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## SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT

# **WACKER CHEMIE POLY 11 REQUEST FOR TENNESSEE VALLEY AUTHORITY LAND USE AND SECTION 26a APPROVALS AND UNITED STATES ARMY CORPS OF ENGINEERS SECTION 404 APPROVAL Bradley County, Tennessee**

**PREPARED BY:**  
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JULY 2011

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#### **The Proposed Decision and Need**

Wacker Chemie, AG (i.e., “Wacker”), a German company, plans to build a plant in Bradley County, Tennessee, to produce polycrystalline silicon for use in solar power systems and other products. Wacker’s manufacturing processes require large amounts of electric power. Possible future plant expansions, in addition to other industrial and commercial growth in the area, will increase demand for power in the local area.

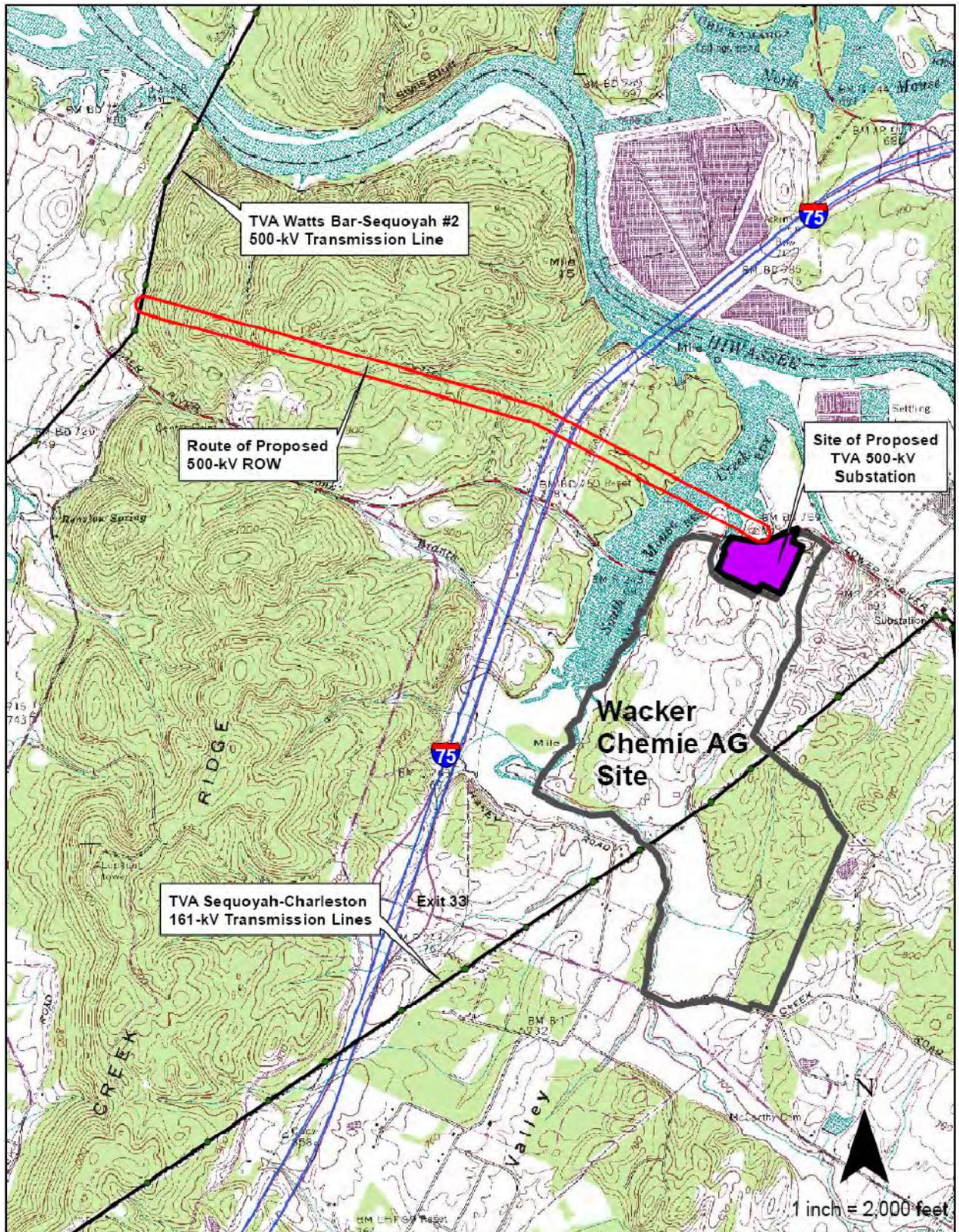
To deliver the necessary electric power required and to provide a high degree of reliability in the power supply, the Tennessee Valley Authority (TVA) is proposing to supply power directly to the Wacker plant. This would involve construction of a new 500-kilovolt (kV) TVA substation at the Wacker site. To provide power to the new 500-kV substation, TVA would construct a 2.3-mile-long 500-kV loop line from the existing TVA Watts Bar-Sequoyah #2 500-kV Transmission Line (see Figure 1). The new TVA 500-kV substation would supply power to a new Wacker substation via two buried 161-kV lines. Additionally TVA would upgrade the Watts Bar-Sequoyah #2 500-kV Transmission Line, and system operation displays would be updated to reflect the status of the new and updated transmission facilities. Further descriptions of these actions are provided in the Action Alternative section below. Anticipated in-service date for the proposed substation and transmission lines is May 2013.

#### **Other Environmental Reviews and Documentation**

In September 2010, TVA issued the final environmental assessment (EA) entitled *Wacker Chemie Poly 11 Request for Tennessee Valley Authority Land Use and Section 26a Approvals and United States Army Corps of Engineers Section 404 Approval, Bradley County, Tennessee* (TVA 2010). In that document, TVA evaluated and documented the potential environmental effects of cut and fill on TVA-controlled shoreline, encapsulation of a perennial stream, off-site stream mitigation, construction of storm water outfalls, stream restoration associated with the site preparation for Wacker’s proposed polycrystalline silicon production plant, and site preparation of an on-site 23-acre area to be used for a 500-kV substation. Wacker’s specific power supply needs were not known when the document was prepared, and the provision of power for the plant could not be addressed in that environmental review. The potential effects of supplying power to the Wacker plant that were not addressed previously are documented in this supplement to the 2010 EA.

#### **Alternatives**

Two alternatives, i.e., the No Action Alternative and the Action Alternative, were considered in the environmental review. These alternatives are described below.



**Figure 1. Vicinity Map of the Proposed Wacker Chemie Plant in Bradley County, Tennessee**

### The No Action Alternative

Under the No Action Alternative, TVA would not supply direct serve power to the Wacker facility. Consequently, the proposed 500-kV loop transmission line and the 500-kV substation would not be built by TVA. Additionally, TVA would not perform the proposed upgrades to the TVA Watts Bar-Sequoyah #2 500-kV Transmission Line. Without an adequate source of power, the proposed Wacker polysilicon plant could not operate as planned, and Wacker could choose to locate the plant elsewhere. In this case, the anticipated local socioeconomic benefits from the planned facility would not be recognized.

### The Action Alternative

Under the Action Alternative, TVA would provide direct service to the Wacker facility by undertaking the following actions.

1. Construct and operate a new 500-kV substation at the Wacker facility. This approximately 23-acre substation would be built on property currently owned by Wacker (see Figure 1). Wacker has performed all of the site preparations for its property and would transfer ownership of approximately 23 acres of plant property to TVA for the proposed substation prior to substation construction. All land disturbance activities related to site preparation for this substation were evaluated in the 2010 EA. During substation construction, TVA would follow the guidelines outlined in the *TVA Environmental Quality Protection Specifications for Transmission Substation or Communications Construction* (Appendix A).

Although the vegetation has been cleared and the site of the proposed substation has been leveled, some additional grading of the site may be required by TVA prior to construction. Once the substation site has been graded, spoil would be removed in preparation for foundations. The topsoil and spoil stored in separate piles would be reused on the property. Gravel would be placed on the substation site. Oil containment would be installed for the 500-161-26-kV transformer bank, and a retention pond would be constructed on the property. The type of breakers installed would be SF-6. The switch house would be equipped with water and sewer. A water line would be installed and would tap into the local water supply system. TVA would utilize Wacker's sewer system. The lighting for the substation would be designed to minimize light pollution while still meeting safety and security requirements.

2. Construct, operate, and maintain an approximately 2.3-mile-long 500-kV loop transmission line from the TVA Watts Bar-Sequoyah #2 500-kV Transmission Line to the proposed 500-kV substation site (Figure 1). This line would consist of two parallel 500-kV transmission lines located on a common 300-foot-wide right-of-way (ROW). The centerlines of these two lines would be located 125 feet apart, and the lines would be located on laced steel towers. This transmission line would supply power to the proposed 500-kV substation. During ROW clearing and construction, TVA would implement the measures described in the *TVA Right-of-Way Clearing Specifications* (Appendix B) and the *TVA Environmental Quality Specifications for Transmission Line Construction* (Appendix C). Likewise, the *TVA Environmental Protection Procedures Right-of-Way Vegetation Management Guidelines* (Appendix D) would be followed during ROW maintenance.

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

TVA would purchase easements from landowners for the new ROW. These easements would give TVA the right to construct, operate, and maintain the transmission line, 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 they fall toward the transmission line. The fee simple ownership of the land within the ROW would remain with the landowner, and many activities and land uses could 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 transmission line or create a hazardous situation.

Because of the need to maintain adequate clearance between tall vegetation and transmission line conductors, as well as to provide access for construction equipment, most trees and shrubs would initially be removed from the entire width of the new ROW. Equipment used during this ROW clearing would include chain saws, skidders, bulldozers, tractors, and/or low ground-pressure feller-bunchers. Marketable timber would be salvaged where feasible; otherwise, woody debris and other vegetation would be piled and burned, chipped, or taken off site. In some instances, vegetation may be windrowed 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 soon to grow tall enough, to interfere with conductors. Clearing in SMZs would be accomplished using hand-held equipment or remote-handling equipment, such as a feller-buncher, in order to limit ground disturbance. *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities* (Muncy 1999) would be followed in clearing and construction activities.

Following clearing and construction, vegetative cover on the ROW would be restored as much as possible to its state prior to construction. Pasture areas would be reseeded with suitable grasses. Wooded areas would be restored using native grasses and other low-growing noninvasive species. Erosion controls would remain in place until the plant communities become fully established. Streamside areas would be revegetated as described in Appendices B, C, D, and Muncy (1999). In rugged terrain, vegetation at the bottom of ravines would be left provided there is adequate clearance between the vegetation and the conductors.

#### *Access Roads*

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

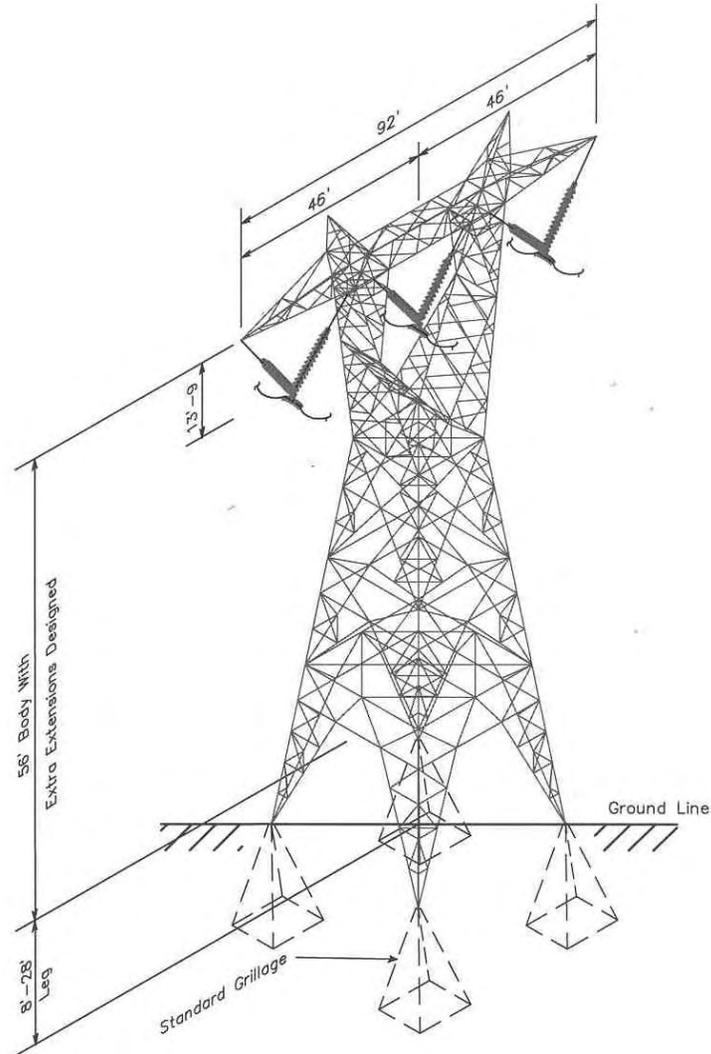
Culverts and other drainage devices, fences, and gates would be installed as necessary. Culverts installed in any permanent streams would be removed following construction. However, in wet-weather conveyances (i.e., streams that run only following a rainfall), they would be left or removed, depending on the wishes of the landowner or on 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.

### *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 one month before construction begins. Properties such as existing parking lots or areas used previously as car lots are ideal laydown areas because site preparation is minimal. Selection criteria used for locating potential laydown areas include an area typically 5 acres in size; relatively flat; well drained; previously cleared; preferably graveled and fenced; preferably containing wide access points with appropriate culverts; sufficiently distant from streams, wetlands, or sensitive environmental features; and located adjacent to an existing paved road near the transmission line. TVA typically 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 may be required. 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 fencing installed by TVA and site restoration would be at the discretion of the landowner.

### *Structures and Conductors*

The proposed 500-kV line would use self-supporting, galvanized, laced-steel structures. The electrical conductors would consist of three sets of three, 954,000 circular mil aluminum-steel-reinforced cables bundled in a triangular configuration, suspended beneath the structure crossarms by two insulators, 14 feet long, arranged in a “V” shape. Two single ground wires would be placed on the two highest points of the structures to provide lightning protection. In some cases, these ground wires may carry fiber optic or other communication circuits. The structures may also have a second crossarm added beneath the 500-kV line to support one or two lower-voltage lines, allowing additional transmission lines on the same ROW. Tower height would vary with terrain and land use along the route but normally ranges between 85 to 135 feet. The distance between structures would vary based on the same factors but would range from 500 to 2,000 feet. Tower foundations are normally a laced-steel grillage, one per leg, buried in the earth. Some towers at points where the line turns an angle would require foundations of reinforced concrete. A typical structure is provided as Figure 2.



**Figure 2. Typical 500-kV Transmission Structure**

Aircraft warning spheres would be placed on the highest wires (ground wires) at river and interstate crossings and at any other locations where aviation patterns require them.

After clearing, construction would generally progress in the following order:

- Excavation of foundation or grillage holes
- Installation of the foundations and grillages
- Assembly, on the ground, of large portions of the steel structures
- Placement of the assembled structures on the foundations using cranes
- Hanging of insulators with “pulling blocks” or pulleys attached to allow the new conductors and ground wires to be pulled through
- Pulling the ground wires and conductors into place

- “Sagging” the conductor; that is, adjusting it to the proper tension and height to achieve the required clearances
- Clipping the conductor into place on the end of the insulators
- Inspection and testing of the line
- ROW restoration and clean up

Prior to installing the conductors, temporary clearance poles would be installed at road and railroad crossings to reduce interference with traffic. A small rope would be pulled from structure to structure through the pulling blocks. The rope would be connected to the conductors and ground wires and used to pull them down the line. 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 pulling blocks. In some areas where access is difficult, a helicopter may be used for various tasks including moving of material and personnel, pulling conductor pull-ropes, or installation of conductor spacers.

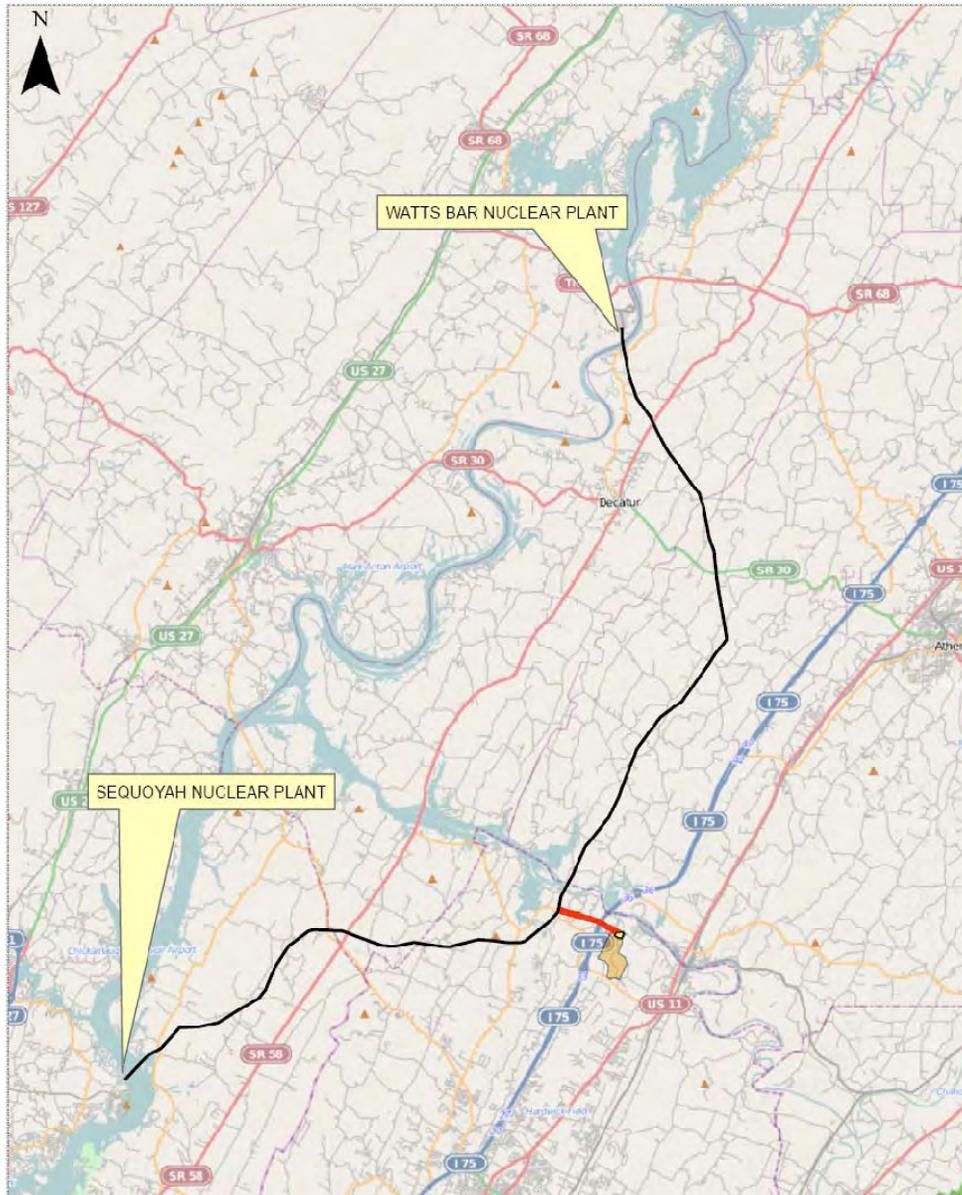
After the line is constructed, the ROW would be revegetated using native, low-growing plant species in appropriate areas. Areas such as pasture, agricultural fields, or lawns would be returned to their former condition. Additional applicable environmental quality protection specifications that would be used during ROW clearing and transmission line construction are listed in Appendices B and C and in Muncy (1999).

The transmission line ROW can be used by the landowner for many purposes; however, the construction of permanent buildings, trees that reach the height of the electrical conductors, and storage of any flammable material would be prohibited.

3. Supply power to the new Wacker 161-kV substation (to be constructed by Wacker) by connecting two 161-kV transmission lines (to be constructed by Wacker) to the proposed 500-kV substation. Wacker would bury these two 161-kV lines, which would run between the Wacker 161-kV substation and the proposed TVA 500-kV substation.
4. Upgrade portions of the local TVA power system. This would include the following actions:
  - Replacement of the 500-kV line relays and associated equipment at the TVA Sequoyah and Watts Bar 500-kV substations.
  - Addition of new telecommunications connections at the TVA Sequoyah, Watts Bar, and Volunteer 500-kV substations.
  - Installation of optical ground wire (known as “OPGW”) on the existing 40-mile-long Watts Bar-Sequoyah #2 500-kV Transmission Line (see Figure 3). OPGW is typically installed on top of the transmission structures above the conductors. OPGW is a fiber optic ground wire that provides lightning protection and serves as a path for communications. Helicopters are commonly used to install OPGW. First, the old ground wire (i.e., the “static wire”) would be removed from its supporting hardware and placed into a temporary support (known as a “traveler”) that allows the old line to be pulled through the traveler. The new OPGW would then be connected to the end of the old wire and the old wire would be pulled along a fixed length, installing the OPGW. The travelers would be removed by helicopter, and the regular OPGW support hardware would be

reinstalled. Typically, lengths ranging from 1,000 to about 15,000 feet are replaced. “Pull points,” located at the end of each replacement segment are typically sited at readily accessible points along the ROW.

- Add status and indicators for the new 500-kV substation and loop line to the map board display at TVA’s System Operations Center and Regional Operations Center in Chattanooga.



**Figure 3. Vicinity Map of the Watts Bar-Sequoyah #2 500-kV Transmission Line**

#### Alternatives Eliminated From Detailed Study

TVA’s Sequoyah-Charleston 161-kV Transmission Lines #1 and #2 supply power to the Charleston 161-kV Substation. These two transmission lines cross a portion of the Wacker property (Figure 1). Although a connection to these lines could provide approximately 100

MW of power, the long-term power needs for the Wacker facility and the local area could not be supplied by these lines. Thus, this power supply option was eliminated from further consideration.

## **Affected Environment and Evaluation of Impacts**

### Site Description

The proposed 500-kV transmission line route and substation site are located in Bradley County, Tennessee, immediately west of the communities of Charleston and Calhoun. The proposed 500-kV loop line would connect to the Watts Bar-Sequoyah #2 500-kV Transmission Line at Structure 111 (Figures 1 and 3). This proposed route is part of a steep wooded ridge. From the loop point, the proposed lines would cross through a relatively low saddle in the ridge to head east, mostly across property owned by Wright Brothers Construction Company. The lines would cross over Interstate Highway (I-) 75 south of the Hiwassee River and then cross the South Mouse Creek embayment of Chickamauga Reservoir before entering the proposed TVA 500-kV substation.

The proposed 500-kV substation and transmission line are within the Ridge and Valley region within the Chickamauga Lake-Hiwassee River watershed. About 70 percent of the proposed transmission line route occurs in the Southern Limestone/Dolomite Valleys and Low Rolling Hills ecoregion (Griffith et al. 1998), which is situated west of the transmission line's crossing of I-75. This ecoregion supports a variety of forested communities. In the vicinity of the proposed transmission line, this ecoregion is dominated by forested ridges. The remaining 30 percent of the proposed transmission line route occurs in the Southern Shale Valleys ecoregion and is located between I-75 eastward to the proposed substation site. This portion of the proposed transmission line corridor exhibits less relief than that found in the Southern Limestone/Dolomite Valleys and Low Rolling Hills ecoregion, which gives rise to lowland forest and agricultural vegetation types that do not occur in other parts of the project area.

The TVA Watts Bar-Sequoyah #2 500-kV Transmission Line connects the TVA Watts Bar Nuclear Plant (WBN) with the Sequoyah Nuclear Plant (SQN) (see Figure 3). This line is approximately 40 miles long and leaves the SQN in a northeasterly direction to cross rural countryside that is gently rolling and occupied by some residential areas, forests, and agricultural areas. Slightly west of the proposed tap point, the line crosses several forested ridges that run in a southwest-to-northeast direction. The bottom land between these ridges is typically used for agriculture. North of the tap point, the line follows a wooded ridge and then descends into an agricultural valley. The line then runs northwesterly to the WBN and crosses a series of wooded ridges and agricultural valleys. The topography becomes more gently rolling as the line approaches the WBN.

For most of its 40-mile length, the Watts Bar-Sequoyah #2 500-kV Transmission Line is located on a 175-foot-wide ROW. However, near the two nuclear plants, the line is on a much wider, shared ROW with other transmission lines. The ROW is subjected to periodic maintenance to control woody vegetation. This is accomplished by a combination of mowing and chemical application. A series of existing access roads across adjacent properties provides vehicular access to the ROW for maintenance.

### Impacts Evaluated

Under the No Action Alternative, TVA would not take possession of the proposed substation site, and this parcel would likely be used as part of the Wacker facility. Because the proposed 2.3-mile-long transmission line would not be constructed under the No Action

Alternative, no direct short-term changes in the current environmental conditions along the proposed route are likely. Additionally, TVA would not perform the proposed upgrades to the TVA Watts Bar-Sequoyah #2 500-kV Transmission Line under the No Action Alternative. Thus, no changes to existing environmental conditions along this transmission line are likely under the No Action Alternative. However, long-term changes could occur, but these would not be due to the proposed action. Thus, under the No Action Alternative, there would be no direct project-related effects to the following local resources: surface water and aquatic life; wetlands and their functions; floodplains and their functions; plant life; wildlife; federally or state-listed species or their habitats; historic and archaeological resources; visual quality; and natural areas.

Installation of the OPGW would occur on the Watts Bar-Sequoyah #2 500-kV Transmission Line. The ROW of this existing transmission line is maintained by periodic mowing and brush control. Various existing access roads provide vehicular access to the ROW for maintenance. Installation of OPGW requires minimal ground disturbance, as equipment would remain on the access roads. Equipment would not have to cross streams, and the work would be accomplished quickly, as no additional construction or ground-clearing operations are required. Thus, the potential for adverse environmental effects from the OPGW installation is very low. Likewise, other system upgrades, including replacement of the relays and associated equipment and the installation of new telecommunications connections at the Sequoyah and Watts Bar substations have minimal potential for causing any adverse environmental effects. Potential environmental effects from the construction and operation of the proposed substation are addressed as appropriate in the following sections. Overall, such effects are expected to be minor. Consequently, the discussion below will focus on the potential effects of constructing the proposed 2.3-mile-long 500-kV transmission line.

#### *Surface Water and Aquatic Life*

Precipitation in the project area averages about 55 inches per year. The wettest month is March, which averages 6.2 inches of precipitation, and the driest month is October at 3.4 inches. The average annual air temperature is 58 degrees Fahrenheit and ranges from a monthly average of 38 degrees Fahrenheit in January to 78 degrees Fahrenheit in July. Stream flow varies with rainfall and averages about 24 inches of runoff per year (approximately 1.8 cubic feet per second per square mile of drainage area).

The project area for the transmission tap line drains to South Mouse Creek and the Hiwassee River in the Tennessee River basin. South Mouse Creek is classified by the Tennessee Department of Environment and Conservation (TDEC) for fish and aquatic life, recreation, livestock watering, and irrigation. The Hiwassee River is classified for domestic and industrial water supply, fish and aquatic life, recreation, livestock watering, irrigation, and navigation. South Mouse Creek is on the state 303(d) list as impaired (i.e., not fully supporting its designated uses) because of biological integrity loss due to undetermined cause, loss of biological integrity due to siltation, habitat loss due to streamside or littoral vegetative cover, and *Escherichia coli* (*E. coli*) from discharges from municipal separate storm sewer system area, channelization, stream bank modification/destabilization, and collection system failure. The Hiwassee River embayment of Chickamauga Reservoir is listed due to mercury and *E. coli* from atmospheric deposition, industrial point source, and collection system failure.

The project area for the OPGW transmission line access roads drains to the Tennessee River at Chickamauga Reservoir via the following streams: Sewee Creek and its tributaries

(Dry Fork and Black Ankle creeks), the Hiwassee River and its tributaries (Rogers Creek [and its tributaries Rock, Stokey, Shoal, Brush, and Short Creeks], Candies Creek, Lick Creek, Sugar Creek, and Gunstocker Creek), Grasshopper Creek, and Savannah Creek of Wolftever Creek. The Tennessee River and the Hiwassee River are classified by TDEC for domestic and industrial water supply, fish and aquatic life, recreation, livestock watering, irrigation, and navigation. The remaining streams are classified for fish and aquatic life, recreation, livestock watering, and irrigation.

The Hiwassee River embayment of Chickamauga Reservoir is on the state 303(d) list as impaired (i.e., not fully supporting its designated uses) due to mercury from atmospheric deposition and industrial point source. Candies Creek is listed because of loss of biological integrity due to siltation and the presence of coliform bacteria (*E. coli*) from discharges from municipal separate storm sewer (MS4) area and pasture grazing. Sugar Creek is listed due to the presence of *E. coli*, habitat loss due to alteration in streamside or littoral vegetative cover, loss of biological integrity due to siltation, total phosphorus, and low dissolved oxygen from pasture grazing and channelization. Gunstocker Creek is listed due to *E. coli* and habitat loss due to alteration in streamside or littoral vegetative cover from pasture grazing. Wolftever Creek is listed due to *E. coli* from discharges from MS4 area.

Streams in the Ridge and Valley ecoregion are guided by ridges and meander along the valley floor. Streams in this region are distinguished by “limestone rubble, bedrock riffles, and silty sand pool areas” (Etnier and Starnes 1993). Twenty-three watercourses including seven perennial, four intermittent, 11 wet-weather conveyances, and one pond occur along the proposed 500-kV transmission line route or on associated access roads. The location of each of these was recorded using a global positioning system. A habitat assessment form was completed for each perennial and intermittent stream during a November 2010 field survey. A listing and description of these stream crossings, excluding wet-weather conveyances, are provided in Appendix E.

Because transmission line construction and maintenance activities may affect riparian conditions and in-stream habitat, TVA evaluated the condition of both of these at each stream crossing along the proposed transmission line route. From these habitat assessments, riparian condition was assigned to one of three classes to indicate the current condition of streamside vegetation along the length of the proposed transmission line. Riparian conditions are summarized in Table 1). The assigned classes are described as follows:

- 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 - riparian area is not forested, but 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 - few, if any, trees are present within the riparian zone. Significant clearing has occurred, usually associated with pasture or cropland.

**Table 1. Riparian Condition of Streams Located Within the Proposed 500-kV Transmission Line Right-of-Way**

Riparian Condition	Number of Perennial Streams	Number of Intermittent Streams	Total
Forested	1	1	2
Partially forested	3	1	4
Nonforested	0	0	0
<b>Total</b>	4	2	6

Soil disturbances associated with access roads or other transmission line construction activities can potentially adversely affect water quality and aquatic life. Soil erosion and sedimentation can clog small streams and harm aquatic life. Siltation has a detrimental effect on many aquatic animals adapted to riverine environments. Turbidity caused by suspended sediment can negatively impact spawning and feeding success of many fish species (Sutherland et al. 2002).

Aquatic life could be affected by the proposed action either directly by the alteration of habitat conditions within the stream or indirectly due to modification of the riparian zone and storm water runoff resulting from construction and maintenance activities along the transmission line corridor. Removal of the tree canopy along stream crossings can increase water temperatures, algal growth, dissolved oxygen depletion, and adverse impacts to aquatic biota. Improper use of herbicides to control vegetation can result in runoff to streams and subsequent aquatic impacts. Other potential construction and maintenance impacts include alteration of stream banks and stream bottoms by heavy equipment and runoff of herbicides into streams.

However, TVA routinely includes precautions in the design, construction, and maintenance of its transmission line projects to minimize these potential impacts. Permanent stream crossings that could not be avoided would be designed not to impede runoff patterns and the natural movement of aquatic fauna. Temporary stream crossings and other construction and maintenance activities would comply with appropriate state permit requirements and TVA requirements as described in Muncy (1999).

As a standard practice, TVA assigns appropriate SMZs and prescribes best management practices (BMPs) based upon these evaluations and other considerations [such as 303(d) status and the presence of endangered or threatened aquatic species]. Canopies in all SMZs would be left undisturbed unless there were no practicable alternative. Right-of-way maintenance would employ manual and low-impact methods wherever possible. In areas requiring chemical treatment, only United States Environmental Protection Agency- (USEPA) registered herbicides would be used in accordance with label directions designed in part to restrict applications in the vicinity of receiving waters and to prevent unacceptable aquatic impacts.

Watercourses that convey surface water only during storm events (i.e., wet-weather conveyances) and that could be affected by the proposed transmission line route would be protected by implementing standard BMPs as identified in Muncy (1999). These BMPs are designed in part to minimize disturbance of riparian areas and the subsequent erosion and sedimentation that can be carried to streams.

As identified in Appendix E, the pond and all perennial and intermittent streams would be protected by measures defined under Standard Stream Protection (Category A, as described in Appendix H). This category of protection is TVA's standard level of protection for streams and riparian zones. Additionally, SMZs of 50 feet would be established as defined in Muncy (1999). SMZs are areas covered with vegetation on both sides of streams or along the margins of bodies of open water, where extra precautions are used in carrying out construction activities to protect stream banks and water quality (Muncy 1999). The width of the SMZs is determined by the type of watercourse, primary use of the water resource, topography, or other physical barriers (Muncy 1999). The portions of South Mouse Creek/Hiwassee embayment that are crossed by the proposed 500-kV transmission line are currently listed on the Tennessee 303(d) list as "not supporting" due to mercury deposition from industrial point source and atmospheric deposition (TDEC 2010). These South Mouse Creek SMZs would still receive a 50-foot Category A buffer.

Because appropriate BMPs and SMZs would be implemented during construction, operation, and maintenance of the proposed transmission line and access roads, any effects to local surface waters and aquatic life resulting from implementing the Action Alternative would be minor and insignificant.

Installation of the OPGW on the Watts Bar-Sequoyah #2 500-kV Transmission Line would involve minimum ground disturbance; therefore, entrance of sediment or runoff into streams is not anticipated. No alternation of stream banks would be necessary, as the line would be pulled over these areas. Thus, no potential effects to local surface waters or their aquatic life are expected from the proposed installation of the OPGW.

#### *Wetlands*

Wetlands are areas inundated by surface water or groundwater such that vegetation adapted to saturated soil conditions is prevalent. Examples include swamps, marshes, bogs, wet meadows, and shoreline fringes. Wetland determinations were performed according to United States Army Corps of Engineers' standards, which require documentation of hydrophytic (i.e., wet-site) vegetation, hydric soil, and wetland hydrology (Environmental Laboratory 1987; Reed 1997; United States Department of Defense and USEPA 2003). Broader definitions of wetlands, such as that used by the United States Fish and Wildlife Service (USFWS) (Cowardin et al. 1979) and the TVA Environmental Review Procedures definition (TVA 1983), were also considered in this review. Using a TVA-developed modification of the Ohio Rapid Assessment Method (Mack 2001) specific to the TVA region (Tennessee Valley Authority Rapid Assessment Method [TVARAM]), wetlands were categorized by their functions, sensitivity to disturbance, rarity, and ability to be replaced. The categorization was used to evaluate impacts and to determine the appropriate levels of mitigation for wetland impacts.

TVARAM scores were used to classify wetlands into three categories. Category 1 wetlands are considered "limited quality waters." They represent degraded aquatic resources that have limited potential for restoration and 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.

A field survey was conducted on November 15, 2010, to identify and delineate wetland areas within the proposed transmission line ROW. Two small wetlands (wetland W001 and wetland W002), totaling less than 0.1 acre, were identified.

Wetland W001 is a 0.06-acre forested wetland located along the south side of the proposed ROW in a cove on the west side of the South Mouse Creek embayment. The majority of this wetland area is located south of the proposed ROW, but the northernmost area (less than 0.01 acre) crosses onto the proposed ROW near a smaller, existing utility line corridor. This wetland exhibits hydric soils. W001 receives hydrology via an intermittent channel draining via the wetland into South Mouse Creek, thereby, exhibiting hydrologic connectivity. Dominant wetland-type vegetation included black willow, American elm, and green ash. This wetland was rated as a Category 2 wetland under TVARAM.

Wetland W002 is scrub-shrub wetland created from historic earth-moving activities conducted for the construction of Cleveland Utilities Wastewater Treatment Plant and associated entrance road. This small wetland, totaling 0.03 acre, is located entirely within the proposed TVA ROW between a gas pipeline corridor and the plant access road. This wetland exhibited hydric soil, wetland hydrology, and hydrologic connectivity via a culvert connecting to an intermittent tributary of South Mouse Creek that eventually feeds W001 before entering the embayment. Dominant wet-site vegetation included saplings of sweet gum, green ash, red maple, and black willow. This wetland was rated as a Category 1 wetland according to TVARAM.

Activities in wetlands are regulated under Section 404 of the Clean Water Act and are covered under Executive Order (EO) 11990, Protection of Wetlands. EO 11990 requires federal agencies to avoid, to the extent practicable, long- and short-term adverse impacts associated with the destruction or modification of wetlands. More specifically, the EO directs federal agencies to avoid new construction in wetlands, unless there is no practicable alternative. Where wetlands cannot be avoided, the proposed action must include all practicable measures to minimize harm to the wetlands.

Adoption of the Action Alternative would result in the conversion of less than 0.01 acre of forested wetland in W001 to scrub-shrub wetland habitat. Because this would not alter the functional capacity of the larger wetland area, no significant wetland impacts to W001 are anticipated as a result of minor tree removal. W002 would be spanned; thus, direct impacts would be avoided. No transmission line structures would be placed within jurisdictional wetland areas. Adequate clearance between tall vegetation and transmission line conductors would require trees within wetlands located within the proposed ROW to be cleared at regular maintenance intervals. This would result in continual maintenance of the wetland area within the ROW as scrub-shrub habitat, as is predominantly the case now. No wetlands would be affected by the installation of OPGW on the Watts Bar-Sequoyah #2 500-kV Transmission Line.

All practicable measures will be taken to minimize harm to wetlands. Furthermore, based on the engineering and environmental evaluations, TVA has determined, in accordance with EO 11990, that there are no additional practicable alternatives or measures for avoiding further wetland impacts. Any direct, indirect, or cumulative impacts to wetlands associated with this project would be minor and insignificant.

### *Floodplains*

A floodplain is the relatively level land area along a stream or river that is subjected to periodic flooding. The area subject to a 1 percent chance of flooding in any given year is normally called the 100-year floodplain. The proposed transmission line route would cross the South Mouse Creek floodplain.

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" (United States Water Resources Council 1978). The EO requires that federal agencies avoid actions in the 100-year floodplain unless there is no practicable alternative.

As stated in the 2010 EA, Wacker will grade and level its 272-acre property, including the 23-acre substation site. Wacker will perform rough-grade preparation of the substation site so that the elevation is approximately 710 feet prior to transferring the parcel to TVA. TVA does not propose to place any additional fill, as the substation site would be above the 100-year and 500-year flood elevations (694.1 feet and 696.8 feet, respectively). In the 2010 EA, TVA determined that there is no practicable alternative for Wacker with respect to the placement of fill in the floodplain. Therefore, construction of the proposed substation is consistent with EO 11988.

Consistent with EO 11988, the construction of an overhead transmission line and related support structures is considered a repetitive action in the 100-year floodplain. The construction of the support structures for the new power line is not expected to result in any increase in flood hazard from either changes in flood elevations or flow-carrying capacity of the streams being crossed. However, to minimize adverse impacts on natural and beneficial floodplain values, the ROW would be revegetated where natural vegetation is removed as described in the *TVA Environmental Quality Protection Specifications for Transmission Line Construction* (Appendix C).

The project also involves the installation of new equipment at the Sequoyah, Watts Bar, and Volunteer 500-kV substations, as well as the addition of OPGW to the Watts Bar-Sequoyah #2 Transmission Line. The Sequoyah, Watts Bar, and Volunteer 500-kV substations are located outside of the 100-year floodplain. However, portions of the Watts Bar-Sequoyah #2 Transmission Line cross 100-year floodplains, but addition of OPGW to the existing transmission line would occur well above the 100-year flood elevation.

Several access roads cross 100-year floodplain areas. Consistent with EO 11988, access roads are considered repetitive actions in the 100-year floodplain. To minimize adverse impacts, any new road construction in the floodplain would be done in such a manner that upstream flood elevations would not be increased.

### *Vegetation*

Vegetation within the proposed 500-kV transmission line ROW and access roads is characterized by forested areas (about 85 percent of the area) and herbaceous vegetation (15 percent). These forested areas are comprised of three main subtypes: deciduous, evergreen, and mixed evergreen-deciduous. None of the forested areas have structural characteristics indicative of old growth forest as characterized by Leverett (1996). All plant communities observed in the proposed ROW and associated access roads are common and are well represented throughout the region.

Evergreen forest is characterized by trees with overlapping crowns where the evergreen species account for more than 75 percent of the canopy cover. Loblolly pine stands dominate the overstory of evergreen forests in the area. These sites are actively managed for pine production. Species like yellow-poplar and Japanese honeysuckle occur sporadically throughout these dense pine stands.

Mixed evergreen-deciduous forest has more than 25 percent canopy cover of both evergreen and deciduous trees and accounts for about 15 percent of total forest cover along the proposed ROW. These areas occur in the flatter sections of the proposed ROW east of I-75 and west of Mouse Creek. Common overstory trees in these stands include the evergreen species loblolly pine, shortleaf pine, and Virginia pine as well as deciduous species like American elm, cherrybark oak, red maple, and sweetgum. The even-aged stands appeared to be heavily disturbed by previous land use and contain understory weed species such as Chinese privet, white crownbeard, and yellow crownbeard.

Small inclusions of deciduous forest were observed among the large blocks of evergreen forest found throughout the western part of the proposed ROW. In these stands, deciduous tree species account for more than 75 percent of canopy cover. The majority of these stands occur along drainages in areas where pines were not planted. Overstory trees in these areas include sweetgum, white oak, winged elm, and yellow-poplar. In general, these areas are dominated by trees that are less than 12 inches diameter at breast height (DBH). One deciduous forest stand in the proposed ROW is comprised primarily of mature hickories and oaks that range in size from 12 to 24 inches DBH. Cover of invasive species was negligible in this stand, and the vegetation as a whole was indicative of a minimally disturbed site.

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. Early successional fields, existing transmission line ROW, and agricultural fields are the most common types of herbaceous vegetation found along the proposed transmission line corridor. These areas have been heavily disturbed and contain plant species indicative of early successional habitats. Common species observed in the herbaceous vegetation type included broomsedge, dog fennel, Loomis' mountain mint, partridge pea, rabbit tobacco, sericea lespedeza, soy beans, and tall fescue.

Vegetation cover in the ROW of the Watts Bar-Sequoyah #2 500-kV Transmission Line is typically herbaceous vegetation. However, this ROW crosses several agricultural areas used as pasture and for row crops.

EO 13112 (Invasive Species) serves to prevent the introduction of invasive species and provides for their control to minimize the economic, ecological, and human health impacts that those species potentially cause. In this context, invasive species are nonnative species that invade natural areas, displace native species, and degrade ecological communities or ecosystem processes (Miller 2003). EO 13112 pertains to specific nonnative plant species designated as federal noxious weeds. No federal noxious weeds were observed in the project area, but several species identified by the Tennessee Exotic Plant Pest Council (2009) as high priority invasive plants were observed (Table 2). During field surveys, invasive plants were observed in both forest and herbaceous vegetation types, but areas of herbaceous vegetation generally contained both greater numbers and cover of nonnative invasive plant species. This likely reflects the frequency and magnitude of disturbance present in areas of herbaceous vegetation. Disturbances associated with

mowing, grazing, and ROW maintenance prevent tree species from becoming established but can also encourage invasion and establishment of weedy species.

**Table 2. Invasive Plant Species Observed in the Right-of-Way of the Proposed 500-kV Transmission Line**

Common Name	Scientific Name
Chinese lespedeza	<i>Lespedeza cuneata</i>
Chinese privet	<i>Ligustrum sinense</i>
Japanese honeysuckle	<i>Lonicera japonica</i>
Japanese stiltgrass	<i>Microstegium vimineum</i>
Princess tree	<i>Paulownia tomentosa</i>
Autumn olive	<i>Elaeagnus umbellata</i>
Tree of heaven	<i>Ailanthus altissima</i>

Adoption of the Action Alternative would not significantly affect the vegetation or vegetative characteristics of the region. Project-related work would temporarily affect herbaceous plant communities, but these communities would likely recover to their preproject condition in less than one year. The conversion of 61 acres of forestland to managed ROW for the proposed 500-kV transmission line would be long term in duration. As of 2008, there were at least 620,000 acres of forestland in Bradley and the adjacent Tennessee counties (United States Forest Service 2010). Cumulatively, project-related effects to forest resources would be negligible when compared to the total amount of forestland occurring in the region. Installation of OPGW on the Watts Bar-Sequoyah #2 500-kV Transmission Line would not cause conversion of any vegetation types within or adjacent to the ROW.

Much of the project area currently has a large component of invasive plants, and adoption of the Action Alternative would not significantly affect the extent or abundance of these species at the county, regional, or state level. Some areas of mature deciduous forest within the ROW of the proposed loop line currently have low concentrations of invasive plants, and invasive species could become more prevalent in these portions of the newly constructed ROW. The use of TVA standard operating procedure for revegetating with noninvasive species (Muncy 1999) would reduce the potential for the introduction and spread of invasive species in the new ROW. Because any equipment necessary for installation of OPGW would likely remain on the access roads or within the existing ROW, this operation would involve a minimal amount of vegetative and ground disturbance. Thus, implementing the project is not expected to cause a significant increase in the abundance of invasive terrestrial plants.

*Terrestrial Animal Life*

The proposed transmission line route, the Watts Bar-Sequoyah #2 500-kV Transmission Line, and associated access roads pass through a heavily managed landscape consisting of managed forest, agricultural fields, industrial infrastructure, and existing transmission line ROW. The area occupied by the proposed substation site and the proposed 500-kV transmission line route is about 92 percent terrestrial habitat and 8 percent aquatic habitat. Approximately 85 percent of the terrestrial habitat is forested, while about 15 percent is herbaceous habitat. The forested habitat is approximately 90 percent commercial pine forest and 10 percent mixed-deciduous forest. Approximately 70 percent of the herbaceous

habitat is found in roadways or highly developed areas, 25 percent is agricultural fields, and 5 percent is patches of early-successional grassland.

Access roads associated with the proposed OPGW work along the Watts Bar-Sequoyah #2 500-kV Transmission Line are all existing and pass through predominantly herbaceous or scrub-shrub vegetation habitat, including maintained agricultural fields and existing transmission line ROW. Some access roads pass through forested habitat and along wood fencerows.

The commercial pine forestland in the proposed ROW is dominated by loblolly pine, which results in a dense and rather homogenous landscape. Birds that frequent this habitat include woodpecker and nuthatch species, great-horned owl, yellow-bellied sapsucker, northern cardinal, and Carolina wren. Common mammals include striped skunk, white-tailed deer, opossum, eastern gray squirrel, raccoon, and eastern chipmunk. Reptile species common in this habitat include box turtle and eastern garter snake. Amphibian species in this habitat are limited by the lack of suitable cover and the scarcity of sites having adequate moisture conditions.

Directly adjacent to the commercial pine area is unmanaged mixed-deciduous forest. The pine-dominated landscape gives way to a higher diversity of hardwoods dominated by sweetgum, black walnut, and oak and hickory species. The dense pine canopy is reduced here, which has allowed the establishment of a mixed understory of vegetative growth and young hardwood saplings. Bird species that occur here include the hermit thrush, wood thrush, white-eyed vireo, indigo bunting, scarlet tanager, pileated woodpecker, and several warbler species. Typical reptile species include black rat snake, black racer, and corn snake, while common amphibians include spotted salamanders, mole salamanders, and tree frogs.

High-quality riparian habitat is located near the southern end of the proposed transmission line route along South Mouse Creek. At this location, the proposed ROW would pass over a large embayment (approximately 700 feet wide) which drains into nearby Hiwassee River. This embayment is subject to water level changes, which creates a variable habitat that attracts different animals. When water levels are high, this embayment can act as quality foraging habitat for bald eagles or ospreys. When water levels are lower and mudflats exposed, this area offers quality foraging habitat for a variety of wading birds, shorebirds, and many mammal species such as raccoon and striped skunk. Reptiles potentially using this habitat include northern copperhead, northern water snake, and eastern spiny softshell turtle. Structures would be placed on both sides of the embayment, allowing the transmission line to span the waterway. The conductors on the proposed 500-kV transmission line are arranged in "bundles" of three and are separated by spacers. Three sets of these bundled conductors are supported by each structure. Thus, the conductors tend to be visible, and the likelihood of waterfowl and shorebird collisions with the conductors is very low. Because of the limited amount of disturbance within this habitat and because transmission line structures would be placed outside of this sensitive area, any impacts to this habitat or the associated species are expected to be minor under the Action Alternative.

Existing and highly disturbed roadways or agricultural fields present in the project area provide habitat for species that are tolerant to disturbance and that have very general habitat requirements. Such species include the American crow, American robin, field sparrow, and northern mockingbird.

A review of the TVA Natural Heritage database during November 2010 and June 2011 revealed the presence of six recorded heronries and seven recorded caves within 3 miles of the project area. The nearest documented cave is approximately 0.5 mile from the closest access road and 0.4 mile from the Watts Bar-Sequoyah #2 500-kV Transmission Line. The nearest documented wading bird colony is approximately 1,850 feet from an access road on the Watts Bar-Sequoyah Line. These resources are located at adequate distances from proposed activities such that impacts to these resources are not expected to occur. No additional wading bird colonies or caves were identified along the proposed transmission line route during field surveys.

The clearing of forest habitat along the proposed transmission line route would increase forest edge habitat and increase fragmentation of these habitats. However, nearly 80 percent of the proposed route is low-quality habitat, either commercial forest or highly developed/disturbed areas. Vegetation present within these habitats would be removed from the proposed ROW, which would be converted and maintained as low-growing, early-successional habitat, typically in the form of herbaceous vegetation. Converting this forested habitat would be regionally insignificant due to the high amount of habitat fragmentation already in the area. Most species that would be affected by the changes are locally and regionally common. Installation of OPGW on the Watts Bar-Sequoyah #2 500-kV Transmission Line would not require any clearing within the ROW.

Use of existing access roads associated with proposed installation of OPGW may cause any wildlife present at the time of activities to be displaced into adjacent areas, but this type of disturbance is expected to be minimal and temporary.

*Endangered and Threatened Species*

*Aquatic Species*

Nine fish species that are either federally or state-listed are known to occur in Bradley County or within a 10-mile radius of the proposed 500-kV transmission line (see Table 3). Likewise, 11 state-listed mussel species, eight of which are also federally listed, occur in the project vicinity. However, seven of these species (the amber darter, blue shiner, fine-lined pocketbook, coldwater darter, trispot darter, Alabama creekmussel, and southern rainbow) are found only in the Conasauga River and its tributaries in Tennessee. They are not known to occur within the affected watershed. Thus, there would be no effects to these seven aquatic species from the proposed actions.

**Table 3. Federally and State-Listed Species Known From the Vicinity of the Proposed Project**

Common Name	Scientific Name	State Status <sup>1</sup> (Rank) <sup>2</sup>	Federal Status <sup>1</sup> (Rank)
<b>Fish</b>			
Amber darter	<i>Percina antesella</i>	END (S1)	END
Blue shiner	<i>Cyprinella caerulea</i>	END (S1)	THR
Coldwater darter	<i>Etheostoma ditrema</i>	THR (S1)	-
Flame chub <sup>4</sup>	<i>Hemitremia flammea</i>	NMGT (S3)	-
Highfin carpsucker <sup>4</sup>	<i>Carpoides velifer</i>	NMGT (S2S3)	-
Lake sturgeon <sup>3</sup>	<i>Acipenser fulvescens</i>	NMGT (S3)	-
Snail darter <sup>4</sup>	<i>Percina tanasi</i>	THR (S2S3)	THR

Common Name	Scientific Name	State Status <sup>1</sup> (Rank) <sup>2</sup>	Federal Status <sup>1</sup> (Rank)
Tennessee dace <sup>3,4</sup>	<i>Phoxinus tennesseensis</i>	NMGT (S3)	-
Trispot darter	<i>Etheostoma trisella</i>	THR (S1)	-
<b>Mollusks</b>			
Alabama creekmussel	<i>Strophitus connasaugaensis</i>	TRKD (S1)	-
Dromedary pearlymussel <sup>4</sup>	<i>Dromas dromas</i>	END (S1)	END
Fanshell	<i>Cyprogenia stegaria</i>	END (S1)	END
Fine-lined pocketbook <sup>4</sup>	<i>Lampsilis altilis</i>	THR (S1S2)	THR
Orangefoot pimpleback	<i>Plethobasus cooperianus</i>	END (S1)	END
Pink mucket <sup>4</sup>	<i>Lampsilis abrupta</i>	END (S1)	END
Pyramid pigtoe <sup>4</sup>	<i>Pleurobema rubrum</i>	TRKD (S2S3)	-
Rough pigtoe <sup>4</sup>	<i>Pleurobema plenum</i>	END (S1)	END
Shiny pigtoe pearlymussel <sup>3,4</sup>	<i>Fusconia cor</i>	END (S1)	END
Southern rainbow	<i>Villosa vibex</i>	TRKD (S2)	-
Tennessee clubshell <sup>3,4</sup>	<i>Pleurobema oviforme</i>	END (S1)	END
<b>Plants</b>			
Spreading false-foxglove	<i>Aureolaria patula</i>	SPCO (S2)	-
Maryland milkwort	<i>Polygala mariana</i>	SPCO (S1)	-
<b>Bird</b>			
Bald eagle <sup>5</sup>	<i>Haliaeetus leucocephalus</i>	NMGT (S3)	DM <sup>6</sup>
<b>Mammals</b>			
Gray bat <sup>5</sup>	<i>Myotis grisescens</i>	END (S2)	END
Meadow jumping mouse	<i>Zapus hudsonius</i>	NMGT (S4)	-
<b>Amphibian</b>			
Hellbender <sup>5</sup>	<i>Cryptobranchus alleganiensis</i>	NMGT (S3)	-

Source: TVA Natural Heritage database, November 2010 and June 2011

<sup>1</sup>Status Codes: DM = Recovered, delisted, and being monitored; END = Listed endangered; NMGT = Listed In need of management; THR = Listed threatened; TRKD = Tracked as sensitive but has no legal status; SPCO = Special concern.

<sup>2</sup>State Ranks: S1 = Extremely rare and critically imperiled in the state, or very few remaining individuals, or because of some special condition where the species is particularly vulnerable to extirpation; S2 = Very rare and imperiled within the state; S3 = Vulnerable; S4 = Widespread and abundant

<sup>3</sup>Record is greater than 25 years old

<sup>4</sup>Aquatic species known to occur within the affected watershed

<sup>5</sup>Species found within a 3-mile radius of project activities

The snail darter is found in larger creeks with sand and gravel shoals. It also inhabits deeper portions of rivers and reservoirs where adequate flow is present (Etnier and Starnes 1993). No suitable snail darter habitat was identified during the November 2010 Wacker field survey. Thus, construction of the proposed transmission line and substation would not affect this federally listed as threatened species. Likewise, installation of OPGW on the Watts Bar-Sequoyah #2 Transmission Line would not affect the snail darter.

The flame chub, the highfin carpsucker, lake sturgeon, and the Tennessee dace, which are state listed as “in need of management” in Tennessee, have been recorded from the Tennessee River. Records for the occurrence of the lake sturgeon and the Tennessee

dace are historic, i.e., over 25 years old. Because installation of OPGW would not involve work in the water or affect water quality, no effects to these four state-listed species are anticipated.

Seven federally listed as endangered mussel species (see Table 3) have been recorded in the Tennessee River in the vicinity of the proposed actions. These mussels include the dromedary pearlymussel, the fanshell, the orangefoot pimpleback, the pink mucket, the rough pigtoe, the shiny pigtoe pearlymussel, and the Tennessee clubshell. The dromedary pearlymussel is known to occur in shoals and riffles. The fanshell occurs in the Ohio, Cumberland, and Tennessee River systems. All viable populations of the fanshell are restricted to unimpounded stretches of the Clinch River on substrate of coarse sand gravel in strong flowing waters. Thus, any local fanshell populations may not be viable. The orangefoot pimpleback is found primarily in big rivers. Individuals have been found at depths of 12 to 18 feet in sand and coarse gravel substrate. The pink mucket is typically a big river species, but occasionally individuals become established in small to medium-sized tributaries of large rivers. It inhabits rocky bottoms with swift current usually in less than 3 feet of water (Parmalee and Bogan 1998). The rough pigtoe can be found in medium to large rivers over substrate composed of firmly packed gravel and sand. The shiny pigtoe is typically found living in shoal and riffle areas of clear streams with moderate to fast current (Parmalee and Bogan, 1998). The Tennessee clubshell occurs in the Tennessee and Cumberland River drainages. It prefers substrate of coarse gravel and sand in small shallow creeks and rivers with good current. The pyramid pigtoe, a state-listed mussel, has been recorded to occur in the Tennessee River in the project area. This species prefers rivers having a strong current and a substrate composed of firm sand and gravel.

Construction of the proposed 500-kV transmission line and substation would not affect waters of the Tennessee River or its aquatic life, including these listed mussel species. Installation of the OPGW on the Watts Bar-Sequoyah #2 500-kV Transmission Line would involve pulling the new ground wire over the river. The proposed work would not affect the water or these federally listed as endangered species.

### Plants

Two state-listed plant species (spreading false-foxglove and Maryland milkwort) have been previously reported from within 5 miles of the proposed transmission line (see Table 3). No federal-candidate or federally listed plant species are known to occur in Bradley County. No designated critical habitat for plant species occurs in the project area.

Field surveys of the proposed transmission line route occurred in November 2010 when most herbaceous species had died back for the season. Despite this, spreading false-foxglove has distinct habitat requirements and can be identified by the diagnostic dried stems and flower heads that remain standing throughout the winter. Neither habitat capable of supporting spreading false-foxglove nor the remains of individual plants were observed in the proposed ROW.

Maryland milkwort has been previously reported from about 1,500 feet north of the proposed ROW near the confluence of Mouse Creek and the Hiwassee River. The species was last observed in 1979 on the "edge of mixed pine-oak woods and disturbed area" (TVA 2010). Habitat capable of supporting this species occurs in the proposed ROW.

Adoption of the Action Alternative would not impact any federally listed plant species because neither individual plants nor habitat capable of supporting federally listed species occurs in the project area. State-listed plant species would not be affected significantly by

adoption of the Action Alternative because most of the project area has experienced previous site disturbance and is unsuitable for most rare plants. However, the state-listed Maryland milkwort can occur in disturbed habitat and has been reported to occur immediately north of the proposed transmission line route. Descriptions of the six Tennessee sites where Maryland milkwort has been observed include habitats like “cutover redgum-oak flats” and “sandy clay gully/barren, power line clearing” (TVA 2010). In fact, the Maryland milkwort site located just north of the proposed ROW has been characterized as “disturbed.” This species would not have been observed in the proposed transmission line ROW even if present because of the timing of the survey (November 2010). However, because the Maryland milkwort occurs in disturbed areas such as utility line ROWs, any adverse effects to this state-listed plant from adopting the Action Alternative are likely to be minor and insignificant.

### Terrestrial Animals

A review of the TVA Natural Heritage database during November 2010 indicated that no federally or state-listed terrestrial animals have been reported from within 3 miles of the proposed transmission line route, and none were encountered during field investigations conducted during that same time period. No federally listed terrestrial animals have been reported from Bradley County. A review of the TVA Natural Heritage database in June 2011, for records within 3 miles of the Watts Bar-Sequoyah #2 500-kV Transmission Line, resulted in records for one federally protected species (bald eagle), one federally listed as endangered species (gray bat), and two Tennessee state-listed species (hellbender and meadow jumping mouse) (see Table 3). No additional occurrences of species with federal protection were identified within the counties crossed by the Watts Bar-Sequoyah #2 500-kV Transmission Line.

Bald eagles have been removed from the endangered species list but are still protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Both acts prohibit harm to eagles or their nests. Bald eagles nest in forested areas near large bodies of water, such as rivers and reservoirs, where they forage (Bryan et al. 2005; Thompson et al. 2005). The closest documented active nest is approximately 0.6 mile from the project area and would not be impacted by proposed actions (USFWS 2007). Suitable habitat for bald eagles may be present within the project area, but this habitat would not be impacted by proposed actions. Because of the bundled configuration of the conductors on the proposed 500-kV transmission line, the conductors tend to be visible to birds and would not pose an unreasonable collision hazard. Although the potential exists for eagles to impact the conductors, the likelihood for this happening is very low.

Gray bats inhabit caves throughout the year, migrating between summer roosts and winter hibernacula and forage over streams, rivers, and reservoirs (Tuttle 1976). The closest record for this species is associated with a cave approximately 2.5 miles from the Watts Bar-Sequoyah #2 500-kV Transmission Line and 1.2 miles from the closest access road. Neither suitable foraging nor cave habitat would be impacted by proposed actions.

The meadow jumping mouse inhabits relatively thick vegetation of open grassy and brushy areas of marshes, meadows, swamps, and streamsides. When inactive (winter), this species occupies underground burrows, usually in a bank or hill, or under a log or grass clump (NatureServe 2009). Suitable habitat for this species would not be impacted by proposed actions.

Hellbenders occur primarily in medium-sized to large free-flowing streams in the Tennessee and Cumberland River drainages. Inhabited streams possess large rocks or logs that

provide shelter and breeding sites. This species usually can be found beneath large rocks in shallow rapids. By day, hellbenders stay under rocks or fallen logs, occasionally sticking their heads out (NatureServe 2009). Individuals have been documented in Sewee Creek, a tributary to Chickamauga Reservoir. Suitable habitat for this species is not present in the project area.

The bald eagle, gray bat, and hellbender have been documented within 3 miles of access roads that will be used to implement OPGW installation activities. Suitable nesting and foraging habitat for bald eagle may be present nearby but would not be impacted by proposed actions. Suitable roosting habitat for gray bat is not present within the project area. Suitable foraging habitat for gray bat may be present in nearby Chickamauga Reservoir and associated tributaries but would not be impacted by proposed actions. Suitable habitat for hellbender is not present in the project area. As well, no listed species were encountered during field investigations at the site of the proposed new transmission line. Therefore, the proposed action is not expected to directly, indirectly, or cumulatively impact any listed protected terrestrial animals or their habitats.

#### *Historic and Archaeological Resources*

Historic and cultural resources, including archaeological resources, are protected under various federal laws including the Archaeological Resources Protection Act, the Native American Graves Protection and Repatriation Act, and the National Historic Preservation Act (NHPA). Section 106 of the NHPA requires federal agencies to consult with the respective State Historic Preservation Officer (SHPO) when proposed federal actions could affect these resources.

For the purposes of this supplement, TVA considered the archaeological area of potential effect (APE) to be the 2.3-mile-long by 300-foot-wide ROW for the proposed 500-kV transmission line and the approximately 40 miles of ROW along the existing Watts Bar-Sequoyah #2 500-kV Transmission Line. The archaeological APE also included existing and proposed access roads. Similarly, the architectural APE was considered to be a 0.5-mile-wide area zone centered along the centerline of the proposed transmission line ROW and a similar 0.5-mile-wide zone along the centerline of the Watts Bar-Sequoyah #2 500-kV Transmission Line. The proposed 500-kV substation site was included in the APE of the original environmental review.

A records search identified five previously recorded archaeological resources within the archaeological APE. These are 40BY54, 40BY166 (the northern route of the Trail of Tears National Historic Trail), 40BY181, 40BY182, and 40HA252. Archaeological sites 40BY54, 40BY181, and 40BY182 were not encountered during the cultural resources survey of the APE (McKee and Karpynec 2010). The portion of 40BY166 within the APE consists of a graded and paved two-lane county road (i.e., Lower River Road). In consultation with the Tennessee SHPO, TVA determined that Site 40HA252 is ineligible for inclusion on the National Register of Historic Places due to a lack of intact deposits and research potential.

Three previously recorded architectural properties (BY-435, BY-436, and BY-437) were identified within the architectural APE. Architectural property BY-437 is no longer extant. Architectural properties BY-435 and BY-436 are located outside the visual line-of-sight to the project corridor (McKee and Karpynec 2010) due to a combination of rolling terrain and mature tree growth.

The archaeological survey identified no previously unrecorded archaeological sites. However, two previously unrecorded architectural resources (HS-1 and HS-2) were identified during the survey (McKee and Karpynec 2010). HS-1 is a farmstead and house, and HS-2 is a house. TVA finds HS-1 and HS-2 ineligible for inclusion in the National Register of Historic Places due to modern alterations and/or lack of architectural merit, as well as the inability to associate the house and/or its original owner(s) with an important historical event or series of events.

TVA finds that the proposed project would have a visual effect to 40BY166, but the effect would not be adverse. In addition to the modern alterations to 40BY166 itself (i.e., it has become a paved county road and has experienced adjacent utilities development), the viewshed of 40BY166 has been compromised by modern industrial development, interstate highway development (I-75), and existing Watts Bar-Sequoyah # 2 500-kV Transmission Line. Thus, TVA has determined that Site 40BY166 would not be adversely affected by implementing the Action Alternative.

Pursuant to regulations (36 Code of Federal Regulations Part 800) implementing section 106 of the NHPA, TVA consulted with the Tennessee SHPO to assess potential effects to historic properties (see Appendix F). The SHPO concurred with TVA's determination that the project area contains no historic properties eligible for listing in the National Register of Historic Places in a letter dated December 16, 2010 (Appendix F). TVA also consulted with the following federally recognized Indian tribes: Absentee Shawnee Tribe of Oklahoma, Alabama-Coushatta Tribe of Texas, Alabama-Quassarte Tribal Town, Cherokee Nation, The Chickasaw Nation, Eastern Band of Cherokee Indians, Eastern Shawnee Tribe of Oklahoma, Kialegee Tribal Town, Muscogee (Creek) Nation of Oklahoma, Seminole Nation of Oklahoma, Seminole Tribe of Florida, Shawnee Tribe, Thlopthlocco Tribal Town, and United Keetoowah Band of Cherokee Indians in Oklahoma. The Tribal Historic Preservation Officer for the Alabama-Coushatta Tribe of Texas responded in a December 29, 2010, e-mail that no known impacts to religious, cultural, or historical assets of the Alabama-Coushatta Tribe of Texas are anticipated in conjunction with the proposal.

#### *Visual Resources*

The area in the vicinity of the proposed actions ranges from industrial development to the south to agricultural lands in all other directions. There are few homes in the area with foreground views of the proposed transmission line route. There may be some views of the route from middleground distances along the higher ridgelines to the south and along minor roads to the east and west.

Potential visual consequences were examined in terms of visual changes between the existing landscape and proposed actions, sensitivity of viewing points available to the public, their viewing distances, and visibility of proposed changes. Scenic integrity indicates the degree of intactness or wholeness of the landscape character. These measures help identify changes in visual character based on commonly held perceptions of landscape beauty and the aesthetic sense of place.

Under the Action Alternative, there would be a minor and insignificant visual change in the landscape as a result of transmission line or substation construction, improvements at the Sequoyah, Watts Bar, and Volunteer 500-kV substations, or the installation of OPGW to the existing Watts Bar-Sequoyah #2 500-kV Transmission Line.

Although the proposed line route is heavily vegetated, there are a few opportunities for views of the cleared ROW. One such opportunity would occur immediately south of the I-75 bridge across the Hiwassee River, where the new transmission line would cross I-75. Although the Bowaters manufacturing facility and some other industrial infrastructure can be seen briefly by motorists from the bridge, views of these facilities are generally blocked from view by intervening roadside vegetation south of the bridge. The new lines and structures at the I-75 crossing would be visually similar to other poles, structures, and industrial elements present in the landscape. There would be some views of structures and the transmission lines for recreation users along South Mouse Creek.

Construction of the new TVA 500-kV substation would result in cumulative but minor and insignificant visual impacts. The new substation would be seen by plant personnel but likely not by the recreating public. The substation site is not generally visible to recreationalists on the Hiwassee River or South Mouse Creek. Motorists along some local roads would be able to see the substation; however, current traffic is very light and future traffic is likely to be associated with industrial activities. TVA standard lighting techniques (see Appendix G) would be used to reduce excess light from nighttime illumination of the substation. Any additional light from illuminating the substation would be a minor contribution to the overall illumination generated by the Wacker facility.

Related work replacing 500-kV relays and associated equipment at the Sequoyah and Watts Bar 500-kV substations and the addition of new telecommunication connections at the Sequoyah, Watts Bar, and Volunteer 500-kV substations would be performed by TVA. These upgrades would be visually similar to industrial elements currently seen in the landscape and would be visually insignificant. Adding OPGW to the existing 40-mile-long Watts Bar-Sequoyah #2 500-kV Transmission Line would cause an increase in personnel and equipment seen in the landscape. This minor visual intrusion would be temporary until all activities are complete.

Operation, construction, and postconstruction maintenance activities of the transmission line, substation, and associated improvements would be visually insignificant. There may be some minor visual discord during the construction and subsequent postconstruction maintenance period along the line route and at each site due to an increase in personnel and equipment and the use of laydown and materials storage areas. These visual obtrusions would be temporary until areas have been restored through the use of TVA standard BMPs (Muncy 1999). Therefore, no significant visual impacts are anticipated as a result of this project.

#### *Natural Areas and Recreation*

A review of data from the TVA Natural Heritage database indicated that one natural area is immediately adjacent to the proposed substation and transmission line and is partially crossed by two proposed access roads. As previously mentioned, the Trail of Tears National Historic Trail is located directly north of the project site and generally follows Lower River Road. There is no defined trail in the traditional sense. Rather, the Trail of Tears National Historic Trail, designated by the National Park Service, commemorates the removal of the Cherokee people and the courses that 17 Cherokee detachments followed westward along 2,200 miles of land and water routes across portions of nine states.

Previous ground disturbance from farming and development has obliterated any traces of the original Trail of Tears in the area. Thus, no additional direct impacts to the Trail of Tears National Historic Trail are anticipated. However, further industrial development in the

area could diminish the scenic values that characterize the landscape the trail follows. The portion of the Trail of Tears National Historic Trail that follows Lower River Road has already been affected aesthetically by existing local industrial development. Therefore, the incremental or cumulative changes to scenic and aesthetic values associated with construction activities would not be significant.

There are four other natural areas within 3 miles of the proposed transmission line, substation, and access roads associated with the Wacker property. A small portion of the South Mouse Creek unit of the 4,000-acre Chickamauga Wildlife Management Area (WMA) is located immediately west of the proposed 500-kV substation site. However, the proposed 500-kV transmission line would cross the South Mouse Creek embayment north of this part of the WMA. The WMA is managed by Tennessee Wildlife Resources Agency (TWRA) for big and small game and waterfowl hunting.

Johnson Bottoms TVA Habitat Protection Area (HPA) consists of approximately 42 acres that provides suitable habitat for false-foxglove (*Aureolaria patula*) and is located along the shoreline of the Hiwassee River approximately 0.5 mile north of the proposed transmission line route. Ledford Island WMA is located 0.9 mile north of the proposed transmission line ROW. Wooten Place Picnic Area is located approximately 2.8 miles southwest of the proposed transmission line.

There are an additional 20 natural areas that are within 3 miles of the proposed 40-mile OPGW. The OPGW line crosses four natural areas. Chickamauga Reservoir State Mussel Sanctuary is crossed by the line at the northern terminus. This sanctuary extends from Chickamauga Reservoir between the hunter navigation light (Tennessee River Mile 520) and Watts Bar Dam (Tennessee River Mile 529). This area is managed by TWRA, and the taking of aquatic mollusks by any means (and/or the destruction of their habitat) is prohibited at all times. Chickamauga Shoreline TVA HPA located across Chickamauga Reservoir on the opposite shoreline from WBN is an area preserved for conservation of sensitive resources. This approximately 62-acre area consists of two parcels of land that provide habitat for osprey and bald eagle. Several federally and state-listed plants and animals have been recorded here. Chickamauga WMA, which consists of 4,000 acres made up of several units, is managed by TWRA for small and large game hunting. It is crossed by the Watts Bar-Sequoyah #2 Transmission Line near Renslow Spring. The 680-acre Friendship Forest was formerly leased to the University of Tennessee for research on genetic tree breeding and pine management and is crossed by the Watts Bar-Sequoyah #2 500-kV Transmission Line and an access road.

Three natural areas are within 1 mile of the 40-mile Watts Bar-Sequoyah #2 500-kV Transmission Line. These include Ledford Island WMA, Johnson Bottoms TVA HPA, and the Wooten Place Picnic Area. Ledford Island WMA is managed by TWRA for waterfowl and small game. Wooten Place Picnic Area, which is owned by Bowater, is primarily the location of an old home site that is used for low-impact recreation.

Additional natural areas located (1.2 to 3.0 miles) from the Watts Bar-Sequoyah #2 500-kV Transmission Line include: Butcher Bluff TVA HPA, Chigger Point TVA HPA, Eaves Bluff TVA HPA, Grasshopper Creek TVA HPA, Harrison Bay State Recreation Park, Hiwassee Refuge State WMA, Meigs County Park, Murphy Hill TVA HPA, Soddy Creek TVA HPA, Sugar Creek State WMA, Ware Branch Bend TVA HPA, Watts Bar State WMA, and Yuchi Wildlife Refuge.

There are no Nationwide Rivers Inventory streams or Wild and Scenic Rivers that occur at, adjacent to, or within 3 miles of the proposed project.

Although the Chickamauga WMA is located near the proposed project, hunting (primarily waterfowl hunting) on the WMA would not be affected significantly by the proposed action. The proposed 500-kV transmission line would cross the South Mouse Creek embayment with a 1,200-foot span, and adequate clearance for sailboats would be provided. Thus, local water-based recreational opportunities would not be affected significantly.

Because the proposed project is not within the boundaries of the WMA, Johnson Bottoms TVA HPA, Ledford Island, or Wooten Place Picnic Area, and because the proposed project is located a sufficient distance away (.06-2.8 miles), no direct or indirect impacts to these natural areas or recreational opportunities afforded by these areas are anticipated. No cumulative impacts to these natural areas are foreseen within the bounds of this project.

The natural areas crossed by the 40-mile Watts Bar-Sequoyah #2 500-kV Transmission Line or by associated access roads, i.e., Chickamauga Reservoir State Mussel Sanctuary, Chickamauga Shoreline TVA HPA, Chickamauga WMA, and Friendship Forest, would not be affected by proposed work activities because appropriate BMPs would be used, and activities would be confined to the access roads and the ROWs. The other natural areas within 3 miles would not be affected significantly by work activities for similar reasons and because of the distance. Thus, no direct or indirect impacts to these natural areas or recreational opportunities afforded by them are anticipated. No cumulative impacts to these natural areas are foreseen within the bounds of this project. Any potential effects to informal recreation caused by the construction of the proposed substation and transmission line or by the installation of OPGW would be minor and insignificant due to the temporary nature of any disruption caused by these actions.

### **Long-Term and Cumulative Impacts**

Construction of the proposed transmission line would result in the conversion of approximately 0.01 acre (about 436 square feet) of forested wetlands to a scrub-shrub wetland type. However, because of the small amount of wetlands involved and because only vegetative characteristics, not hydrological characteristics, would change, overall wetland functions of this area would remain relatively unchanged. This is a minor and insignificant cumulative loss of forested wetlands.

Construction of the ROW would involve clearing about 61 acres of forest, 45 acres of which are managed pine plantations. Because the ROW would be cleared periodically of woody vegetation, this loss of forestland would persist for the life of the transmission line. However, this cumulative loss of forestland is minor and insignificant at the local and regional level. Establishment of the ROW would contribute to a minor amount of additional forest fragmentation in the local area. Because approximately 75 percent of the affected forests are managed pine plantations, which will likely be harvested within the next 25 to 50 years, the cumulative effects of any fragmentation caused by the ROW would be negligible.

The construction of the proposed 500-kV transmission line would provide a power supply to the Wacker plant site and, perhaps, at some time in the future, to other ancillary industries and facilities that may locate to the area. Thus, this area may experience additional industrial development. Over the long term, this additional growth would tend to convert the visual character of the area from rural and industrial to a more extensive industrial setting.

## **Mitigation Measures**

No special or nonroutine mitigation measures are needed to avoid potential adverse environmental effects. However, the following routine measures would be implemented to reduce the potential for adverse environmental effects.

- TVA would implement the *TVA Environmental Quality Protection Specifications for Transmission Substation or Communications Construction* (Appendix A) in constructing the proposed 500-kV substation.
- TVA would implement the *TVA Right-of-Way Clearing Specifications* (Appendix B) during construction of the proposed 500-kV transmission line.
- TVA would construct the proposed 500-kV transmission line consistent with the methodology described in *TVA Environmental Quality Protection Specifications for Transmission Line Construction* (Appendix C).
- TVA would implement appropriate BMPs as described in Muncy (1999) during transmission line construction.
- TVA would implement the measures described in the *TVA Substation Lighting Guidelines* (Appendix G) in the construction of the proposed 500-kV substation.
- TVA would implement the *TVA Environmental Protection Procedures Right-of-Way Vegetation Management Guidelines* (Appendix D).
- TVA would implement the measures described in the *TVA Site Clearing and Grading Specifications* (Appendix I) during construction of the proposed substation.
- All environmental work at the Sequoyah and Watts Bar 500-kV substations would be overseen by EP&C PSO personnel and coordinated with EP&C NPG staff at SQN and WBN. The retired equipment would be retained for reuse, recycled, sent for disposal, or handled through Investment Recovery. All equipment would be checked for lead content and recycled accordingly. The retired wave traps would be checked for asbestos and polychlorinated biphenyls (PCBs) (in the tuning packs) and handled according to TVA procedures. The electromechanical relays would be handled according to the PCB Management section of TVA's Environmental Protection Procedures. Any mercury switches would be removed from relays before recycling or disposal and would be recycled through the Hazardous Waste Storage Facility.

## **Preferred Alternative**

TVA's Preferred Alternative is the Action Alternative

## **TVA Preparers**

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### **Agencies and Others Consulted**

TVA consulted with the following entities:

- Absentee Shawnee Tribe of Oklahoma
- Alabama-Coushatta Tribe of Texas
- Alabama-Quassarte Tribal Town
- Cherokee Nation
- The Chickasaw Nation
- Eastern Band of Cherokee Indians
- Eastern Shawnee Tribe of Oklahoma
- Kialegee Tribal Town
- Muscogee (Creek) Nation of Oklahoma
- National Park Service
- Seminole Nation of Oklahoma
- Seminole Tribe of Florida
- Shawnee Tribe
- Tennessee Historical Commission
- Thlopthlocco Tribal Town
- United Keetoowah Band of Cherokee Indians in Oklahoma

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## **Appendices**

- A. TVA Environmental Quality Protection Specifications for Transmission Substation or Communications Construction
- B. TVA Right-of-Way Clearing Specifications
- C. TVA Environmental Quality Specifications for Transmission Line Construction
- D. TVA Environmental Protection Procedures Right-of-Way Vegetation Management Guidelines
- E. Stream Crossings Along the Proposed 500-kV Transmission Line Route
- F. Correspondence With the Tennessee State Historic Preservation Office
- G. TVA Substation Lighting Guidelines
- H. TVA Transmission Construction Guidelines Near Streams
- I. TVA Site Clearing and Grading Specifications

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

1. General – Tennessee Valley Authority (TVA) and/or the assigned contractor and subcontractors shall plan, coordinate, and conduct his or her operations in a manner that protects the quality of the environment and complies with TVA's environmental expectations discussed in the preconstruction meeting (including clearing and grading or reclearing and removal or dismantling). This specification contains provisions that shall be considered in all TVA and contract construction, dismantling, or forensic operations. If the contractor and his or her subcontractors fail to operate within the intent of these requirements, TVA will direct changes to operating procedures. Continued violation will result in a work suspension until correction or remedial action is taken by the contractor. Penalties and contract termination will be used as appropriate. The costs of complying with the Environmental Quality Protection Specifications are incidental to the contract work, and no additional compensation will be allowed. At all site perimeters, structure, foundation, conduit, grounding, fence, drainage ways, etc., appropriate protective measures to prevent erosion or release of contaminants will be taken immediately upon the end of each step in a construction, dismantling, or forensic sequence, and those protective measures will be inspected and maintained throughout the construction and site stabilization and rehabilitation period.
2. Regulations - TVA and/or the assigned contractor and subcontractor(s) shall comply with all applicable federal, state, and local environmental and antipollution laws, regulations, and ordinances related to environmental protection and prevention, control, and abatement of all forms of pollution.
3. Use Areas - TVA and/or the assigned contractor and/or subcontractor(s) use areas include but are not limited to site office, shop, maintenance, parking, storage, staging, assembly areas, utility services, and access roads to the use areas. The construction contractor and subcontractor(s) shall submit plans and drawings for their location and development to the TVA engineer and project manager for approval. Secondary containment will be provided for fuel and petroleum product storage pursuant to 29CFR1910.106(D)(6)(iii)(OSHA).
4. Equipment - All major equipment and proposed methods of operation shall be subject to the approval of TVA. The use or operation of heavy equipment in areas outside the right-of-way, access routes, site, or structure, pole, or tower sites will not be permitted without permission of the TVA inspector or field engineer. Heavy equipment use on steep slopes (greater than 20 percent) and in wet areas will be held to the minimum necessary to construct the transmission or communication facility. Steps will be taken to limit ground disturbance caused by heavy equipment usage, and erosion and sediment controls will be instituted on disturbed areas in accordance with state requirements and best management practices (BMPs).

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

roots shall remain in place. (Note: Tracked vehicles disturb surface layer of the ground due to size and function.) Some disking of the right-of-way, access, and site(s) may occur for proper seedbed preparation.

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

5. Sanitation - A designated TVA or contractor and/or subcontractor(s) representative shall contract a sanitary contractor who will provide sanitary chemical toilets convenient to all principal points of operation for every working party. The facilities shall comply with applicable federal, state, or local health laws and regulations. They shall not be located closer than 100 feet to any stream or tributary or to any wetland. The facilities shall be required to have proper servicing and maintenance, and the waste disposal contractor shall verify in writing that the waste disposal will be in state-approved facilities. Employees shall be notified of sanitation regulations and shall be required to use the toilet facilities.
6. Refuse Disposal - Designated TVA and/or contractor and subcontractor(s) personnel shall be responsible for daily inspection, cleanup, and proper labeling, storage, and disposal of all refuse and debris produced by his or her operations and by his or her employees. Suitable refuse collecting facilities will be required. Only state-approved disposal areas shall be used. Disposal containers such as dumpsters or roll-off containers shall be obtained from a proper waste disposal contractor. Solid, special, construction/demolition, and hazardous wastes as well as scrap are part of the potential refuse generated and must be properly managed with emphasis on reuse, recycle, or possible give away, as appropriate, before they are handled as wastes. Records of the amounts generated shall be provided to the site's or project's designated environmental specialist. Contractor(s) and subcontractor(s) must meet similar provisions on any project contracted by TVA. Final debris, refuse, product, and material removal is the responsibility of the contractor unless special written agreement is made with the ultimate TVA owner of the site.
7. Landscape Preservation - TVA and its contractor(s) and subcontractor(s) shall exercise care to preserve the natural landscape in the entire construction, dismantling, or forensic area as well as use areas, in or outside the right-of-way, and on or adjacent to access roads. Construction operations shall be conducted to prevent any unnecessary destruction, scarring, or defacing of the natural vegetation and surroundings in the vicinity of the work.
8. Sensitive Areas Preservation - Certain areas on site and along the access and/or right-of-way may be designated by the specifications or the TVA engineer as environmentally sensitive. These areas include but are not limited to areas classified as erodible, geologically sensitive, scenic, historical and archaeological, fish and wildlife refuges, endangered species' habitat, water supply watersheds, and public recreational areas

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

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

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

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

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

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

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*. Exceptions would

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

- D. Rehabilitation species shall use species designated by federal guidance that are low-maintenance, native species appropriate for the site conditions that prevail at that location.
  - E. TVA holds the option, depending upon the time of year and weather condition, to delay or withdraw the requirement of seeding until more favorable planting conditions are certain. In the meantime, other stabilization techniques must be applied.
  - F. The site must be protected from species designated by the federal Invasive Species Council and must not be the source of species that can be transported to other locations via equipment contaminated with viable materials; thus, the equipment must be inspected, and any such species' material found must be removed and destroyed prior to transport to another location.
14. Air Quality Control - Construction, dismantling, and/or forensic crews shall take appropriate actions to minimize the amount of air pollution created by their operations. All operations must be conducted in a manner that avoids creating a nuisance and prevents damage to lands, crops, dwellings, or persons.
15. Burning - Before conducting any open burning operations, the contractor and subcontractor(s) shall obtain permits or provide notifications as required to state forestry offices and/or local fire departments. Burning operations must comply with the requirements of state and local air pollution control and fire authorities and will only be allowed in approved locations and during appropriate hours and weather conditions. If weather conditions such as wind direction or speed change rapidly, the contractor's burning operations may be temporarily stopped by the TVA field engineer. The debris for burning shall be piled and shall be kept as clean and as dry as possible, then burned in such a manner as to reduce smoke. No materials other than dry wood shall be open burned. The ash and debris shall be buried away from streams or other water sources and shall be in areas coordinated with the property owner on rights-of-way or project manager for TVA sites.
16. RENOVATION OR DEMOLITION DEBRIS MAY NOT BE BURNED.
17. Dust and Mud Control - Construction, dismantling, or forensic activities shall be conducted to minimize the creation of dust. This may require limitations as to types of equipment, allowable speeds, and routes utilized. Water, straw, wood chips, dust palliative, gravel, combinations of these, or similar control measures may be used subject to TVA's approval. On new construction sites and easements, the last 100 feet before an access road approaches a county road or highway shall be graveled to prevent transfer of mud onto the public road.
18. Vehicle Exhaust Emissions - TVA and/or the contractor(s) and subcontractor(s) shall maintain and operate equipment to limit vehicle exhaust emissions. Equipment and vehicles that show excessive emissions of exhaust gasses and particulates due to poor engine adjustments or other inefficient operating conditions shall not be operated until corrective repairs or adjustments are made.

19. Vehicle Servicing - Routine maintenance of personal vehicles will not be performed on the right-of-way or access route to the site. However, if emergency or "have to" situations arise, minimal/temporary maintenance to personal vehicles will occur in order to mobilize the vehicle to an off-site maintenance shop. Heavy equipment will be serviced on the site except adjacent to or in designated sensitive areas. The Heavy Equipment Department within TVA or the construction, dismantling, or forensic contractor will properly maintain these vehicles with approved spill protection controls and countermeasures. If emergency maintenance in a sensitive or questionable area arises, the area environmental coordinator or construction environmental engineer will be consulted. All wastes and used oils will be properly recovered, handled, and disposed/recycled. Records of amounts generated shall be provided to TVA. Equipment shall not be temporarily stored in stream floodplains whether overnight or on weekends or holidays.
20. Smoke and Odors - TVA and/or the contractor(s) and subcontractor(s) shall properly store and handle combustible material that could create objectionable smoke, odors, or fumes. The contractor and subcontractor(s) shall not burn refuse such as trash, rags, tires, plastics, or other debris.
21. Noise Control - TVA and/or the contractor and subcontractor(s) shall take measures to avoid the creation of noise levels that are considered nuisances, safety, or health hazards. Critical areas including but not limited to residential areas, parks, public use areas, and some ranching operations will require special considerations. TVA's criteria for determining corrective measures shall be determined by comparing the noise level of the construction, dismantling, or forensic operation to the background noise levels. In addition, especially noisy equipment such as helicopters, pile drivers, air hammers, chippers, chain saws, or areas for machine shops, staging, assembly, or blasting may require corrective actions when required by TVA.
22. Noise Suppression - All internal combustion engines shall be properly equipped with mufflers as required by the Department of Labor's *Safety and Health Regulations for Construction*. TVA may require spark arresters in addition to mufflers on some engines. Air compressors and other noisy equipment may require sound-reducing enclosures in some circumstances.
23. Damages - The movement of construction, dismantling, or forensic crews and equipment shall be conducted in a manner that causes as little intrusion and damage as possible to crops, orchards, woods, wetlands, and other property features and vegetation. The contractor and subcontractor(s) will be responsible for erosion damage caused by his or her actions and employees and, especially, for creating conditions that would threaten the stability of the right-of-way or site soil, the structures, or access to either. When property owners prefer the correction of ground cover condition or soil and subsoil problems themselves, the section of the project to be handled shall be documented with an implementation schedule and a property owner signature obtained.
24. Final Site Cleanup and Inspection - The contractor's designated person shall ensure that all construction, dismantling, or forensic-related debris, products, materials, and wastes are properly handled, labeled as required, and removed from the site. Upon completion of those activities, that person and a TVA-designated person shall walk down the site and complete an approval inspection.

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## Appendix B

### Tennessee Valley Authority Right-of-Way Clearing Specifications

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

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

2. Regulations - The clearing contractor shall comply with all applicable federal, state, and local environmental and antipollution laws, regulations, and ordinances including without limitation all air, water, solid and hazardous waste, noise, and nuisance laws, regulations, and ordinances. The contractor shall secure or ensure that TVA has secured all necessary permits or authorizations to conduct work on the acres shown on the drawings and plan and profile for the contract. The contractor's designated project manager will actively seek to prevent, control, monitor, and safely abate all commonly recognized forms of workplace and environmental pollution. Permits or authorizations and any necessary certifications of trained or licensed employees shall be documented with copies submitted to TVA's right-of-way inspector or construction environmental engineer before work begins. The contractor will be responsible for meeting all conditions specified in permits. Permit conditions shall be reviewed in prework discussions.
3. Land and Landscape Preservation - The clearing contractor shall exercise care to preserve the condition of cleared soils by avoiding as much compacting and deep scarring as possible. As soon as possible after initial disturbance of the soil and in accordance with any permit(s) or other state or local environmental regulatory requirements, cover material shall be placed to prevent erosion and sedimentation of water bodies or conveyances to surface water or groundwater. In areas outside the clearing, use, and access areas, the natural vegetation shall be protected from damage. The contractor and his employees must not deviate from delineated access routes or use areas and must enter the site at designated areas that will be marked.

Clearing operations shall be conducted to prevent any unnecessary destruction, scarring, or defacing of the remaining natural vegetation and adjacent surroundings in the vicinity of the work. In sensitive public or environmental areas, appropriate buffer zones shall be observed and the methods of clearing or reclearing modified to protect the buffer and sensitive area. Some areas may require planting native plants or grasses to meet the criteria of regulatory agencies or commitments to special program interests.

4. Streamside Management Zones - The clearing contractor must leave as many rooted ground cover plants as possible in buffer zones along streams and other bodies of water or wet-weather conveyances thereto. In such streamside management zones (SMZ), tall-growing tree species (trees that would interfere with TVA's National Electrical Safety Code clearances) shall be cut, and the stumps may be treated to prevent resprouting. Low-growing trees identified by TVA as marginal electrical clearance problems may be cut, and then stump treated with growth regulators to allow low, slow-growing canopy development and active root growth. Only approved herbicides shall be used, and herbicide application shall be conducted by certified applicators from TVA's Transmission, Operations, and Maintenance (TOM) organization after initial clearing and construction. Cutting of trees within SMZs must be accomplished by using either hand-held equipment or other appropriate clearing equipment, such as a feller-buncher. The method will be selected based on site-specific conditions and topography to minimize soil disturbance and impacts to the SMZ and surrounding area. Disturbed soils in SMZs must be stabilized by appropriate methods immediately after the right-of-way is cleared. Stabilization must occur within the time frame specified in applicable storm water permits or regulations. Stumps within SMZs may be cut close to the ground but must not be removed or uprooted. Trees, limbs, and debris shall be immediately removed from streams, ditches, and wet areas using methods that will minimize dragging or scarring the banks or stream bottom. No debris will be left in the water or watercourse. Equipment will cross streams, ditches, or wet areas only at locations designated by TVA after the application of appropriate erosion control BMPs consistent with permit conditions or regulatory requirements.
5. Wetlands - In forested wetlands, tall trees will be cut near the ground, leaving stumps and roots in place. The cambium may be treated with herbicides applied by certified applicators from the TOM organization to prevent regrowth. Understory trees that must be initially cut and removed may be allowed to grow back or may be treated with tree growth regulators selectively to slow growth and increase the reclearing cycle. The decision will be situationally made based on existing ground cover, wetland type, and tree species since tall tree removal may "release" understory species and allow them to grow quickly to "electrical clearance problem" heights. In many circumstances, herbicides labeled for water and wetland use may be used in reclearing.
6. Sensitive Area Preservation - If prehistoric or historic artifacts or features that might be of archaeological significance are discovered during clearing or reclearing operations, the activity shall immediately cease within a 100-foot radius, and a TVA right-of-way inspector or construction environmental engineer and the Cultural Resources Program manager shall be notified. The site shall be protected and left as found until a determination about the resources, their significance, and site treatment is made by TVA's Cultural Resources Program. Work may continue beyond the finding zone and the 100-foot radius beyond its perimeter.

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

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

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

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

9. Air Quality Control - The clearing or reclearing contractor shall take appropriate actions to limit the amount of air emissions created by clearing and disposal operations to well within the limits of clearing or burning permits and/or forestry or local fire department requirements. All operations must be conducted in a manner that prevents nuisance conditions or damage to adjacent land crops, dwellings, highways, or people.
10. Dust and Mud Control - Clearing activities shall be conducted in a manner that minimizes the creation of fugitive dust. This may require limitations as to type of equipment, allowable speeds, and routes utilized. Control measures such as water, gravel, etc., or similar measures may be used subject to TVA approval. On new construction sites and easements, the last 100 feet before an access road approaches a county road or highway shall be graveled to prevent transfer of mud onto the public road.
11. Burning - The contractor shall obtain applicable permits and approvals to conduct controlled burning. The contractor will comply with all provisions of the permit, notification, or authorization including burning site locations, controlled draft, burning

hours, and such other conditions as stipulated. If weather conditions such as wind speed or wind direction change rapidly, the contractor's burning operation may be temporarily stopped by TVA's field engineer. The debris to be burned shall be kept as clean and dry as possible and stacked and burned in a manner that produces the minimum amount of smoke. Residue from burning will be disposed of according to permit stipulations. No fuel starters or enhancements other than kerosene will be allowed.

12. Smoke and Odors - The contractor will properly store and handle combustible and volatile materials that could create objectionable smoke, odor, or fumes. The contractor shall not burn oil or refuse that includes trash, rags, tires, plastics, or other manufactured debris.
13. Vehicle Exhaust Emissions - The contractor shall maintain and operate equipment in a manner that limits vehicle exhaust emissions. Equipment and vehicles will be kept within the manufacturers' recommended limits and tolerances. Excessive exhaust gases will be eliminated, and inefficient operating procedures will be revised or halted until corrective repairs or adjustments are made.
14. Vehicle Servicing - Routine maintenance of personal vehicles will not be performed on the right-of-way. However, if emergency or "have to" situations arise, minimal/temporary maintenance to personal vehicles will occur in order to mobilize the vehicle to an off-site maintenance shop. Heavy equipment will be serviced on the right-of-way, except in designated sensitive areas. The clearing or reclearing contractor will properly maintain these vehicles with approved spill protection controls and countermeasures. If emergency maintenance in a sensitive or questionable area arises, the area environmental coordinator or construction environmental engineer will be consulted. All wastes and used oils will be properly recovered, handled, and disposed/recycled. Equipment shall not be temporarily stored in stream floodplains, whether overnight or on weekends or holidays.
15. Noise Control - The contractor shall take steps to avoid the creation of excessive sound levels for employees, the public, or the site and adjacent property owners. Concentration of individual noisy pieces as well as the hours and locations of operation should be considered.
16. Noise Suppression - All internal combustion engines shall be properly equipped with mufflers. The equipment and mufflers shall be maintained at peak operating efficiency.
17. Sanitation - A designated representative of TVA or the clearing contractor shall contact a sanitary contractor who will provide sanitary chemical toilets convenient to all principal points of operation for every working party. The facilities shall comply with applicable federal, state, or local health laws and regulations. They shall not be located closer than 100 feet to any stream or tributary or to any wetland. The facilities shall be required to have proper servicing and maintenance, and the waste disposal contractor shall verify in writing that the waste disposal will be in state-approved facilities. Employees shall be notified of sanitation regulations and shall be required to use the toilet facilities.
18. Refuse Disposal - The clearing or reclearing contractor shall be responsible for daily cleanup and proper labeling, storage, and disposal of all refuse and debris on the site produced by his operations and employees. Facilities that meet applicable regulations

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

19. Brush and Timber Disposal (Reclearing) - The reclearing contractor shall place felled tree boles in neat stacks at the edge of the right-of-way, with crossing breaks at least every 100 feet. Property owner requests shall be reviewed with the project manager or right-of-way specialist before accepting them. Lop and drop activities must be specified in the contract and on plan and profile drawings with verification with the right-of-way specialist before conducting such work. When tree trimming and chipping is necessary, disposal of the chips on the easement or other locations on the property must be with the consent of the property owner and the approval of the right-of-way specialist. No trees, branches, or chips shall remain in a surface water body or be placed at a location where washing into a surface water or groundwater source might occur.
20. Brush and Timber Disposal (Initial Clearing) - For initial clearing, trees are commonly part of the contractor's contract to remove as they wish. Trees may be removed from the site for lumber or pulpwood or they may be chipped or stacked and burned. All such activities must be coordinated with the TVA field engineer, and the open burning permits, notifications, and regulatory requirements must be met. Trees may be cut and left in place only in areas specified by TVA and approved by appropriate regulatory agencies. These areas may include sensitive wetlands or SMZs where tree removal would cause excessive ground disturbance or in very rugged terrain where windrowed trees are used as sediment barriers along the edge of the right-of-way.
21. Restoration of Site - All disturbed areas, with the exception of farmland under cultivation and any other areas as may be designated by TVA's specifications, shall be stabilized in the following manner unless the property owner and TVA's engineer specify a different method:
  - A. The subsoil shall be loosened to a minimum depth of 6 inches if possible and worked to remove unnatural ridges and depressions.
  - B. If needed, appropriate soil amendments will be added.
  - C. All disturbed areas will initially be seeded with a temporary ground cover such as winter wheat, rye, or millet, depending on the season. Perennials may also be planted during initial seeding if proper growing conditions exist. Final restoration and final seeding will be performed as line construction is completed. Final seeding will consist of permanent perennial grasses such as those outlined in TVA's *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities*. Exceptions would include those areas designated as native grass planting areas. Initial and final restoration will be performed by the clearing contractor.
  - D. TVA holds the option, depending upon the time of year and weather condition, to delay or withdraw the requirement of seeding until more favorable planting conditions are certain. In the meantime, other stabilization techniques must be applied.

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**Appendix C**  
**Tennessee Valley Authority**  
**Environmental Quality Protection Specifications**  
**for Transmission Line Construction**

1. General – Tennessee Valley Authority (TVA) and/or the assigned contractor shall plan, coordinate, and conduct operations in a manner that protects the quality of the environment and complies with TVA's environmental expectations discussed in the preconstruction meeting. This specification contains provisions that shall be considered in all TVA and contract construction operations. If the contractor fails to operate within the intent of these requirements, TVA will direct changes to operating procedures. Continued violation will result in a work suspension until correction or remedial action is taken by the contractor. Penalties and contract termination will be used as appropriate. The costs of complying with the Environmental Quality Protection Specifications are incidental to the contract work, and no additional compensation will be allowed. At all structure and conductor pulling sites, protective measures to prevent erosion will be taken immediately upon the end of each step in a construction sequence, and those protective measures will be inspected and maintained throughout the construction and right-of-way rehabilitation period.
2. Regulations - TVA and/or the assigned contractor shall comply with all applicable federal, state, and local environmental and antipollution laws, regulations, and ordinances related to environmental protection and prevention, control, and abatement of all forms of pollution.
3. Use Areas - TVA and/or the assigned contractor's use areas include but are not limited to site office, shop, maintenance, parking, storage, staging, assembly areas, utility services, and access roads to the use areas. The construction contractor shall submit plans and drawings for their location and development to the TVA engineer and project manager for approval. Secondary containment will be provided for fuel and petroleum product storage pursuant to 29CFR1910.106(D)(6)(iii)(OSHA).
4. Equipment - All major equipment and proposed methods of operation shall be subject to the approval of TVA. The use or operation of heavy equipment in areas outside the right-of-way, access routes, or structure, pole, or tower sites will not be permitted without permission of the TVA inspector or field engineer. Heavy equipment use on steep slopes (greater than 20 percent) and in wet areas will be held to the minimum necessary to construct the transmission line. Steps will be taken to limit ground disturbance caused by heavy equipment usage, and erosion and sediment controls will be instituted on disturbed areas in accordance with state requirements.

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

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

5. Sanitation - A designated TVA or contractor representative shall contact a sanitary contractor who will provide sanitary chemical toilets convenient to all principal points of operation for every working party. The facilities shall comply with applicable federal, state, or local health laws and regulations. They shall not be located closer than 100 feet to any stream or tributary or to any wetland. The facilities shall be required to have proper servicing and maintenance, and the waste disposal contractor shall verify in writing that the waste disposal will be in state-approved facilities. Employees shall be notified of sanitation regulations and shall be required to use the toilet facilities.
6. Refuse Disposal - Designated TVA and/or contractor personnel shall be responsible for daily inspection, cleanup, and proper labeling, storage, and disposal of all refuse and debris produced by his operations and by his employees. Suitable refuse collecting facilities will be required. Only state-approved disposal areas shall be used. Disposal containers such as dumpsters or roll-off containers shall be obtained from a proper waste disposal contractor. Solid, special, construction/demolition, and hazardous wastes as well as scrap are part of the potential refuse generated and must be properly managed with emphasis on reuse, recycle, or possible give away, as appropriate, before they are handled as waste. Contractors must meet similar provisions on any project contracted by TVA.
7. Landscape Preservation - TVA and its contractors shall exercise care to preserve the natural landscape in the entire construction area as well as use areas, in or outside the right-of-way, and on or adjacent to access roads. Construction operations shall be conducted to prevent any unnecessary destruction, scarring, or defacing of the natural vegetation and surroundings in the vicinity of the work.
8. Sensitive Areas Preservation - Certain areas on site and along the right-of-way may be designated by the specifications or the TVA engineer as environmentally sensitive. These areas include but are not limited to areas classified as erodible, geologically sensitive, scenic, historical and archaeological, fish and wildlife refuges, water supply watersheds, and public recreational areas such as parks and monuments. Contractors and TVA construction crews shall take all necessary actions to avoid adverse impacts to these sensitive areas and their adjacent buffer zones. These actions may include suspension of work or change of operations during periods of rain or heavy public use; hours may be restricted or concentrations of noisy equipment may have to be dispersed. If prehistoric or historic artifacts or features are encountered during clearing or construction operations, the operations shall immediately cease for at least 100 feet in each direction, and TVA's right-of-way inspector or construction superintendent and Cultural Resources Program shall be notified. The site shall be left as found until a significance determination is made. Work may continue elsewhere beyond the 100-foot perimeter.

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

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

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

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

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

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

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

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

12. Restoration of Site - All construction disturbed areas, with the exception of farmland under cultivation and any other areas as may be designated by TVA's specifications, shall be stabilized in the following manner unless the property owner and TVA's engineer specify a different method:
  - A. The subsoil shall be loosened to a minimum depth of 6 inches if possible and worked to remove unnatural ridges and depressions.
  - B. If needed, appropriate soil amendments will be added.
  - C. All disturbed areas will initially be seeded with a temporary ground cover such as winter wheat, rye, or millet, depending on the season. Perennials may also be planted during initial seeding if proper growing conditions exist. Final restoration and final seeding will be performed as line construction is completed. Final seeding will consist of permanent perennial grasses such as those outlined in TVA's *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities*. Exceptions would include those areas designated as native grass planting areas. Initial and final restoration will be performed by the clearing contractor.
  - D. TVA holds the option, depending upon the time of year and weather condition, to delay or withdraw the requirement of seeding until more favorable planting conditions are certain. In the meantime, other stabilization techniques must be applied.
13. Air Quality Control - Construction crews shall take appropriate actions to minimize the amount of air pollution created by their construction operations. All operations must be conducted in a manner that avoids creating a nuisance and prevents damage to lands, crops, dwellings, or persons.
14. Burning - Before conducting any open burning operations, the contractor shall obtain permits or provide notifications as required to state forestry offices and/or local fire departments. Burning operations must comply with the requirements of state and local air pollution control and fire authorities and will only be allowed in approved locations and during appropriate hours and weather conditions. If weather conditions such as wind direction or speed change rapidly, the contractor's burning operations may be temporarily stopped by the TVA field engineer. The debris for burning shall be piled and shall be kept as clean and as dry as possible, then burned in such a manner as to reduce smoke. No materials other than dry wood shall be open burned. The ash and debris shall be buried away from streams or other water sources and shall be in areas coordinated with the property owner.
15. Dust and Mud Control - Construction activities shall be conducted to minimize the creation of dust. This may require limitations as to types of equipment, allowable speeds, and routes utilized. Water, straw, wood chips, dust palliative, gravel, combinations of these, or similar control measures may be used subject to TVA's approval. On new construction sites and easements, the last 100 feet before an access road approaches a county road or highway shall be graveled to prevent transfer of mud onto the public road.
16. Vehicle Exhaust Emissions - TVA and/or the contractors shall maintain and operate equipment to limit vehicle exhaust emissions. Equipment and vehicles that show

excessive emissions of exhaust gasses and particulates due to poor engine adjustments or other inefficient operating conditions shall not be operated until corrective repairs or adjustments are made.

17. Vehicle Servicing - Routine maintenance of personal vehicles will not be performed on the right-of-way. However, if emergency or "have to" situations arise, minimal/temporary maintenance to personal vehicles will occur in order to mobilize the vehicle to an off-site maintenance shop. Heavy equipment will be serviced on the right-of-way except in designated sensitive areas. The Heavy Equipment Department within TVA or the construction contractor will properly maintain these vehicles with approved spill prevention controls and countermeasures. If emergency maintenance in a sensitive or questionable area arises, the area environmental coordinator or construction environmental engineer will be consulted. All wastes and used oils will be properly recovered, handled, and disposed/recycled. Equipment shall not be temporarily stored in stream floodplains, whether overnight or on weekends or holidays.
18. Smoke and Odors - TVA and/or the contractors shall properly store and handle combustible material that could create objectionable smoke, odors, or fumes. The contractor shall not burn refuse such as trash, rags, tires, plastics, or other debris.
19. Noise Control - TVA and/or the contractor shall take measures to avoid the creation of noise levels that are considered nuisances, safety, or health hazards. Critical areas including but not limited to residential areas, parks, public use areas, and some ranching operations will require special considerations. TVA's criteria for determining corrective measures shall be determined by comparing the noise level of the construction operation to the background noise levels. In addition, especially noisy equipment such as helicopters, pile drivers, air hammers, chippers, chain saws, or areas for machine shops, staging, assembly, or blasting may require corrective actions when required by TVA.
20. Noise Suppression - All internal combustion engines shall be properly equipped with mufflers as required by the Department of Labor's *Safety and Health Regulations for Construction*. TVA may require spark arresters in addition to mufflers on some engines. Air compressors and other noisy equipment may require sound-reducing enclosures in some circumstances.
21. Damages - The movement of construction crews and equipment shall be conducted in a manner that causes as little intrusion and damage as possible to crops, orchards, woods, wetlands, and other property features and vegetation. The contractor will be responsible for erosion damage caused by his actions and especially for creating conditions that would threaten the stability of the right-of-way or site soil, the structures, or access to either. When property owners prefer the correction of ground cover condition or soil and subsoil problems themselves, the section of the contract dealing with damages will apply.

Revision April 2007

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## Appendix D

### Tennessee Valley Authority 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 Options

- A. TVA uses an integrated vegetation management approach. In farming areas, TVA encourages property owner management of the right-of-way using low-growing crops. In dissected terrain with rolling hills and interspersed woodlands, TVA uses mechanical mowing to a large extent.
- B. When slopes become hazardous to farm tractors and rotary mowers, TVA may use a variety of herbicides specific to the species present with a variety of possible application techniques. When scattered small stands of tall-growing vegetation are present and access along the right-of-way is difficult or the path to such stands is very long, herbicides may be used.
- C. In very steep terrain, in sensitive environmental areas, in extensive wetlands, at stream banks, and in sensitive property owner land use areas, hand clearing may be utilized. Hand clearing is recognized as one of the most hazardous occupations documented by the Occupational Safety and Health Administration. For that reason, TVA is actively looking at better control methods, including use of low-volume herbicide applications, occasional single tree injections, and tree growth regulators (TGRs).

- D. TVA does not encourage tree reclearing 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 reclear the right-of-way with trained reclearing 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 resprout from the root crown, and shattered stumps can produce a multistem dense stand in the immediate area. Repeated use of mowers on short cycle reclearing with many original stumps regrowing 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 regrowth 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 and little wildlife food or nesting potential and become a property owner's concern. Selective herbicide application may be used to control monoculture stands.
- F. TVA encourages property owners to sign an agreement to manage rights-of-way on their land for wildlife under the auspices of "Project Habitat," a joint project by TVA, BASF, and wildlife organizations, e.g., National Wild Turkey Federation, Quail Unlimited, and Buckmasters. The property owner maintains the right-of-way in wildlife food and cover with emphasis on quail, turkey, deer, or other wildlife. A variation used in or adjacent to developing suburban areas is to sign agreements with the developer and residents to plant and maintain wildflowers on the right-of-way.
- G. TVA places strong emphasis on managing rights-of-way in the above manner. When the property owners do not agree to these opportunities, TVA must maintain the right-of-way in the most environmentally acceptable, cost-effective, and efficient manner possible.

### **3.0 Herbicide Program**

- A. TVA has worked with universities (such as Mississippi State University, University of Tennessee, Purdue University, and others), chemical manufacturers, other utilities, U.S. Department of Transportation, U.S. Fish and Wildlife Service (USFWS), and U.S. Forest Service (USFS) personnel to explore options for vegetation control. The results have been strong recommendations to use species-specific, low-volume herbicide applications in more situations. Research, demonstrations, and other right-of-way programs show a definite improvement of rights-of-way treated with selective low-volume applications of new herbicides using a variety of application techniques and timing. Table 1 below identifies herbicides currently used on 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. The rates of application utilized are those listed on the USEPA-approved label and consistent with utility standard practice throughout the Southeast.

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

<u>Trade Name</u>	<u>Active Ingredients</u>	<u>Label Signal Word</u>
Accord	Glyphosate/Liquid	Caution
Arsenal	Imazapyr/Liquid/Granule	Caution
Chopper	Imazapyr/RTU	Caution
Escort	Metsulfuron Methyl/Dry Flowable	Caution
Garlon	Triclopyr/Liquid	Caution
Garlon 3A	Triclopyr/Liquid	Danger
Krenite S	Fosamine Ammonium	Caution
Pathfinder II	Triclopyr/RTU	Caution
Roundup	Glyphosate/Liquid	Caution
Roundup Pro	Glyphosate	Caution
Spike 20P	Tebuthiuron	Caution
Transline	Clopyralid/Liquid	Caution

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

<u>Trade Name</u>	<u>Active Ingredients</u>	<u>Label Signal Word</u>
Sahara	Diuron/Imazapyr	Caution
SpraKil SK-26	Tebuthiuron and Diuron	Caution
Topsite	Diuron/Imazapyr	Caution

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

<u>Trade Name</u>	<u>Active Ingredients</u>	<u>Label Signal Word</u>
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-round with a better mix of food species and associated high-protein insect populations for birds in the right seasons. Most also report less damage to soils (even when compared with rubber-tired equipment).
- E. Property owners interested in tree production often request the use of low-volume applications rather than hand- or mechanical clearing because of the insect and fungus problems in damaged vegetation and debris left on the right-of-way. The insect and fungus invasions, such as pine tip moth, oak leaf blight, sycamore and dogwood blight, etc., are becoming widespread across the nation.
- F. Best management practices (BMPs) governing application of herbicides are contained within *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities* (Muncy 1999), which is incorporated by reference. Herbicides can be liquid, granular, or powder and can be applied aerially or by ground equipment and may be selectively applied or broadcast, depending on the site requirements, species present, and condition of the vegetation. Water quality considerations include measures taken to keep herbicides from reaching streams whether by direct application or through runoff of or flooding by surface water. "Applicators" must be trained, licensed, and follow manufacturers' label instructions, U.S. Environmental Protection Agency (USEPA) guidelines, and respective state regulations and laws.
- G. When herbicides are used, their potential adverse impacts are considered in selecting the compound, formulation, and application method. Herbicides that are designated "Restricted Use" by USEPA require application by or under the supervision of applicators certified by the respective state control board. Aerial and ground applications are either done by TVA or by contractors in accordance with the following guidelines identified in TVA's BMPs manual (Muncy 1999):
  - 1. The sites to be treated are selected and application directed by the appropriate TVA official.
  - 2. A preflight walking or flying inspection is made within 72 hours prior to applying herbicides aerially. This inspection ensures that no land use changes have occurred, that sensitive areas are clearly identified to the pilot, and that buffer zones are maintained.
  - 3. Aerial application of liquid herbicides will normally not be made when surface wind speeds exceed 5 miles per hour, in areas of fog, or during periods of temperature inversion.
  - 4. Pellet application will normally not be made when the surface wind speeds exceed 10 miles per hour or on frozen or water-saturated soils.
  - 5. Liquid application is not performed when the temperature reaches 95 degrees Fahrenheit or above.

6. Application during unstable, unpredictable, or changing weather patterns is avoided.
  7. Equipment and techniques are used that are designed to ensure maximum control of the spray swath with minimum drift.
  8. Herbicides are not applied to surface water or wetlands unless specifically labeled for aquatic use. Filter and buffer strips will conform at least to federal and state regulations and any label requirements. The use of aerial or broadcast application of herbicides is not allowed within a streamside management zone (SMZs) (200 feet minimum width) 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 utilizes Activate Plus, manufactured by Terra, as an adjuvant to herbicides to improve the performance of the spray mixture. Application rates are consistent with the USEPA-approved label. The USFWS has expressed some concern on toxicity effects of surfactants on aquatic species. TVA is working in coordination with Mississippi State University and chemical companies to evaluate efficacy of additional low-toxicity surfactants, including LI700 as manufactured by Loveland Industries, through side-by-side test plots in the SMZs of area transmission lines.
- I. TVA currently uses primarily low-volume applications of foliar and basal applications of Accord (glyphosate) and Accord- (glyphosate) Arsenal (imazapyr) tank mixes. Glyphosate is one of the most widely used herbicidal active ingredients in the world and has been continuously the subject of numerous exhaustive studies and scrutiny to determine its potential impacts on humans, animals, and the environment.

#### **4.0 References**

- Muncy, J. A. 1999. *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities*, revised edition. Edited by C. Austin, C. Brewster, A. Lewis, K. Smithson, T. Broyles, and T. Wojtalik. Norris: Tennessee Valley Authority, Technical Note TVA/LR/NRM 92/1.
- U.S. Forest Service. 1989a. *Vegetation Management in the Coastal Plain/Piedmont Final Environmental Impact Statement*, Volumes I and II. Southern Region Management Bulletin R8-MB-23, January 1989. Atlanta, Ga.: USDA Forest Service.

- . 1989b. *Vegetation Management in the Appalachian Mountains Final Environmental Impact Statement*, Volumes I and II. Southern Region Management Bulletin R8-MB-38, July 1989. Atlanta, Ga.: USDA Forest Service.
- . 2002a. *Vegetation Management in the Appalachian Mountains Final Environmental Impact Statement Supplement*. Southern Region Management Bulletin R8-MB-97A, October 2002. Atlanta, Ga.: USDA Forest Service.
- . 2002b. *Vegetation Management in the Coastal Plain/Piedmont Final Environmental Impact Statement Supplement*. Southern Region Management Bulletin R8-MB-98A, October 2002. Atlanta, Ga.: USDA Forest Service.

Revision April 2008

## Appendix E

### Stream Crossings Along the Proposed 500-kV Transmission Line Route

Stream Identifier	Stream Type	Streamside Management Zone Category	Stream Name	Field Notes
001	Other	Category A (50 feet)	Pond	Pond
002	Intermittent	Category A (50 feet)	Unnamed tributary to South Mouse Creek	3 to 6-foot-wide by 3-foot-deep stream with clay/gravel substrate; wetted width is 2 feet; wetted depth is 1 foot; riparian condition is forested
003	Perennial	Category A (50 feet)	South Mouse Creek/Hiwassee River embayment	Drawn down for winter pool; riparian condition is forested; 303d listed for mercury
004	Intermittent	Category A (50 feet)	Unnamed tributary to South Mouse Creek	2 to 10-foot-wide by 1 to 3-foot-deep stream with clay/gravel substrate; riparian condition is partially forested
005	Perennial	Category A (50 feet)	South Mouse Creek/Hiwassee River embayment	Drawn down for winter pool; riparian condition is partially forested; 303d listed for mercury
006	Perennial	Category A (50 feet)	South Mouse Creek/Hiwassee River embayment	Drawn down for winter pool; riparian condition is partially forested; 303d listed for mercury
007	Perennial	Category A (50 feet)	Unnamed tributary to Hiwassee River	20-foot by 10-foot stream with cobble/boulder substrate; flows through culvert under Old Lower River Road; riparian condition is partially forested.
001AR <sup>1</sup>	Perennial	Category A (50 feet)	Embayment of Tennessee River	Tennessee River embayment
002AR	Intermittent	Category A (50 feet)	Tributary to Gunstocker Creek	Existing culvert in place
003AR	Perennial	Category A (50 feet)	Tributary to Rogers Creek	Existing culvert in place
004AR	Perennial	Category A (50 feet)	Tributary to Black Ankle Creek	Channel flowing through a pasture
005AR	Intermittent	(Category A (50 Feet)	Tributary to Black Ankle Creek	

<sup>1</sup> The suffix "AR" in the stream identifier indicates a crossing associated with an access road.

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# Appendix F

## Correspondence With the Tennessee State Historic Preservation Office

December 6, 2010

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

Dear Mr. McIntyre:

TENNESSEE VALLEY AUTHORITY (TVA) PROPOSED 500-kV LOOP FOR WACKER  
CHEMIE INDUSTRIAL PLANT, BRADLEY COUNTY, TENNESSEE

TVA proposes to construct, operate, and maintain an approximately 2.3-mile long 500-kV loop transmission line (TL) for the proposed Wacker Chemie industrial plant in Bradley County, Tennessee. TVA considers the area of potential effects (APE) to be the 2.3-mile long by 300-foot wide TL right-of-way (ROW). The architectural APE includes the 0.5-mile wide area linearly centered along the proposed TL ROW.

TVA contracted with TRC to conduct the cultural resources survey. TRC's records search at the Tennessee Division of Archaeology and the Tennessee Historical Commission identified four previously recorded archaeological resources (40BY54, 40BY166- Northern Route of the Trail of Tears, 40BY181, and 40BY182) and three previously recorded architectural properties (BY-435, BY-436, and BY-437) within the APE. BY-437 is no longer extant and BY-436 and BY-437 are located, through a combination of rolling terrain and mature tree growth, outside the visual line of-sight to the project corridor.

Following the records search, TRC conducted the cultural resources survey. Enclosed is the draft report *Phase I Cultural Resource Survey of the Proposed Wacker Chemie 500 kV Transmission Line Project, Bradley County, Tennessee*.

The architectural survey resulted in the identification of two previously unrecorded architectural resources (HS-1 and HS-2). TVA finds HS-1 and HS-2 ineligible for the National Register of Historic Places (NRHP) due to modern alterations and/or lack of architectural merit, as well as the inability to associate the house and/or its original owner(s) with an important historical event or series of events.

The archaeological survey conducted from September 15 to 17, 2010, identified no previously unrecorded archaeological sites. Sites 40BY54, 40BY181 and 40BY182 were not encountered. The only portion of 40BY166 (Northern Route of the Trail of Tears) within the APE consists of a graded and paved two-lane road. TVA finds that the proposed project would have a visual affect to 40BY166, but the effect would not be adverse. In addition, to the modern alterations to 40BY166 itself (county road and utilities development), the viewshed of 40BY166 has been compromised by modern industrial development, interstate highway development (I-75), and existing Watts Bar-Sequoyah # 2 500-kV TL. TVA previously consulted with your office regarding visual effects to 40BY166 in association with the 26a permit for the Wacker Chemie

Mr. E. Patrick McIntyre, Jr.

Page 2

December 6, 2010

industrial complex. In a letter dated September 23, 2010, your office concurred to the finding of no adverse visual effect to 40BY166.

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

TVA agrees with the recommendations of the authors and finds that no historic properties would be adversely affected by the proposed undertaking. Pursuant to 36 CFR Part 800, we are seeking your concurrence with TVA's findings and recommendations.

If you have any questions or comments, please contact Richard Yarnell by telephone at (865) 632-3463 or by email at [wryarnell@tva.gov](mailto:wryarnell@tva.gov).

Sincerely,

***Original signed by***

A. Eric Howard, Manager

Cultural Compliance

WT 11D-K

RY:MH:IKS

Enclosure

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

Cynthia M. Anderson, LP 5D-C

Kelly R. Baxter, WT 11D-K

Brenda E. Brickhouse, LP 5U-C

Tina I. Broyles, MR 2W-C

Thomas Cureton Jr., MR 4G-C

Susan J. Kelly, LP 5U-C

Todd C. Liskey, MR 4G-C

Khurshid K. Mehta, WT 6A-K

Bruce S. Schofield, LP 5U-C

EDMS, WT 11D-K



**TENNESSEE HISTORICAL COMMISSION**  
DEPARTMENT OF ENVIRONMENT AND CONSERVATION  
2941 LEBANON ROAD  
NASHVILLE, TN 37243-0442  
(615) 532-1550

Save: \_\_\_\_\_  
Sent to: \_\_\_\_\_  
File: \_\_\_\_\_

December 16, 2010

Mr. A. Eric Howard  
Tennessee Valley Authority  
400 West Summit Hill Drive  
Knoxville, Tennessee 37902-1499

RE: TVA, CULTURAL RESOURCES ASSESSMENT, WACKER CHEMIE INDUST.  
500-KV LOOP, UNINCORPORATED, BRADLEY COUNTY, TN

Dear Mr. Howard:

At your request, our office has reviewed the above-referenced cultural resources survey report in accordance with regulations codified at 36 CFR 800 (Federal Register, December 12, 2000, 77698-77739). Based on the information provided, we concur that the project area contains no historic properties eligible for listing in the National Register of Historic Places.

If project plans are changed or archaeological remains are discovered during construction, please contact this office to determine what further action, if any, will be necessary to comply with Section 106 of the National Historic Preservation Act.

Your cooperation is appreciated.

Sincerely,

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

EPM/jmb

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## **Appendix G**

### **Tennessee Valley Authority**

### **Substation Lighting Guidelines**

#### **For Greenfield Sites**

Permanent substation lighting should be a two-stage design. Stage 1 is operated dusk to dawn for fixtures at higher mounting heights, more than 12 feet above the ground, and Stage 2 is switch-controlled for low mounting heights at 12 feet and below.

Stage 1 will be continuous nighttime lighting turned on with a photocell and designed to meet minimum requirements for safety and security. The general purpose of Stage 1 lighting is to light the ground and general area to the fence. Designing Stage 1 continuous lighting should follow Illuminating Engineering Society of North America (IESNA) RP-33-99 recommended practices for maximum lighting at the fence and past the fence, except where National Electrical Safety Code (NESC) requirements supersede these guidelines for safety reasons or *Federal Register* requirements supersede these guidelines for spill-containment facilities. Stage 1 lighting fixtures mounted at an elevation above 12 feet should be the cutoff or full-cutoff type to reduce off-site glare.

The Stage 2 lighting will be provided for temporary operational needs and will only be turned on when required. Stage 2 lighting is intended to provide visibility of substation structures and devices, to operate switches, and to perform tasks. Design of Stage 2 lighting should follow NESC and IESNA RP-7-01 recommended practices for task lighting.

Substation structures should be utilized for mounting Stage 1 and Stage 2 lighting fixtures wherever feasible. Lighting fixtures should be mounted at the minimum elevation required to provide coverage dictated by the required vertical and horizontal light levels and uniformity. Lights may be mounted above an elevation of 40 feet when required for security reasons, such as cameras, or lighting of objects taller than 40 feet.

#### **For Minor Modifications to Existing Facilities**

Additional lighting required for substation modifications will follow the basic existing lighting design. To the degree possible, substation structures should be utilized to mount light fixtures. Lighting fixtures may be mounted at an elevation above 40 feet when required for site coverage, security reasons, such as cameras, or lighting of objects taller than 40 feet. All substation lights mounted at an elevation above 12 feet should be cutoff or full-cutoff type, such that no light is emitted from the fixture at lateral angles above 90 degrees (above the horizontal plane) to reduce off-site glare, unless the light is required for operational needs, such as the operation of a disconnect switch mounted at a higher elevation. To the extent possible, lighting additions should follow *Federal Register*, NESC, IESNA RP-7-01, and IESNA RP-33-99 recommended practices for lighting.

The Stage 1 and Stage 2 lighting approach will not be considered for minor modifications because of the difficulty in rearranging wiring circuits for lighting power supply and control. These changes are more appropriately addressed when major modifications are made.

*(For major modifications to existing substations, consideration should be given to implement lighting policies for greenfield sites. This can be determined during site visits and project scoping.)*

### **General Design Issues and Design Principle Definitions**

- A Good Neighbor. Most of the design constraints are summed up by this principle. Thoughtful consideration of the neighbors is critical to the success of the design.
- Luminaire Optical Properties. Four designations are used for the light control of outdoor lighting fixtures: Full Cutoff (0 percent, <10 percent), Cutoff (<2.5 percent, <10 percent), Semicutoff (<5 percent, < 20 percent), and Noncutoff. These are in terms of a percentage of the lamp's intensity lateral to the fixture and at an angle 10 degrees below the horizontal plane.
- Light Levels. Light levels are determined for both horizontal and vertical surfaces by the appropriate standards. Principally American National Standards Institute (ANSI)/IESNA RP-7-01, IESNA RP-33-99, IESNA *Lighting Handbook*, 9<sup>th</sup> Edition, 2000, blue pages Safety/Security-1, IESNA G-1-03, and the NESC, Section 111.A, should be considered.
- Neighboring Property Uses. The lighting design shall consider ways to reduce light trespass in directions where neighbors are known to exist through light fixture placement and control of the fixture light output.
- Design Standards. Design standards are general engineering guides to proper application of lighting equipment to achieve lighting levels consistent with their recommended standards. Primary design standards are listed under the "Light Levels" definition.
- Physical Security Survey. If warranted, specific lighting needs can be determined through the process outlined in IESNA G-1-03, Annex B, with measurements according to Annex C.
- Television Surveillance. If required, television surveillance provides lighting compatible with the needs of camera visibility, which may or may not enhance human visibility.
- Mounting Heights. Mounting height is a key factor in determining the uniformity or evenness of the light level. For substations, mounting heights are defined as Stage 1 or Stage 2 for high and low under "Mounting Locations." Generally, mounting heights provide good uniformity on the ground or structure when lights are spaced a distance two times the mounting height or lateral distance. Aboveground structures will have decreased uniformity by the same ratio unless this design geometry is considered. For example, lights at a 12-foot mounting height typically provide uniform coverage on the ground 24 feet wide. Spacing between fixtures of 48 feet would provide good uniformity on the ground. When lighting vertical structures, the distance to the light affects the uniformity in the same way.
- Mounting Locations. Low mounting heights are defined as 12 feet and below and high mounting heights are above 12 feet.

- Terrain. Nuisance glare and light trespass are also a function of the substation height above or below the average local terrain, including land contours and vegetation height. Terrain can shield fixtures and reduce lighting control requirements.
- Temporary Lighting Systems. Systems designed for outages and limited to portable systems should have no restrictions due to their temporary nature.
- Permanent Lighting Systems. These systems require the most care due to their persistent effect on the neighbors.
- New Construction Greenfield Sites. These sites have a higher level of care due to the clean slate available to accommodate good lighting design.
- Minor Substation Modifications. Small modifications include substation component replacement and expansions of less than 50 percent of the substation capacity. Following the existing lighting design pattern in these cases is acceptable practice to expand the lighting system coverage.
- Extensive Substation Modifications. Extensive modifications involve site voltages or expansions of more than 50 percent capacity. Lighting should be evaluated by design engineers to determine feasibility of using the design approaches of new construction greenfield sites.
- Safety. Wherever unsafe conditions are present, in the judgment of design engineers, additional lighting is warranted.

## References

IESNA G-1-03, *Guideline on Security Lighting for People, Property, and Public Spaces*

IESNA *Lighting Handbook*, 9<sup>th</sup> Edition, 2000, blue pages Safety/Security-1

IESNA RP-7-01, *Recommended Practice for Lighting Industrial Facilities*

IESNA RP-33-99, *Recommended Practice for Lighting for Exterior Environments*

NESC, Institute of Electrical and Electronic Engineers (IEEE), *ANSI/IEEE C2-2007*, 2007 Edition

May 2008 Revision

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## **Appendix H**

### **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, TVA Environmental Stewardship and Policy staff will have studied each possible stream impact site and will have identified it as falling into one of three categories: (A) standard stream protection, (B) protection of important permanent streams, 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 state and federal requirements to avoid harming certain species. The category designation for each site will be marked on the 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 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 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 6, "Standards and Specifications."
2. All equipment crossings of streams 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 by the actions of plowing, disking, blading, or other tillage or grading equipment will not be allowed in SMZs; however, a minimal amount of soil disturbance may occur as a result of clearing operations. Shorelines that have to be disturbed must be stabilized as soon as feasible.

## **(B) Protection of Important Permanent Streams**

This category will be used when there is one or more specific reason(s) why a permanent (always-flowing) stream requires protection beyond that provided by standard BMPs. Reasons for requiring this additional protection include the presence of important sports fish (trout, for example) and habitats for federal endangered species. 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 6, "Standards and Specifications."
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. Proposed crossings of permanent streams must be discussed in advance with Environmental Stewardship and Policy staff and may require an on-site planning session before any work begins. The purpose of these discussions will be to minimize the number of crossings and their impact on the important resources in the streams.
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 not be allowed in SMZs; however, a minimal amount of soil disturbance may occur as a result of clearing operations. 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 (for example, a particular spring run) or protected species (for example, one that breeds in a wet-weather ditch) is known to occur on or adjacent to the construction corridor. 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 6, "Standards and Specifications."
2. All construction activity in and within 30 meters (100 feet) of the unique habitat must be approved in advance by Environmental Stewardship and Policy staff, preferably as a result of an on-site planning session. The purpose of this review and approval will be to minimize impacts on the unique habitat. All crossings of streams also must comply with appropriate state (and, at times, federal) permitting requirements.
3. Cutting of trees within 30 meters (100 feet) of the unique habitat must be discussed in advance with Environmental Stewardship and Policy staff, preferably during the on-site planning session. Cutting of trees near the unique habitat must be kept to an absolute minimum. Stumps must not be removed, uprooted, or cut shorter than 0.30 meter (1 foot) above the ground line.
4. Other vegetation near the unique habitat must be disturbed as little as possible during construction. The soil must not be disturbed by plowing, disking, blading, or grading. Areas that have to be disturbed must be stabilized as soon as possible and revegetated as soon as feasible, in some cases with specific kinds of native plants. These and other vegetative requirements will be coordinated with Environmental Stewardship and Policy staff.

### **Additional Help**

If you have questions about the purpose or application of these guidelines, please contact your supervisor or the environmental coordinator in the local Transmission Service Center.

Revision April 2007

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

Guidelines	A: Standard	B: Important Permanent Streams	C: Unique Water Habitats
<p align="center"><b>1.</b></p> <p><b>Reference</b></p>	<ul style="list-style-type: none"> <li>All TVA construction work around streams will be done using pertinent BMPs such as those described in <i>A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities</i>, especially Chapter 6, BMP “Standards and Specifications.”</li> </ul>	<p>Except as modified by guidelines 2-4 below, all construction work around streams will be done using pertinent BMPs such as those described in <i>A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities</i>, especially Chapter 6, BMP “Standards and Specifications.”</p>	<ul style="list-style-type: none"> <li>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 <i>A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities</i>, especially Chapter 6, BMP “Standards and Specifications.”</li> </ul>
<p align="center"><b>2.</b></p> <p><b>Equipment Crossings</b></p>	<ul style="list-style-type: none"> <li>All crossings of streams must comply with appropriate state and federal permitting requirements.</li> <li>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.</li> <li>Crossings of any permanent streams must allow for natural movement of fish and other aquatic life.</li> </ul>	<ul style="list-style-type: none"> <li>All crossings of streams must comply with appropriate state and federal permitting requirements.</li> <li>Crossings of drainage channels and intermittent streams must be done in ways that avoid erosion problems and long-term changes in water flow.</li> <li>Proposed crossings of permanent streams must be discussed in advance with Environmental Stewardship and Policy staff and may require an on-site planning session before any work begins. The purpose of these discussions will be to minimize the number of crossings and their impact on the important resources in the streams.</li> </ul>	<ul style="list-style-type: none"> <li>All crossings of streams also must comply with appropriate state and federal permitting requirements.</li> <li>All construction activity in and within 30 meters (100 feet) of the unique habitat must be approved in advance by Environmental Stewardship and Policy staff, preferably as a result of an on-site planning session. The purpose of this review and approval will be to minimize impacts on the unique habitat.</li> </ul>

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

Guidelines	A: Standard	B: Important Permanent Streams	C: Unique Water Habitats
<p align="center"><b>3.</b></p> <p align="center"><b>Cutting Trees</b></p>	<ul style="list-style-type: none"> <li>• 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.</li> <li>• Stumps can be cut close to ground level but must not be removed or uprooted.</li> </ul>	<ul style="list-style-type: none"> <li>• Cutting of trees with 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.</li> <li>• Cutting of trees near permanent streams must be limited to those meeting National Electrical Safety Code and danger tree requirements.</li> <li>• Stumps can be cut close to ground level but must not be removed or uprooted.</li> </ul>	<ul style="list-style-type: none"> <li>• Cutting of trees within 30 meters (100 feet) of the unique habitat must be discussed in advance with Environmental Stewardship and Policy staff, preferably during the on-site planning session. Cutting of trees near the unique habitat must be kept to an absolute minimum.</li> <li>• Stumps must not be removed, uprooted, or cut shorter than 1 foot above the ground line.</li> </ul>
<p align="center"><b>4.</b></p> <p align="center"><b>Other Vegetation</b></p>	<ul style="list-style-type: none"> <li>• Other vegetation near streams must be disturbed as little as possible during construction.</li> <li>• Soil displacement by the actions of plowing, disking, blading, or other tillage or grading equipment will not be allowed in SMZs; however, a minimal amount of soil disturbance may occur as a result of clearing operations.</li> <li>• Shorelines that have to be disturbed must be stabilized as soon as feasible.</li> </ul>	<ul style="list-style-type: none"> <li>• Other vegetation near streams must be disturbed as little as possible during construction.</li> <li>• Soil displacement by the actions of plowing, disking, blading, or other tillage or grading equipment will not be allowed in SMZs; however, a minimal amount of soil disturbance may occur as a result of clearing operations.</li> <li>• Shorelines that have to be disturbed must be stabilized as soon as possible and revegetated as soon as feasible.</li> </ul>	<ul style="list-style-type: none"> <li>• Other vegetation near the unique habitat must be disturbed as little as possible during construction.</li> <li>• The soil must not be disturbed by plowing, disking, blading, or grading.</li> <li>• Areas that have to be disturbed must be stabilized as soon as possible and revegetated as soon as feasible, in some cases with specific kinds of native plants. These and other vegetative requirements will be coordinated with Environmental Stewardship and Policy staff.</li> </ul>

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## Appendix I

### Tennessee Valley Authority Site Clearing and Grading Specifications

1. General - The project manager with the clearing and/or grading contractor(s) shall review the environmental evaluation documents for the project or proposed activity (categorical exclusion checklist, environmental assessment, or environmental impact statement) along with all clearing and construction appendices, conditions in applicable general and/or site-specific permits, the storm water pollution prevention plan, open burning or demolition notification requirements, 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 storm water management practices as outlined in TVA's best management practices (BMPs) manual. 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. BMPs shall be installed before general site clearing or grading, with progressive stabilization BMPs applied from the perimeter toward the interior work areas as grading is completed. Any stabilized area that must be disturbed in subsequent steps shall have temporary BMPs installed until work is completed and the area is restabilized.

If the contractor fails to use BMPs or to follow environmental expectations discussed in the prebid, 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. He or she shall secure, or ensure that TVA has **secured, all necessary permits and authorizations and made all appropriate notifications** 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 employees knowledgeable of environmental requirements shall be documented** with copies submitted to TVA's project manager or environmental specialist before work begins. The **contractor and subcontractors will be responsible for meeting all** conditions **specified in permits**. Permit conditions shall be reviewed in prework discussions.
3. Land and Landscape Preservation - The contractor shall exercise care to preserve the condition of cleared soils by avoiding as much compacting and deep scarring as possible in areas not to be developed for buildings, structures, or foundations. 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. The placement of erosion/sediment controls shall begin at the perimeter and work progressively to the interior of the site. Repeated work in an area will require establishment of a ground cover immediately after each disturbance is completed. In areas outside the clearing, borrow, fill, or use and access areas, the natural vegetation shall be protected from damage. The contractor and his or her employees and subcontractors must not deviate from delineated access routes or use areas and must enter the site(s) 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 by modifying the methods of clearing or reclearing, grading, borrow, or fill so that the buffer and sensitive area are protected. Some areas may require planting native low-growing plants or grasses to meet the criteria of regulatory agencies, executive orders, or commitments to special program interests.

4. Streamside Management Zones - The clearing and/or grading contractor(s) 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 (SMZs), 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 the 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 the 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 access or site 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 prevented from falling into water bodies or immediately removed from streams, ditches, ponds, 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 and 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 quickly grow to "electrical clearance problem" heights. In many circumstances, herbicides labeled for water and wetland use may be used in reclearing.

At substation, switching stations, and communications sites, wetlands are avoided unless there is no feasible alternative.

6. Sensitive Area Preservation - If prehistoric or historic artifacts or features that might be of archaeological or historical significance are discovered during clearing, grading, borrow, or fill operations, the activity shall immediately cease within a 100-foot radius, and a TVA project manager, an environmental specialist, and the TVA 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, grading, borrow and fill, and/or disposal activities shall be performed using BMPs that will prevent erosion and entrance of spillage, contaminants, debris, and other pollutants or objectionable materials into drainageways, surface waters, 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 shall be kept away from streams and ditches and shall be incorporated into the soil. Only materials allowed to be burned under an open burning permit may be incorporated into the soil.

The clearing and grading contractor(s) and subcontractors 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 at least as frequently as required by the permit or good management practices and during periods of high runoff; any necessary repairs will be made as soon as practicable. BMP runoff sampling will be conducted in accordance with permit requirements. Records of all inspections and sampling will be maintained on site, and copies of inspection forms and sampling results will be forwarded to the TVA environmental specialist.

8. Turbidity and Blocking of Streams - If temporary clearing, grading, borrow, or fill 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. In Tennessee, conditions of an Aquatic Resource Alteration Permit shall be met. 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, borrow, fill, or right-of-way disturbance and after sequential disturbance of stabilized areas due to stepwise construction requirement in accordance with applicable permit or regulatory requirements.

On rights-of-way, 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 design or construction access road standards. At any

construction site, 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 immediately. Appropriate U.S. Army Corps of Engineers and state permits shall be obtained for stream or wetland crossings.

9. Air Quality Control - The clearing or grading contractor shall take appropriate actions to limit the amount of air emissions created by clearing and disposal operations to be 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. If building renovation or demolition is involved, the required air quality organization shall be notified the minimum 10 days in advance, and if the start date is delayed, renotified to start the clock again.
10. Dust and Mud Control - Clearing, grading, borrow, fill, or transport 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 manufacturer's recommended limits and tolerances. Excessive exhaust gases will be eliminated, and inefficient operating procedures will be revised or halted until corrective repairs or adjustments are made.
14. Vehicle Servicing - Routine maintenance of vehicles will not be performed on the site, right-of-way, or access route. However, if emergency or "have to" situations arise, minimal/temporary maintenance to vehicles will occur in order to mobilize the vehicle to an off-site maintenance shop. Some heavy equipment may have to be serviced on the right-of-way, site, or access route, except in designated sensitive areas. The clearing, grading, borrow, or fill 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 Program Administration or project manager will be consulted. All wastes and used oils will be properly recovered, handled, and disposed/recycled. Equipment shall not be temporarily stored in stream floodplains, whether overnight or on weekends or holidays.

15. Noise Control - The contractor shall take steps to avoid the creation of excessive sound levels for employees, the public, or the site and adjacent property owners. Concentration of individual noisy pieces as well as the hours and locations of operation should be considered.
16. Noise Suppression - All internal combustion engines shall be properly equipped with mufflers. The equipment and mufflers shall be maintained at peak operating efficiency.
17. Sanitation - A designated representative of TVA or the clearing, grading, borrow, fill, or construction contractor shall contract a sanitary contractor who will provide sanitary chemical toilets convenient to all principal points of operation for every working party and at each construction step. The facilities shall comply with applicable federal, state, or local health laws and regulations. They shall not be located closer than 100 feet to any stream or tributary or to any wetland. The facilities shall be required to have proper servicing and maintenance, and the waste disposal contractor shall verify in writing that the waste disposal will be in state-approved facilities. Employees shall be notified of sanitation regulations and shall be required to use the toilet facilities.
18. Refuse Disposal - The clearing, grading, borrow, fill, or construction contractor and subcontractor(s) shall be responsible for daily cleanup and proper labeling, storage, and disposal of all refuse and debris on the site produced by his or her 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. Records of waste generation shall be maintained for a site and shall be provided to the project manager and environmental specialist assigned to the project.
19. 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. On rights-of-way, 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, site, or access.

Trees that have been cut may not be left on a substation, switching station, or communications site.

20. 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, site, or communications facilities construction is completed. Final seeding will consist of permanent perennial grasses such as those outlined in TVA's *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities*. Exceptions would include those areas designated as native grass planting areas. Initial and final restoration will be performed by the clearing contractor with emphasis on using landscaping materials provided in guidelines for low maintenance native vegetation use.
- 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.
- E. Vegetation designated by the Federal Invasive Species Council must be eliminated at the work site, and equipment being transported from location to location must be inspected to ensure removal and destruction of live material.

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