ROW would be spanned by the proposed TL (Table 3-6). As described in Section 2.2.1.1, adequate clearance between tall vegetation and TL conductors would require trees within the proposed ROW to be cleared. Establishing a TL would require vegetation clearing within the full extent of the ROW, and future maintenance of low stature vegetation to accommodate clearance and abate interference with the overhead wires.

Of the 15.43 acres of wetland that could potentially be impacted, 3.62 acres are currently low-growing emergent wetland habitat and 3.35 acres are scrub-shrub wetland habitat (Table 3-6). Emergent wetland areas would not require clearing due to the existing low stature of this habitat type. Scrub-shrub wetland area would require minimal clearing to accommodate TL construction; however, it would be anticipated that this community type would recover quickly due to the fast-growing nature of scrub-shrub vegetation.

Once the State has identified an industrial tenant for the Megasite, the clearing and habitat conversion of the remaining 8.46 forested wetland acres within the ROW would be required to accommodate the construction of the proposed TL. 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 (Wilder and Roberts 2002; Ainslie et al. 1999; Scott et al. 1990). These forested wetland areas would be converted to emergent and scrub-shrub wetland communities providing the same suite of functions.

The proposed conversion of forested wetland to scrub-shrub or emergent habitat is subject to the regulation of the USACE Memphis District and TDEC to ensure no net loss of wetland function across the landscape. During ROW clearing, TVA would abide by all requirements in compliance with all applicable State and federal wetland laws. In addition, TVA would provide compensatory mitigation as is deemed reasonably sufficient and practicable for converting 8.46 acres of forested wetland, and the loss of associated forested wetland functions in compliance with TVA’s obligations under EO 11990.

During construction and maintenance activities, TVA would minimize any wetland disturbance by following standard BMPs as found in Muncy (2012). These standards include eliminating mechanized clearing in wetlands, using low ground-pressure equipment (i.e., fellerbunchers), and using mats during clearing and construction activities to minimize rutting thus reducing soil compaction. Some wetland habitat could experience minor and temporary impacts during TL construction to accommodate vehicular traffic within narrowed access corridors along the ROW for structure and conductor placement. Within wetlands where the placement of poles may be required, a minor loss of wetland function is anticipated since only a nominal amount of fill would be required for structure placement. Any structure placement in wetlands would be conducted within the parameters and meet the conditions of the approved USACE permit, resulting in no significant wetland impacts.

Cumulative impact analysis of wetland effects takes into account wetland loss and conversion at a watershed-level scale and includes current actions or those that would occur within the reasonable and foreseeable future. In addition to the above wetland conversion, wetland fill is anticipated to result from actions associated with the development of the Megasite (i.e., roadway and site construction). Likewise, development within the larger watershed is anticipated to follow general trends. As stated above, in accordance with CWA and EO 11990, and under the directives of USEPA and TDEC, wetland mitigation is required for the loss of wetland resources to ensure no net loss of wetland function across the landscape. Wetland loss associated with the Megasite development and/or general development within the watershed per projected trends are subject to avoidance, minimization, and mitigation requirements. Similar requirements would apply to the developer of the Megasite to protect against wetland loss resulting from trending developments within the watershed. With TVA abiding by the same wetland regulations, cumulative wetland impacts resulting from this project are anticipated to be insignificant.

TVA has considered alternatives to avoid and minimize wetland impacts, resulting in the least wetland disturbance practicable. As a result of use of protective measures during construction, maintenance, and operation of the TL, and the implementation of mitigation measures required to meet the CWA and EO 11990 requirements, the proposed TL 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.

#### *4.2.9.1 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 are integrated with planning methods used by TVA. The classifications are based on methodology and descriptions from the U.S. Department of Agriculture (1995) and TVA (2003). Sensitivity of viewing points available to the 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.

The proposed ROW would begin at a loop point on either the existing Haywood Switching Station-Cordova 500-kV Transmission Line or the Cordova-South Jackson 161-kV Transmission Line. Either of the new loop points for the proposed TL would be visually similar to the existing lines and structures currently observable in the existing landscape. Either of the new lines would travel cross-country over properties involved primarily with agriculture, away from any major highways. Views for area motorists on the affected rural roads and for local residents would be slightly affected.

The proposed 161-kV option, if selected, would be approximately 6.5 miles long, using steel-pole structures about 88 feet tall on 100-foot-wide ROW. The 161-kV line would pass through an area of rural residential and farmland. The majority of residential tracts along the proposed route are approximately 0.7 mile from the new ROW. Much of this area is developed with TLs present along each road. Views from the road would be sustained and in the foreground. This portion of the TL would be located in the foreground viewing distance of some agricultural properties adjacent to SR 222, Hall Road, Hebron Road, Akin Road, and Albright Road as well as vehicles using these roads.

If 500-kV power is needed to support industry at the Megasite, about 3.1 miles of the purchased ROW (from the Cordova-South Jackson 161-kV TL to the Haywood Switching Station-Cordova 500-kV shared ROW) would not be used. Thus, the area along Hall Road and Hebron Road would not be affected. The 500-kV option would use only the 3.4 miles beginning at the Haywood Switching Station-Cordova 500-kV TL. This option would require two laced-steel 500-kV towers, separated by 125 feet between the circuit centerlines, on 300-foot-wide ROW. The average height of these towers would be 112 feet.

Along the proposed route affected by either option, one school and one cemetery are located within the foreground viewing distance. However, the proposed TL would not be visible from receptors at the school due to topography and trees. A number of places of worship, cemeteries, and schools are located within the middle-ground distance. Similarly, the proposed TL would not be visible from these receptors for the same reasons. The termination point near the Megasite would not likely be visible from SR 222 due to topographical screening and the distance from the road.

Scenic attractiveness is common to good along the entire 6.5 mile route, which ranges from sparsely populated rural residential to farmland and forested land. Scenic integrity is moderate to high as the landscape appears to have been altered by farming activity in most areas, with forested areas interspersed throughout.

Construction, operation, and maintenance of the proposed TL would be visually insignificant. There may be some minor visual discord during the construction period due to an increase in personnel and equipment and the use of laydown and materials storage areas. These minor visual obtrusions would be temporary until the existing and proposed ROW and laydown areas have been restored using TVA standard BMPs (Muncy 2012). Therefore, overall visual impacts are anticipated to be minimal with the implementation of the proposed project.

It is anticipated that cumulative visual impacts would be minor as other large TLs are located in the project area. Under the No Action Alternative, changes to the scenic quality of the area could occur over time as factors such as population trends, land use and development, recreational patterns, and cultural, ecological, and educational interests affect scenic quality within the area. Under the Action Alternative, changes in the scenic quality of the area could occur at a more accelerated pace than the No Action Alternative as more development may come to the area due to the power supply. However, since future development is speculative, enough time would elapse so that viewers adjust to the new TLs and any associated infrastructure before any future development.

#### *4.2.9.2 Noise and Odors*

During construction, operation, and maintenance of the proposed TL, equipment could generate noise above ambient levels (Appendix G). Because of the short construction period, noise-related effects are expected to be temporary and minor. For similar reasons, noise related to periodic line 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

Under the Action Alternative, a TL ROW easement would be obtained and the proposed TL and access roads would be constructed and maintained.

Based on field surveys, TVA determined that all four archaeological loci and both isolated finds are ineligible for inclusion in the NRHP. Likewise, TVA determined that all five newly recorded architectural resources are ineligible for inclusion in the NRHP.

TVA consulted with the TN SHPO and with federally recognized Native American tribes concerning these determinations. The TN SHPO agreed with TVA's findings and determinations in a letter dated August 4, 2015 (Appendix A). TVA received responses from the Chickasaw Nation of Oklahoma and the United Keetoowah Band of Cherokee Indians in Oklahoma (see Appendix A). Neither tribe objected to the undertaking nor to TVA's findings and determinations regarding cultural resources in the APE.

TVA finds that there are no historic properties (archaeological or architectural) eligible for listing in the NRHP within the APE. Therefore, the undertaking, i.e., implementing the Action Alternative, would have no direct, indirect, or cumulative effects on sensitive cultural resources.

### 4.2.11 Recreation, Parks, and Natural Areas

Under the Action Alternative, TVA would purchase the proposed ROW easements with the purpose of constructing a future TL. Construction activities could cause some temporary minor shifts in hunting or other dispersed recreation activities in the immediate vicinity of the proposed TL ROW. However, no formal recreation facilities are located near the proposed TL ROW or any of the access roads; therefore, the extent of any changes in use patterns would be minor and insignificant.

There are no natural areas within the proposed ROW. One natural area, Sanders Woods, is approximately 2.5 miles from the proposed ROW. This site is of sufficient distance such that there would be no impacts. There would be no impacts to these areas under either the No Action or Action Alternative.

The cumulative effect assessment takes into account actions that are not TVA's, but are occurring in the reasonable foreseeable future and could impact resources that would be affected by TVA's proposed Action Alternative. Actions that are known include the Megasite infrastructure construction to accommodate future industrial tenants and changes to other infrastructure including the realignment of SR 222. Lands affected by these projects are currently rural in character. There are no formal outdoor public recreation areas within or near these project areas. Some of the properties in this area may receive a limited amount of informal dispersed recreation activity such as hunting, hiking, or wildlife observation and implementation of these projects could some shifts in these recreation activities to other nearby rural areas. However, any impacts to informal outdoor recreation activities should be minor and insignificant.

Cumulative impacts to natural areas would be associated with development of infrastructure related to the Megasite, urbanization as the result of increased development of the immediate and surrounding area, etc. There are no natural areas within the Megasite footprint. There is the potential that development within the surrounding area would remove/impact areas that could be incorporated as natural areas; however there are no proposed natural areas within a five mile radius of the study area. Cumulative impacts to natural areas would be insignificant.

### 4.2.12 Socioeconomics and Environmental Justice

Under the Action Alternative, the ROW for the proposed TL would occupy approximately 158 acres in portions of Haywood and Fayette counties. To construct a proposed TL, TVA would normally purchase an easement from private land owners. That easement gives TVA the right to locate, operate, and maintain the TL across the property owner's land. In certain cases, TVA may be required to acquire property. In either case, current landowners would be compensated for the value of such rights or properties. The direct local economic effect from the purchase of any additional property or ROW easements would be minor.

Under the Action Alternative, the proposed TL would encourage investment in the area and facilitate employment opportunities. Virtually the entire ROW would cross primarily agricultural land and public and private roads; developed areas have been avoided to the extent possible. Most homes in the area are located far enough from the proposed TL route that property values would not be directly affected. The proposed TL was routed to avoid impacting the pivot irrigation systems allowing most agricultural practices to continue with the ROW areas. Since the majority of residential tracts along the proposed TL are approximately 0.7 miles from the new line, homes would not be negatively affected by the proposed project.

Various studies have concluded that TLs of this size have little or no impact on the value of nearby properties; and that if there are any impacts on property value, they would dissipate over time (Kroll and Priestley 1992). A more recent study based on the use of regression analysis confirms that transmission lines and structures have little or no effects on sales prices despite the fact that surveys conducted in the course of that study identified subjective feedback from market participants of their perceptions that property values would be impacted (Jackson and Pitts 2010). This same study also found, based on paired sales and other techniques, that transmission lines did not have effects on property values; and that any effects dissipate with time and distance (Jackson and Pitts 2010). Importantly, any TL construction or maintenance activities would be temporary and would generally have little impact on residents of the area. Operational activities would be limited to mowing the ROW, which is similar to the agricultural activity of the area.

As provided in Section 3.12, the poverty level in Haywood County (21.1 percent) is above the state and national poverty level. The proposed TL is located in Census Tract 9305, Block Group 1 in Haywood County. The American Community Survey table with poverty status data for that block indicates that based on a total population of 1071, only 38 persons are identified with income below the poverty level, resulting in a poverty rate for the block group of only 3.5 percent. Thus, the poverty level in the immediate vicinity of the proposed TL is much lower than the county or state poverty levels (U.S. Census Bureau 2015). TVA construction and maintenance personnel would utilize the local businesses while in the area and add to the local economy. Positive impacts to the local economy through purchase of supplies, meals and fuel by workers are anticipated. However, given the modest size of the project, the construction and operation, including maintenance activities, are expected to have minimal direct and indirect effects on the local community. No significant negative impacts are expected as a result of the project. Overall, therefore, there would be no disproportionate impacts to disadvantaged populations notwithstanding the higher minority population and higher poverty level for the larger Haywood County area.

In conducting the analysis of potential cumulative effects, reasonably foreseeable actions in the local area as well as likely regional trends in environmental conditions were considered. The provision of a LPC under the Action Alternative creates the potential for industrial growth in the area over the long-term (20 years or more). Consequently, this could result in some localized long-term and cumulative socioeconomic benefits as compared to the No Action Alternative. Additional employment opportunities and power supply in the area would provide a resource that could more successfully accommodate residential, commercial, and industrial expansion and development. However, any such future developments are speculative.

### 4.2.13 Postconstruction Effects

#### *4.2.13.1 Electric and Magnetic Fields*

TLs, 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 line, and the distance from the line.

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 residual very low amount is reduced to background levels near the ROW or energized equipment.

Magnetic fields can induce currents in conducting objects. Electric fields can create static charges in ungrounded, conducting materials. The strength of the induced current or charge under a 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 a source of shocks.

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

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

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

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

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

The consensus of scientific panels reviewing this research is that the evidence does not support a cause-and-effect relationship between EMFs and any adverse health outcomes (e.g., American Medical Association 1994; National Research Council 1997; National Institute of Environmental Health Sciences 2002). Some research continues on the statistical association between magnetic field exposure and a rare form of childhood

leukemia known as acute lymphocytic leukemia. A recent review of this topic by the WHO (International Association for Research on Cancer 2002) concluded that this association is very weak, and there is inadequate evidence to support any other type of excess cancer risk associated with exposure to EMFs.

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

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

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

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

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 line and with the terrain. Nevertheless, EMF strength attenuates rapidly with distance from the line and is usually equal to local ambient levels at the edge of the ROW. Thus, public exposure to EMFs would be minimal, and no significant impacts from EMFs are anticipated.

#### *4.2.13.2 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 top of structures and along the line, for at least the width of the ROW. The NESC is strictly followed when installing, repairing, or upgrading TVA lines or equipment. 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.

#### *4.2.13.3 Transmission Structure Stability*

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

Pole structures similar to those shown in Figure 2-1 would be used if a 161-kV TL is needed. These structures have demonstrated a good safety record. They are not prone to rot or crack like wooden poles, nor are they subject to substantial storm damage due to their low cross-section in the wind.

Laced-steel tower structures similar to those shown in Figure 2-2 would be used if a 500-kV TL is needed. These tower structures are the result of detailed engineering design and have been used by TVA for over 70 years with an exceptional safety record. Many structures of this type have been in service for more than 60 years with little maintenance necessary other than painting or minor repair of some of the steel members.

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.

#### *4.2.13.4 Other Impacts*

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

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

## 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 lines would traverse mostly rural areas with few residences and would involve only a few road crossings, the TL would not be especially prominent in the local landscape. Likewise, the establishment of easements for the proposed ROW with local landowners would pose a long-term encumbrance on the affected properties. 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 availability of a reliable power supply is one factor in improving the overall infrastructure in the local area, which over time could make the area more attractive to additional commercial and residential development. However, the extent and degree of such development in the Megasite area depends on a variety of factors and cannot be predicted accurately. Cumulative impacts of the construction, maintenance, and operation of the proposed TL loop and the Megasite development have been examined to the extent

practicable in resource sections above. Thus, residential and commercial growth of this mainly rural area would be a minor, long-term and cumulative consequence of the proposed transmission system improvements.

## 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.
- Trees would not be permitted to grow within the TL ROW or to a determined height adjacent to the ROW that would endanger the TL. In areas where the ROW would traverse forested areas, this would cause a change in the visual character of the immediate area and would segment some forested areas.
- Clearing and construction would result in the disruption and/or loss of some plant and wildlife, and the permanent loss of about 51 acres of forested habitat.
- Any burning of cleared material would result in some short-term air pollution.
- ROW construction would involve tree clearing and conversion of 8.46 acre of forested wetland to emergent or scrub-shrub wetland habitat.
- The proposed TL would result in minor, long-term visual effects on the landscape in the immediate local area.

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

Land within the ROW of the proposed TL would be committed to use for electrical system needs for the foreseeable future. Approximately 158 acres of land would be purchased (as described in Section 2.2.1.1) and some of this acreage would be converted from their current use of pasture, agriculture, and as forested land to use as a ROW. The proposed ROW would support either the 161-kV option or the 500-kV option (see Figure 1-1), with use of existing access roads outside the ROW. Agricultural uses of the ROW could and would likely continue. However, periodic 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 and as wildlife habitat are minor both locally and regionally.

## 4.6 Irreversible and Irretrievable Commitments of Resources

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

The materials used for construction of the proposed TL would be committed for the life of the line. Some materials, such as ceramic insulators and concrete foundations, may be irrevocably committed, but the metals used in equipment, conductors, and supporting steel structures could be recycled. The useful life of steel-pole transmission structures or laced-

steel towers is expected to be at least 60 years. Thus, recyclable materials would be irretrievably committed until they are eventually recycled.

The ROW used for the 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.

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# CHAPTER 5

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# CHAPTER 6

## 6.0 ENVIRONMENTAL ASSESSMENT RECIPIENTS

### 6.1 Federal Agencies

United States Army Corps of Engineers
Nashville, Tennessee

United States Fish and Wildlife Service
Cookeville, Tennessee

### 6.2 Federally Recognized Tribes

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

Chickasaw Nation
United Keetoowah Band of Cherokee Indians in Oklahoma

### 6.3 State Agencies

Tennessee Historical Commission
Nashville, Tennessee

### 6.4 County Agencies

Fayette County Commission
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# CHAPTER 7

## 7.0 LITERATURE CITED

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# Appendix A – Correspondence

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August 18, 2015

Ms. Pat Bernard Ezzell
Senior Program Manager
Tribal Relations and Corporate History
Tennessee Valley Authority
400 West Summit Hill Drive
460 WT 7D-K
Knoxville, TN 37902

Dear Ms. Ezzell:

Thank you for the letters of notification and Phase 1 cultural resources surveys of the proposed projects in Tennessee and Alabama, delineated in the table below. We accept the invitation to consult under Section 106 of the National Historic Preservation Act.

The Chickasaw Nation supports the proposed undertakings and is presently unaware of any specific historic properties, including those of traditional religious and cultural significance, in the project areas. In the event the agency becomes aware of the need to enforce other statutes we request to be notified under ARPA, AIRFA, NEPA, NAGPRA, NHPA and Professional Standards.

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

Sincerely,

Lisa John, Secretary
Department of Culture & Humanities

cc: pbezzell@tva.gov

| Project Description | Location |
|---|---|
| Transmission Line Loop to Memphis Regional Megasite | Fayette and Haywood Counties, Tennessee |
| Power Purchase Agreement with Solar Development for the proposed Moulton, Alabama Solar Farm | Moulton, Lauderdale County, Alabama |
| Planned Economic Development Project in Shelbyville | Shelbyville, Bedford County, Tennessee |

Recd. 8/7/15

**TENNESSEE HISTORICAL COMMISSION**
**2941 LEBANON ROAD**
**NASHVILLE, TENNESSEE 37243-0442**
**OFFICE: (615) 532-1550**

August 4, 2015

Mr. Clinton E. Jones
Tennessee Valley Authority
400 W. Summet Hill Dr.
Knoxville, Tennessee, 37902-1499

RE: TVA, CULTURAL RESOURCES SURVEY REPORT, MEMPHIS REGIONAL MEGASITE/LOOP, HAYWOOD, FAYETTE COUNTY

Dear Mr. Jones:

Pursuant to your request, received on Tuesday, July 21, 2015, this office has reviewed documentation concerning the above-referenced undertaking. This review is a requirement of Section 106 of the National Historic Preservation Act for compliance by the participating federal agency or applicant for federal assistance. Procedures for implementing Section 106 of the Act are codified at 36 CFR 800 (Federal Register, December 12, 2000, 77698-77739)

Considering the information provided, we find that the area of potential effects for this undertaking contains no historic properties eligible for listing in the National Register of Historic Places. You should notify interested persons and make the documentation associated with this finding available to the public.

If your agency proposes any modifications in current project plans or discovers any archaeological remains during the ground disturbance or construction phase, please contact this office to determine what further action, if any, will be necessary to comply with Section 106 of the National Historic Preservation Act.

This office appreciates your cooperation.

E. Patrick McIntyre

E. Patrick McIntyre
Executive Director and
State Historic Preservation Officer

EPM/jyg

You forwarded this message on 07/29/2015 1:54 PM.

From: Lisa LaRue-Baker - UKB THPO <ukbthpo-larue@yahoo.com> Sent: Wed 07/29/2015 12:39 PM
To: Ezzell, Patricia Bernard
Cc: ebird@unitedkeetoowahband.org
Subject: Re: TVA, TRANSMISSION LINE LOOP TO MEMPHIS REGIONAL MEGASITE PROJECT, PHASE I CULTURAL RESOURCES SURVEY, FAYETTE AND HAYWOOD COUNTIES, TI

TVA External Message. Please use caution when opening.

The United Keetoowah Band of Cherokee Indians in Oklahoma has reviewed your project under Section 106 of the NHPA, and at this time, have no comments or concerns. Should any human remains be inadvertently discovered, please cease all work and contact us immediately.
In addition, the UKB reserves the right to re-enter consultation at any time regarding this project.

Best,

Lisa C. Baker
Acting THPO
United Keetoowah Band of Cherokee Indians in Oklahoma
PO Box 746
Tahlequah, OK 74465

c 918.822.1952
ukbthpo-larue@yahoo.com

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Please FOLLOW our historic preservation page and LIKE us on FACEBOOK

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

July 28, 2015

To Those Listed:

TENNESSEE VALLEY AUTHORITY (TVA), TRANSMISSION LINE LOOP TO MEMPHIS REGIONAL MEGASITE PROJECT, PHASE I CULTURAL RESOURCES SURVEY, FAYETTE AND HAYWOOD COUNTIES, TENNESSEE

The State of Tennessee owns a large collected property in the Stanton, Tennessee area between Memphis and Jackson that has been determined by the Tennessee Valley Authority (TVA) to be suitable for any type of large industrial development. The State has gone through the certification process to establish this property as a Megasite to be marketed with the intent of promoting jobs, property development and tax base in the state. In order to attract potential industrial companies to this Megasite, the State has requested TVA to provide future transmission line (TL) routes into the Megasite that could support either a 161-kV or a 500-kV double circuit "loop" TL. For a loop line, the existing TL is extended to the substation by building two circuits to the station from two tap points in the existing line and removing the line between the two tap points. A loop would normally connect into two breakers at the substation. There is no plan to build TLs of both voltages. Both TL route options would be located to the border of the Megasite, since the substation voltage and location required to serve a Megasite industrial customer cannot yet be known. The in-service date for the TL is to be determined based on an industrial company locating at the Megasite.

The 500-kV double circuit option would begin between existing structures 428 and 427 on TVA's Haywood Switching Station-Cordova 500-kV TL. This TL would run approximately 3.4 miles to the property line at the Megasite location. The 161-kV double circuit option would begin between existing structures 205 and 206 on TVA's Cordova-South Jackson 161-kV TL. This TL would run approximately 6.5 miles to the property line at the Megasite, with the final 3.4 miles following the same path as the 500-kV option.

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

TVA has identified the area of potential effects (APE) for archaeological resources as the combined total of ca. 6.5 miles of new TL right-of-way (ROW). TVA would acquire ROW widths that will allow flexibility to provide whatever power is needed for the Megasite. The proposed easement would be 100 feet wide between the Cordova-South Jackson 161-kV TL and the Haywood Switching Station-Cordova 500-kV TL, and 300 feet wide from the Haywood Switching Station-Cordova 500-kV TL to the Megasite location. Where the new 161-kV TL would parallel

To Those Listed
Page Two
July 28, 2015

the existing 500-kV TL, TVA proposes to use 40 feet of the existing 200 foot-wide ROW and acquire 60 feet of new ROW in order to achieve the 100 foot total ROW width required for a 161-kV TL. The total amount of ROW proposed to be acquired is approximately 158 acres.

The archaeological APE also includes ca. 7 miles of access roads to be used in the construction and maintenance of the new TL. The APE for above-ground (historic architectural) resources consists of a one-half mile radius surrounding the centerline of the 6.5 miles of new ROW.

TVA contracted with Tennessee Valley Archaeological Research (TVAR) to perform a Phase I cultural resources survey of the APE. Please find a copy of the draft report titled *A Phase I Cultural Resources Survey of Tennessee Valley Authority's Transmission Line Loop to Memphis Regional Megasite in Fayette and Haywood Counties, Tennessee* online at this link: http://www.tvaresearch.com/download/TVAR_Memphis_Megasite_Final_High_Res.pdf.

TVAR's background study, conducted prior to the field study, indicated there are no previously identified archaeological sites within the APE. The archaeological survey identified four historic loci (JWR001, KMM001, KMM002, and KMM003) and two isolated finds of archaeological material. The four historic loci consist of mid-twentieth century artifact scatters and lack evidence of pre-1933 occupations. For that reason, the Tennessee Division of Archaeology declined to issue site numbers. One historic locus (JWR001) also contained a single prehistoric artifact. TVAR recommends that all four historic loci and two isolated finds are ineligible for inclusion in the National Register of Historic Places (NRHP).

The background study indicated that one historic architectural resource (HD-329) had been recorded previously in the APE. The survey revealed that this resource has been demolished since its recordation. The survey also recorded five previously unrecorded properties (IS-1 to IS-5). TVAR recommends all five of these properties are ineligible for inclusion in the NRHP.

TVAR recommends no further cultural resources investigations in connection with the undertaking.

TVA has reviewed the enclosed letter report and agrees with the findings and recommendations of the authors. TVA finds that no historic properties are present within the APE. TVA finds that no historic properties would be affected by the proposed undertaking.

Pursuant to 36 CFR Part 800.3(f)(2), TVA is consulting with the following federally recognized Indian tribes regarding historic properties within the proposed project's APE that may be of religious and cultural significance and are eligible for listing in the NRHP. The Chickasaw Nation and the United Keetoowah Band of Cherokee Indians in Oklahoma.

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

To Those Listed
Page Three
July 28, 2015

If you have any questions, please contact me in Knoxville at (865) 632-6461 or by e-mail at pbezzell@tva.gov. If you have any comments on the proposed undertaking, please respond by August 28, 2015.

Sincerely,

Pat Bernard Ezzell

Patricia Bernard Ezzell
Senior Program Manager
Tribal Relations and Corporate Historian
Public Relations and Corporate Information
Communications, WT 7D-K

SCC:CSD
Enclosures

# A Phase I Cultural Resources Survey of Tennessee Valley Authority's Transmission Line Loop to Memphis Regional Megasite in Fayette and Haywood Counties, Tennessee

Tennessee Valley Archaeological Research

IDENTICAL LETTER MAILED TO THE FOLLOWING ON JULY 28, 2015:

Mrs. Lisa C. LaRue-Baker
Acting Tribal Historic Preservation Officer
United Keetoowah Band
of Cherokee Indians in Oklahoma
Post Office Box 746
Tahlequah, Oklahoma 74464

Mr. Kirk Perry
Administrator
Department of Homeland Affairs
The Chickasaw Nation
Post Office Box 1548
Ada, Oklahoma 72821-1548

cc: Ms. Virginia (Gingy) Nail
Assistant Tribal Historic Preservation Officer
Department of Homeland Affairs
The Chickasaw Nation
Post Office Box 1548
Ada, Oklahoma 72821-1548

Ms. Amber Jarrett
Preservation & Repatriation Manager
Division of Historic Preservation
Department of Culture & Humanities
The Chickasaw Nation
P.O. Box 1548
Ada, OK 74821-1548

Dr. Tim Baugh
Cultural Preservation Specialist
Historic Preservation Division
Department of Homeland Affairs
The Chickasaw Nation
P.O. Box 1548
Ada, OK 74821-1548

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

July 16, 2015

Mr. E. Patrick McIntyre, Jr.
Executive Director
Tennessee Historical Commission
2941 Lebanon Road
Nashville, Tennessee 37243-0442

Dear Mr. McIntyre:

TENNESSEE VALLEY AUTHORITY (TVA), TRANSMISSION LINE LOOP TO MEMPHIS REGIONAL MEGASITE PROJECT, PHASE I CULTURAL RESOURCES SURVEY, FAYETTE AND HAYWOOD COUNTIES, TENNESSEE

The State of Tennessee owns a large collected property in the Stanton, Tennessee area between Memphis and Jackson that has been determined by the Tennessee Valley Authority (TVA) to be suitable for any type of large industrial development. The State has gone through the certification process to establish this property as a Megasite to be marketed with the intent of promoting jobs, property development and tax base in the state. In order to attract potential industrial companies to this Megasite, the State has requested TVA to provide future transmission line (TL) routes into the Megasite that could support either a 161-kV or a 500-kV double circuit "loop" TL. For a loop line, the existing TL is extended to the substation by building two circuits to the station from two tap points in the existing line and removing the line between the two tap points. A loop would normally connect into two breakers at the substation. There is no plan to build TLs of both voltages. Both TL route options would be located to the border of the Megasite, since the substation voltage and location required to serve a Megasite industrial customer cannot yet be known. The in-service date for the TL is to be determined based on an industrial company locating at the Megasite.

The 500-kV double circuit option would begin between existing structures 428 and 427 on TVA's Haywood Switching Station-Cordova 500-kV TL. This TL would run approximately 3.4 miles to the property line at the Megasite location. The 161-kV double circuit option would begin between existing structures 205 and 206 on TVA's Cordova-South Jackson 161-kV TL. This TL would run approximately 6.5 miles to the property line at the Megasite, with the final 3.4 miles following the same path as the 500-kV option.

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

Mr. E. Patrick McIntyre, Jr.
Page Two
July 16, 2015

TVA has identified the area of potential effects (APE) for archaeological resources as the combined total of ca. 6.5 miles of new TL right-of-way (ROW). TVA would acquire ROW widths that will allow flexibility to provide whatever power is needed for the Megasite. The proposed easement would be 100 feet wide between the Cordova-South Jackson 161-kV TL and the Haywood Switching Station-Cordova 500-kV TL, and 300 feet wide from the Haywood Switching Station-Cordova 500-kV TL to the Megasite location. Where the new 161-kV TL would parallel the existing 500-kV TL, TVA proposes to use 40 feet of the existing 200 foot-wide ROW and acquire 60 feet of new ROW in order to achieve the 100 foot total ROW width required for a 161-kV TL. The total amount of ROW proposed to be acquired is approximately 158 acres.

The archaeological APE also includes ca. 7 miles of access roads to be used in the construction and maintenance of the new TL. The APE for above-ground (historic architectural) resources consists of a one-half mile radius surrounding the centerline of the 6.5 miles of new ROW.

TVA contracted with Tennessee Valley Archaeological Research (TVAR) to perform a Phase I cultural resources survey of the APE. Enclosed are two bound copies of the draft report titled *A Phase I Cultural Resources Survey of Tennessee Valley Authority's Transmission Line Loop to Memphis Regional Megasite in Fayette and Haywood Counties, Tennessee*, along with two CDs containing digital copies of the report.

TVAR's background study, conducted prior to the field study, indicated there are no previously identified archaeological sites within the APE. The archaeological survey identified four historic loci (JWR001, KMM001, KMM002, and KMM003) and two isolated finds of archaeological material. The four historic loci consist of mid-twentieth century artifact scatters and lack evidence of pre-1933 occupations. For that reason, the Tennessee Division of Archaeology declined to issue site numbers. One historic locus (JWR001) also contained a single prehistoric artifact. TVAR recommends that all four historic loci and two isolated finds are ineligible for inclusion in the National Register of Historic Places (NRHP).

The background study indicated that one historic architectural resource (HD-329) had been recorded previously in the APE. The survey revealed that this resource has been demolished since its recordation. The survey also recorded five previously unrecorded properties (IS-1 to IS-5). TVAR recommends all five of these properties are ineligible for inclusion in the NRHP.

TVAR recommends no further cultural resources investigations in connection with the undertaking.

TVA has reviewed the enclosed letter report and agrees with the findings and recommendations of the authors. TVA finds that no historic properties are present within the APE.

Pursuant to 36 CFR Part 800.4(d)(1), we are seeking your concurrence with TVA's findings and determinations.

Mr. E. Patrick McIntyre, Jr.
Page Three
July 16, 2015

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

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

Sincerely,

Clinton E. Jones
Manager, Biological and Cultural Compliance
Safety, River Management and Environment
WT 11B-K

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

Fayette County Government

Rhea Taylor / County Mayor

April 24, 2014

Allen Miller
Transmission System Siting
Tennessee Valley Authority
1101 Market St. MR 4G
Chattanooga, TN 37402-2801

Dear Mr. Miller:

As County Mayor of Fayette County, I have received notification of the TVA open house for obtaining Right-Of-Way (ROW) for the construction of a main electrical transmission line for the Memphis Megasite. After having discussions with local landowners, receiving input from TVA representatives, and direction from the Fayette County Commission, I am making it known that the proposed routes for the transmission lines are unacceptable and must be rerouted.

The routes that have been suggested for this service line all have serious enough flaws that it requires another direction. First, the map omits several overhead irrigation structures. These structures have required substantial investment and would be a financially disastrous burden to remove if the routes are not changed. Secondly, these structures have greatly enhanced the ability to grow crops in the region and are an economic driver that must be kept. The suggested routes all go through farms which have made substantial investments in this technology. All have studies and plans, which have already been initiated, to continue the installation of these structures. Continuing with the suggested routes will have an unwarranted adverse impact on the agricultural community of Fayette County. Next, the line will go very near several homes and residences. Not only will this negatively affect land values in this area, but poses a perceived health risk for those individuals. Last, the Fayette County Commission has been on record as being against condemnation for a private purpose since 2005. This has been renewed with two additional resolutions on April 22 of this year. I have included both with this letter.

There appears to be a solution that would allow the acquisition of the ROW and construction of the service line, and avoid the impact that the proposed lines would have. The proposed 500 k-V transmission line from the Megasite could meet near where Albright Road and the current 500k-V transmission line cross. From there, the 161 k-V transmission line could continue and

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cross the Big Muddy Creak, and then go south toward the nearby sub-station, where Highway 76 and Old Brownsville Road meet. This route would avoid irrigation structures, follow property where the transmission line would have minimal impact, and would receive less resistance from citizens. To avoid any future delays and disagreements, the landowners and residents must be consulted prior to any additional future plan being put forward.

The Megasite has the potential for improving many lives and livelihoods, but this should not happen at the expense of another sector of our economy, or at the expense of the rights and property of our citizens. I have consulted our legislative representatives and they are in agreement with our position in this matter. I want to thank you for taking my comments and I am sure that you will find them reasonable and informative.

Sincerely,

Rhea Taylor

Rhea Taylor
Fayette County Mayor

Included:
Resolution Regarding the Tennessee-Haywood County Megasite Project
Resolution Regarding Fayette County Taking Private Property for Private Use

**RESOLUTION**

**WHEREAS,** the takings clause of the Fifth Amendment of the United States Constitution states "nor shall private property be taken for public use, without just compensation";

**WHEREAS,** upon adoption, the Fourteenth Amendment of the United States Constitution extended the application of the Fifth Amendment to each and every state and local government;

**WHEREAS,** the takings clause of the Fifth Amendment of the United States Constitution has historically been interpreted and applied by the United States Supreme Court to be conditioned upon the necessity that Government assumption of private property through eminent domain must be for the public use and requires just compensation;

**WHEREAS,** the Constitution of Tennessee states in Article I, Section 21 "that no man's particular services shall be demanded or property taken, or applied to public use, without the consent of his representatives, or without just compensation being made therefore";

**WHEREAS,** Tennessee Code Annotated Section 29-17-101 allows the counties to exercise the power of eminent domain "for any county purpose";

**WHEREAS,** the opinion of the majority of the United States Supreme Court in *Kelo, et al. v. City of New London, et al.*, renders the public use provision in the takings clause of the Fifth Amendment without meaning;

**WHEREAS,** the majority opinion in *City of New London* justifies the forfeiture of a person's private property through eminent domain for the sole benefit of another private person;

**WHEREAS,** the dissenting opinion in *City of New London* upholds the historical interpretations of the takings clause and affirms that "the public use requirement imposes a more basic limitation upon government, circumscribing the very scope of the eminent domain power: Government may compel an individual to forfeit her property for the public's use, but not for the benefit of another private person";

**WHEREAS,** all levels of Government have a responsibility and moral obligation to always defend the property rights of individuals and to only execute their power of eminent domain for the good of public use and contingent upon the just compensation to the individual property owner;

**WHEREAS,** it is appropriate for the Fayette County Commission to take action, consistent with its limited powers, to restore the vital protections of the Fifth Amendment, and to uphold the provisions of Article I, Section 21 of the Constitution of Tennessee and to protect homes, small businesses and other private property rights against unreasonable government use of the power of eminent domain; and

**WHEREAS,** it is appropriate for the County of Fayette, Tennessee to take action to voluntarily limit its own power of eminent domain;

**NOW, THEREFORE, BE IT RESOLVED** that the Fayette County Commission interprets the phrase "for any county purpose" in Tennessee Code Annotated Section 29-17-101 to require that any use of eminent domain by the County must be for the public use;

**FURTHER RESOLVED,** that the County Commission disagrees with the majority opinion in the *City of New London* case and its holdings that effectively negate the public use requirement of the takings clause;

**FURTHER RESOLVED,** that the County Commission agrees with the dissenting opinion in *City of New London* in its upholding of the historical interpretation of the takings clause and its deference to the rights of individuals and their property;

**FURTHER RESOLVED,** that the term "public use" and "county purpose" shall not be construed to include economic development;

**FURTHER RESOLVED,** that this self-imposed limitation on the power of Fayette County government's use of eminent domain may be amended only with a two-thirds vote of the Fayette County Commission; and

**FURTHER RESOLVED,** that the provisions of this Resolution shall have no application as a limitation of the exercise by Fayette County of those police powers which are necessary to the safety and tranquility of a well-ordered community, nor of the general power over private property which is necessary for the orderly existence of all governments.

Adopted this 22nd day of April, 2014.

Fayette County Commission Chairman

4/22/14
Date

Attest:

Fayette County Clerk Deputy Clerk

**RESOLUTION REGARDING THE TENNESSEE-HAYWOOD COUNTY MEGASITE PROJECT**

**WHEREAS,** the State of Tennessee has approximately 1700 acres in the TVA certified Megasite and has recently purchased over 200 acres in Fayette County to add to the acreage of the total Megasite land and seeks to induce the development of heavy industry along Interstate 40 in this area and into northern Fayette County; and

**WHEREAS,** the Fayette County Commission, as the elected representatives of the people of Fayette County, have received little information and no opportunity for input into the TVA Megasite development; and

**WHEREAS,** most of the property in the Megasite lies within Haywood County but the State of Tennessee has acquired options for and purchased land in Fayette County in a manner, which some Fayette County citizens allege to be racially discriminatory; and

**WHEREAS,** the Megasite project has received the approval of budgeted funds for infrastructure improvements and the State of Tennessee intends to develop it as a speculative heavy industrial site; and

**WHEREAS,** no information has been provided to the Fayette County Commission on the number of jobs that the TVA Megasite can reasonably be expected to provide or about the estimated short term and long term cost to Fayette County taxpayers to provide infrastructure for the TVA Megasite and its ancillary development; and

**WHEREAS,** TVA has provided no information or analysis on the economic benefits or the possibly harmful impacts of an automotive or similar industry on Fayette County residents in regards to land use, water and air quality; and

**WHEREAS,** TVA now seeks to purchase or condemn Fayette County farmland and other holdings for transmission line easement to merely improve the marketability of the speculative TVA Megasite project; and

**WHEREAS,** TVA has not accurately located or considered all of the costly irrigation systems that Fayette County farmers and landowners have installed along the currently proposed transmission line routes considered by TVA; and

**WHEREAS,** TVA has refused to schedule their public open house in Fayette County and has refused to hold it at a time convenient to the farmers and not in conflict with the critically important planting season; and

**WHEREAS,** TVA has not provided information or analysis on the loss of production and opportunity cost to Fayette County farmers for the taking of the easements and use of their land for large electrical transmission lines; and

**NOW, THEREFORE, BE IT RESOLVED** by the County Commission of Fayette County that:

1. We respectfully petition the Tennessee Valley Authority, the Governor of Tennessee, the Commissioner of Economic and Community Development and the State Building Commission to assist the Fayette County Commission in performing its due diligence in determining:
(A) if the TVA Megasite will be a financial benefit or burden to Fayette County;
(B) if state funds may be expended for purchase of land without investigating the claims of certain minority landowners alleging specific discriminatory actions taken by Haywood County and TVA;
(C) that TVA take no actions regarding the acquisition or condemnation of transmission line easements before the cumulative impact of the TVA Megasite proposed heavy industrial effects on land use, water and air quality, as is required by 40 CFR § 1502 and 18 CFR § 1302.(b)(3) and 18 CFR 1302.6 (b);
(D) that TVA take no actions regarding the acquisition or condemnation of transmission line easements before all current and planned agricultural improvements such as irrigation pivots are accurately located;
(E) that TVA take no actions regarding the acquisition or condemnation of transmission line easements before a public meeting is scheduled in Fayette County at a time accommodative to landowner farming and work requirements;
(F) that Tennessee Economic Development provide estimates of what infrastructure with estimated costs Fayette County will be expected to provide in connection with the TVA Megasite in the next 20 years.

2. Copies of this resolution shall be forwarded to the Tennessee Valley Authority, the Governor of Tennessee, the Tennessee Commissioner of Economic and Community Development, and the Tennessee State Building Commission by the Fayette County Attorney and that responses be received by the Fayette County Attorney.

**Adopted this 22nd day of April, 2014.**

**APPROVED:**

**Fayette County Commission Chairman**

4/22/14

**Date**

**ATTEST:**

**Fayette County Clerk**

Deputy Clerk

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# Appendix B – TVA Right-of-Way Clearing Specifications

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# Tennessee Valley Authority Right-of-Way Clearing Specifications

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

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

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

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

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

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

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

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

7. Water Quality Control - The contractor's clearing and disposal activities shall be performed using BMPs that will prevent erosion and entrance of spillage, contaminants, debris, and other pollutants or objectionable materials into drainage ways, surface water, or groundwater. Special care shall be exercised in refueling equipment to prevent spills. Fueling areas shall be remote from any sinkhole, crevice, stream, or other water body. Open burning debris will be kept away from streams and ditches and shall be incorporated into the soil.

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

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

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

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

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

11. Burning - The contractor shall obtain applicable permits and approvals to conduct controlled burning. The contractor will comply with all provisions of the permit, notification, or authorization including burning site locations, controlled draft, burning hours, and such other conditions as stipulated. If weather conditions such as wind speed or wind direction change rapidly, the contractor's burning operation may be temporarily stopped by TVA's field engineer. The debris to be burned shall be kept as clean and dry as possible and stacked and burned in a manner that produces the minimum amount of smoke. Residue from burning will be disposed of according to permit stipulations. No fuel starters or enhancements other than kerosene will be allowed.

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

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

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

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

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

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

5. Refuse Disposal - The clearing or reclearing contractor shall be responsible for daily cleanup and proper labeling, storage, and disposal of all refuse and debris on the site produced by his operations and employees. Facilities that meet applicable regulations and guidelines for refuse collection will be required. Only approved transport, storage, and disposal areas shall be used.

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

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

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

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

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

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

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

References

Muncy, J. A. 2012. *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities* (revised edition). Edited by A. Bowen, et al. <http://www.tva.com/power/projects/bmp_manual_2012.pdf>. Norris: Tennessee Valley Authority, Technical Note TVA/LR/NRM 92/1. Retrieved from: <http://www.tva.com/power/projects/index.htm> (n.d.)

Revision January 2013

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

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# Tennessee Valley Authority Environmental Quality Protection Specifications for Transmission Line Construction

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

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

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

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

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

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

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

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

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

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

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

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

   The clearing contractor erected erosion and/or sedimentation control shall be maintained and (when TVA or contract construction personnel are unable) the construction crew(s) shall maintain BMPs such as silt fences on steep slopes and adjacent to any stream, wetland, or other water body. Additional BMPs may be required for areas of disturbance created by construction activities and at sequential steps of construction at the same location on site. BMPs will be inspected by the TVA field engineer or other designated TVA or contractor and/or subcontractor(s) personnel routinely and during periods of high runoff, and any necessary repairs will be made as soon as practicable. BMP inspections and any required sampling will be conducted in accordance with permit requirements. Records of all inspections and sampling results will be maintained on site, and copies of inspection forms and sampling results will be forwarded to the TVA project manager or supporting environmental specialist. Acceptable measures for disposal of waste oil from vehicles and equipment shall be followed. No waste oil shall be disposed of within the site, access, or right-of-way, on a related construction site or its access roads

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

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

    On rights-of-way, mechanized equipment shall not be operated in flowing or standing water bodies except when approved and, then, only to construct crossings or to perform

required construction under direct guidance of TVA. Construction of stream fords or other crossings will only be permitted at approved locations and to current TVA construction access road standards. Material shall not be deposited in watercourses, their adjacent wetlands, or within stream bank areas where it could be washed away by high stream flows. Appropriate U.S. Army Corps of Engineers' and state permits shall be obtained.

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

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

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

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

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

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

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

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

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

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

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

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

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

16. RENOVATION OR DEMOLITION DEBRIS MAY NOT BE BURNED.

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

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

19. Vehicle Servicing - Routine maintenance of personal vehicles will not be performed on the right-of-way or access route to the site. However, if emergency or "have to"

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

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

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

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

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

**References**

Muncy, J. A. 2012. A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities (revised edition). Edited by A. Bowen, et al. <http://www.tva.com/power/projects/bmp_manual_2012.pdf>. Norris: Tennessee Valley Authority, Technical Note TVA/LR/NRM 92/1. Retrieved from: <http://www.tva.com/power/projects/index.htm> (n.d.)

Revision January 2013

# Appendix D – TVA Transmission Construction Guidelines Near Streams

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# Tennessee Valley Authority Transmission Construction Guidelines Near Streams

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

## Three Levels of Protection

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

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

## (A) Standard Stream Protection

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

**Guidelines:**

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

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

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

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

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

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

**Guidelines:**

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

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

3. Cutting of trees within SMZs must be accomplished by using either hand-held equipment or other appropriate clearing equipment (e.g., a feller-buncher) that would result in minimal soil disturbance and damage to low-lying vegetation. The method will be selected based on site-specific conditions and topography to minimize soil disturbance and impacts to the SMZ and surrounding area. Cutting of trees near permanent streams must be limited to those required to meet National

Electrical Safety Code and danger tree requirements. Stumps can be cut close to ground level, but must not be removed or uprooted.

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

### (C) Protection of Unique Habitats

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

**Guidelines:**

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

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

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

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

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

**Maintenance**

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

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

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

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

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

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

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

# Appendix E – TVA Transmission and Power Supply Environmental Protection Procedures Right-of-Way Vegetation Management Guidelines

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

## 1.0 Overview

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

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

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

## 2.0 Right-of-Way Management Methods

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

B. TVA uses a variety of herbicides specific to the species present with a variety of possible application techniques. TVA utilizes control methods, including use of low volume herbicide applications, occasional single tree injections, and tree growth regulators (TGRs) to a large extent.

C. In very steep terrain, in sensitive environmental areas, in extensive wetlands, at stream banks, and in sensitive property owner land use areas, hand clearing may be utilized. Hand clearing is recognized as one of the most hazardous occupations documented by the Occupational Safety and Health Administration. For that reason, TVA utilizes low volume herbicide applications in these areas when feasible.

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

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

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

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

## 3.0 Herbicide Program

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

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

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

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

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

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

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

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

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

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

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

F. Best Management Practices (BMPs) governing application of herbicides are contained within *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities* (Muncy 2012) which is incorporated by reference. Herbicides can be liquid, granular, or powder and can be applied aerially or by ground equipment and may be selectively applied or broadcast, depending on the site requirements, species present, and condition of the vegetation. Water quality considerations include measures taken to keep herbicides from reaching streams whether by direct application or through runoff of or flooding by surface water. “Applicators” must be trained, licensed, and follow manufacturers’ label instructions, USEPA guidelines, and respective state regulations and laws.

G. When herbicides are used, their potential adverse impacts are considered in selecting the compound, formulation, and application method. Herbicides that are designated “Restricted Use” by USEPA require application by or under the supervision of applicators certified by the respective state control board. Aerial and ground applications are done either by TVA or by contractors in accordance with the following guidelines identified in the TVA BMP manual (Muncy 2012):

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

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

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

## 4.0 References

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# Appendix F – Stream Crossings along the Proposed Transmission Line and Access Roads

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**Stream Crossings along the Proposed Transmission Line Loop Right-of-Way into the Memphis Regional Megasite and Associated Access Roads Located in Fayette and Haywood Counties, Tennessee**

| Stream ID | Stream Type | Streamside Management Zone Category | Stream Name | Field Notes |
|---|---|---|---|---|
| 001 | Perennial | Category A (50 feet) | Unnamed tributary to Big Muddy Creek | Meandering flowing stream, vehicular crossing at ford south of mapped access road. |
| 002 | Perennial | Category A (50 feet) | Unnamed tributary to Big Muddy Creek | Meandering stream, vehicular crossing at ford south of mapped access road. |
| 003AR | Perennial | Category A (50 feet) | Unnamed tributary to Big Muddy Creek | Meandering stream, vehicular crossing at ford south of mapped access road. |
| 004AR | Perennial | Category A (50 feet) | Unnamed tributary to Big Muddy Creek | Meandering stream through riparian wetland floodplain habitat; empties into industrial ag land ditch. |
| 005 | Intermittent | Category A (50 feet) | Unnamed Stream | A stream between bw5 and bw6. |
| 006AR | Intermittent | Category A (50 feet) | Unnamed Stream | Drainage ditch along road side between BW11 empties south via culvert. |
| 007AR | Perennial | Category A (50 feet) | Unnamed tributary to Big Muddy Creek | Moderate sinuosity; sand/gravel substrate; almost entirely stagnant, some mild flow in riffle areas; no obligate lotic aquatic organisms (organisms that require flowing water for all or almost all of the aquatic phase of their life) observed. |
| 008AR | Perennial | Category A (50 feet) | Unnamed tributary to Big Muddy Creek | A stream crossing via man-made; 10-foot-wide X 0.5-foot to 2-feet-high (asm04) |
| 009AR | Other | Category A (50 feet) | Pond | Pond adjacent to ROW (asm08) |
| 010AR | Intermittent | Category A (50 feet) | Unnamed tributary to Little Laurel Canal | Tadpoles abundant; mostly stagnant pools w/ minimal flow in riffle areas; moderate sinuosity; substrate primarily sand/gravel (asm10) |
| 011AR | Perennial | Category A (50 feet) | Unnamed tributary to Little Laurel Canal | A stream in ROW; 20- to 30-foot-wide X 15-foot-high channel; 6-foot-wide X 0.5-foot high; sand/gravel substrate; significant bank scour observed (asm12) |
| 012AR | Intermittent | Category A (50 feet) | Unnamed tributary to Little Laurel Canal | Tributary to asm12; braided channel; same channel features as asm12 (asm13) |

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# Appendix G – 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

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

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