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FINAL ENVIRONMENTAL ASSESSMENT

**ETOWAH, TENNESSEE, AREA POWER SUPPLY
IMPROVEMENT PROJECT**

MCMINN AND POLK COUNTIES, TENNESSEE

TENNESSEE VALLEY AUTHORITY

MARCH 2005

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ACRONYMS AND ABBREVIATIONS

°F	Degree Fahrenheit
#	Number
A.D.	Latin term, anno Domini, meaning “in the year of our Lord”
APE	Area of Potential Effect
B.C.	Before Christ
BMP	Best Management Practice
CFR	Code of Federal Regulations
CR	County Road
EA	Environmental Assessment
e.g.	Latin term, <i>exempli gratia</i> , meaning “for example”
EMF	Electric and Magnetic Fields
EO	Executive Order
et al.	Latin term <i>et alii</i> (masculine), <i>et aliae</i> (feminine), or <i>et alia</i> (neutral) meaning and others
etc.	Latin term <i>et cetera</i> meaning “and other things” “and so forth”
HRM	Hiwassee River Mile
i.e.	Latin term, <i>id est</i> , meaning “that is”
kV	Kilovolt
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
NRI	Nationwide Rivers Inventory
OSHA	Occupational Safety and Health Administration
SCADA	System Control and Data Acquisition
SHPO	State Historic Preservation Officer
SMZ	Streamside Management Zone
SR	State Route
TDEC	Tennessee Department of Environment and Conservation
TDOT	Tennessee Department of Transportation
TEPCO	Tennessee Electric Power Company
TVA	Tennessee Valley Authority
TVARAM	TVA-developed version of the Ohio Rapid Assessment Method
TWRA	Tennessee Wildlife Resources Agency
US	United States Highway
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WMA	Wildlife Management Area

CHAPTER 1

1. PURPOSE OF AND NEED FOR ACTION

1.1. Proposed Action: Improve Power Supply

The Tennessee Valley Authority (TVA) is proposing to improve the reliability of the electric power supply in the Etowah area of McMinn County and nearby Polk County, Tennessee. To accomplish this, TVA would rebuild 9 miles of the existing Ocoee #1-Etowah Switching Station 69-kilovolt (kV) Transmission Line and construct the Northeast Benton 161-69-kV Substation (Figure 1-1). The substation would be in service by July 2006 and the transmission line by April 2007.

1.2. Need

The major power supply to the Etowah area is from the Athens Primary Substation via a 161-kV transmission line to TVA's Etowah Switching Station (Figure 1-1). Electric power is then transferred from the existing Ocoee #1-Etowah Switching Station 69-kV Transmission Line to other electrical loads at the J. M. Huber and Etowah District Substations. This power is delivered in part over an older section of transmission line constructed in 1917 by the Tennessee Electric Power Company (TEPCO). This 69-kV transmission line runs to the Ocoee #1 Hydro Plant, which provides a weak secondary electric supply for the project area. The TEPCO section is degraded and is considered inadequate for reliable service into the future. Residential and industrial customers in the project area have expressed concern for safety and reliability of the transmission line due to its condition. Should a power outage occur along the long transmission line from Athens during heavy use periods, the TEPCO section of the Ocoee #1-Etowah Switching Station 69-kV Transmission Line could not provide the project area with an adequate backup supply of power. As a result, some of the electric load would need to be dropped on this transmission line in order to maintain adequate voltage, and outages would occur to residential and industrial customers in the proposed project area.

1.3. Decisions That Must Be Made

The primary decision before TVA is whether to rebuild a portion of 69-kV transmission line and to construct a new substation to improve the electrical service in the Etowah, Tennessee, area. A detailed description of the alternatives is provided in Section 2.2.

If service to the area is to be improved, other, secondary decisions are involved. These include the following considerations:

- The timing of improvements
- Determining any necessary mitigation and/or monitoring measures to implement to meet TVA standards and minimize potential damages to resources

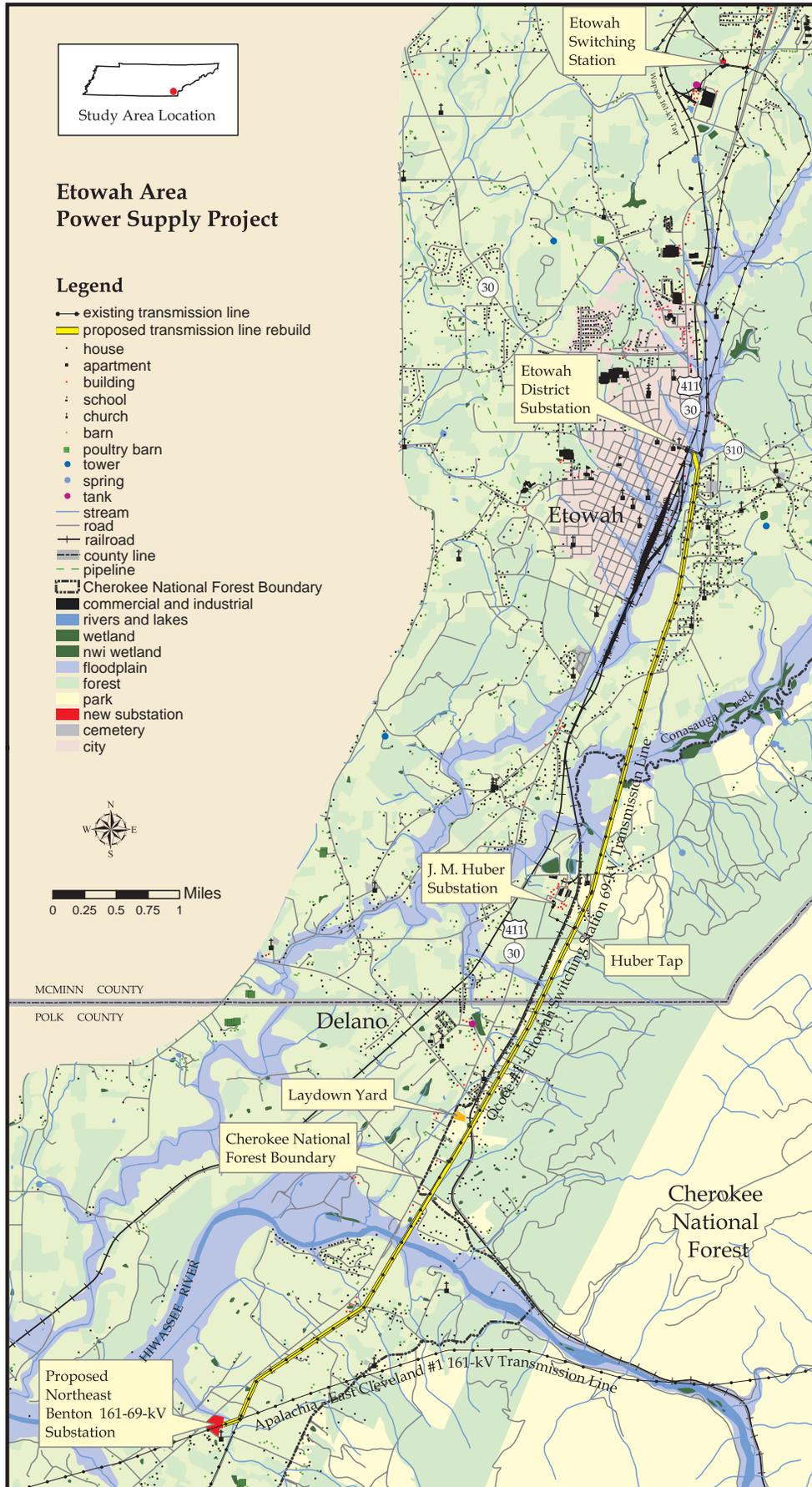


Figure 1-1. Northeast Benton 161-69-kV Substation and Ocoee #1-Etowah Switching Station 69-kV Transmission Line Study Area

1.4. Public Involvement

The following Federal and state agencies have been contacted to date by TVA concerning this project.

- United States Army Corps of Engineers
- United States Fish and Wildlife Service
- Tennessee Conservation League
- Tennessee Department of Agriculture
- Tennessee Department of Economic and Community Development
- Tennessee Department of Environment and Conservation
- Tennessee Department of Transportation
- Tennessee State Historic Preservation Officer
- Tennessee Wildlife Resources Agency

This proposal was reviewed in accordance with Executive Order (EO) 11988 (Floodplain Management), EO 11990 (Protection of Wetlands), Farmland Protection Policy Act, National Historic Preservation Act (NHPA), Endangered Species Act, Section 404 of the Clean Water Act, and EO 12372 (Intergovernmental Review). Correspondence received related to this coordination is contained in Appendix I.

TVA held a public meeting in the project area on September 30, 2003. Plans for constructing a new substation and rebuilding a portion of the existing Ocoee #1-Etowah Switching Station 69-kV Transmission Line were presented to the public for comment. The property owners living near the transmission line and substation site were sent letters inviting them to come to the public meeting. TVA also issued a news release to local news outlets. Total attendance at the meeting was approximately 90.

During a 30-day public comment period following the open house, TVA accepted public comments on potential line routes and other issues. A toll-free phone number and fax number were made available to facilitate comments. Comments were primarily related to how the rebuilt transmission line would affect the current property owners.

1.5. Necessary Permits or Licenses

Permits would be required from the state of Tennessee for construction-site storm water discharge for both the substation construction and for demolition and rebuilding of the existing transmission line. TVA's substation construction organization and transmission line construction organization would individually prepare the required erosion and sedimentation control plans and coordinate them with the appropriate state and local authorities. A permit would also be required for burning trees and other combustible materials removed during transmission line construction. Construction of the transmission line and substation would require a Section 404 Nationwide Permit #12 (Utility Line Crossing) issued by the United States Army Corps of Engineers (USACE). An Aquatic Resources Alteration Permit may also be required.

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CHAPTER 2

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1. Introduction

Chapter 2: Alternatives Including the Proposed Action is the *heart* of this Environmental Assessment (EA). This chapter has the following five major sections:

- Description of Alternatives
- Alternative Eliminated From Detailed Study
- Description of Construction, Operation, and Maintenance of the Proposed 161-kV Transmission Line
- Project and Siting Alternatives
- Identification of the Preferred Alternative

This chapter describes all of the alternatives explored and provides a detailed description of the necessary steps in constructing a transmission line and substation. Chapter 2 also identifies TVA's preferred alternative.

2.2. Description of Alternatives

2.2.1. *Alternative 1 – Do Not Upgrade Transmission Line (No Action)*

Under the No Action Alternative, TVA would not upgrade the 69-kV transmission line system or construct the new substation in the project area. As a result, the safety and reliability concerns regarding the continued use of the existing TEPCO transmission line to provide service to Etowah Utilities and J. M Huber Company Substations would continue. During high load conditions, if the 161-kV transmission line feed from Athens to the project area was lost, large voltage swings on the 69-kV transmission line system and electric load reductions would occur. This would result in increasing numbers of system outages of electric service provided to the customers in the Etowah project area. This would not meet TVA's performance criteria.

2.2.2. *Alternative 2 – Build a Substation and Rebuild 9 Miles of the Ocoee #1-Etowah Switching Station 69-kV Transmission Line (Action)*

Under the Action Alternative, TVA would construct the proposed Northeast Benton 161-69-kV Substation as a second reliable power source to serve the Etowah area. The proposed substation would be located on an approximately 8-acre site near the intersection of the Apalachia-East Cleveland #1 161-kV Transmission Line and the Ocoee #1-Etowah Switching Station 69-kV Transmission Line (Figure 1-1). A loop connection would be installed on both transmission lines into the proposed substation. To improve the power supply to the Etowah area, TVA would retire and rebuild an approximate 9-mile section of the existing Ocoee #1-Etowah Switching Station 69-kV Transmission Line from the proposed Northeast Benton 161-69-kV Substation site to the Etowah District 69-kV Substation.

The existing transmission line would be rebuilt to 161-kV insulation standards to allow for future electric load growth in the project area, but it would be initially operated at 69-kV. TVA would upgrade the existing TEPCO pole line easement to the current TVA standard for rights-of-way easements. The current pole line easement does not limit the property owners' use of the area around the transmission line or include a defined right-of-way width. However, the existing transmission line easement is currently maintained or cleared along the easement to a width between 75 or 100 feet. TVA does not intend to expand the Ocoee #1-Etowah Switching Station 69-kV Transmission Line right-of-way width from the current minimum maintained 75 feet to the standard 100 feet for a 161-kV transmission line right-of-way. This was due in part to development that has taken place along parts of the right-of-way edges and the number of buildings that would have had to be removed.

A new 100-foot-wide right-of-way easement (1.7 acres) would be purchased adjacent to the proposed substation. With the existing 150-foot right-of-way along the Apalachia-East Cleveland #1 161-kV Transmission Line, this section of right-of-way near the proposed substation would then be 250 feet in width. This area would be used to accommodate the loop connections into the Northeast Benton 161-69-kV Substation and the possible future expansion of up to three additional 161-kV transmission lines into the substation. Additional new right-of-way would also be purchased to relocate the Ocoee #1-Etowah Switching Station 69-kV Transmission Line from over a highway bridge near the Etowah District Substation. Enhanced switches would be installed at the Huber Tap (Figure 1-1). Implementation of this alternative would meet the growing power needs in the project area, reduce service interruptions, eliminate voltage fluctuations, and provide capacity for future growth of the electrical load.

The proposed substation would be constructed to include a 161-69-kV 60/80/10 megavolt amperes transformer, three 161-kV circuit breakers, and two 69-kV circuit breakers. The proposed substation would be sized to accommodate the possible future expansion of up to three additional 161-kV transmission lines into the substation and the possible future installation of up to four capacitor banks.

Full-time System Control and Data Acquisition (SCADA), digital fault recorder, protective relays, and controls would be installed at the Northeast Benton 161-69-kV Substation. The protective relays, controls, and transmission line carrier equipment for the Apalachia-East Cleveland #1 161-kV Transmission Line, currently located at the Apalachia Hydro Plant and East Cleveland 161-kV Substation, would be retired and new digital relays, digital controls, and microwave radio communications equipment would be installed in their place.

A new microwave radio with a 50-foot antenna would be installed at the Northeast Benton 161-69-kV Substation to communicate SCADA information via Oswald Dome Repeater Station to East Cleveland 161-kV Substation. A new repeater radio would be added at the existing Oswald Dome Repeater Station to transmit data to East Cleveland 161-kV Substation.

At the Apalachia Hydro Plant, the digital relays would be tied into the existing microwave radio circuit and would transmit to East Cleveland 161-kV Substation via Oswald Dome Repeater Station.

At East Cleveland 161-kV Substation, the SCADA signals would be received on the microwave system and retransmitted on dual paths to the Power System Operations Center and the System Operations Center (SOC), which would be modified to complete the

communications path. Northeast Benton 161-69-kV Substation and transmission line connection point would be added to the system map board in the SOC and to the Supervisory Control Master.

Should the substation and transmission line need to be converted to a 161-kV system at a later date, the 69-kV transmission line loop into the substation would be retired and 1,000 feet of new 161-kV transmission line would be constructed in the proposed Northeast Benton 161-69-kV Substation 250-foot right-of-way expansion area. Additional 161-kV circuit breakers would then be installed at the substation.

2.3. Alternative Eliminated from Detailed Study - Build a Substation and Rebuild 12.4 Miles of the Ocoee #1-Etowah Switching Station 69-kV Transmission Line

Under this alternative, as described in Section 2.2.2 - Alternative 2, TVA would construct the proposed Northeast Benton 161-69-kV Substation as a second reliable power source to serve the Etowah area and install the necessary modifications at the Apalachia Hydro Plant, East Cleveland 161-kV Substation, Oswald Dome Repeater Station, Power System Operations Center, SOC, and the Supervisory Control Master. However, to improve the power supply to the Etowah area under this alternative, TVA would renovate 12.4 miles of the Ocoee #1-Etowah Switching Station 69-kV Transmission Line beginning at the proposed Northeast Benton 161-69-kV Substation and ending at the Etowah Switching Station. The transmission line would be maintained and operated at the present 69-kV standards and not upgraded to 161-kV standards. The cost of this alternative was comparable to Alternative 2; however, it would have potentially greater impacts as the proposed action due to the additional length of new transmission line, and it would not have allowed for a possible future upgrade of the project area's electric load supply to 161-kV. As a result, additional upgrades on the transmission line to 161-kV could be anticipated at a future date. For these reasons, this alternative was eliminated from further consideration.

2.4. Description of Construction, Operation, and Maintenance of the Proposed Transmission Line Rebuild and Substation

2.4.1. Transmission Line Construction

2.4.1.1. Right-of-Way Acquisition and Clearing

The proposed transmission line would be rebuilt on the existing transmission line centerline. TVA would purchase upgraded rights for the proposed transmission line from landowners from a pole line easement to standard structure rights for a 75-foot right-of-way. The current pole line easement does not limit the property owners' use of the area around the transmission line or include a defined right-of-way width. However, the existing transmission line easement is currently maintained or cleared along the easement to a width between 75 or 100 feet. The upgraded right-of-way easements would give TVA the right to construct, operate, and maintain the transmission line, as well as remove danger trees off the right-of-way. Danger trees are those trees that are located away from the cleared right-of-way, but that are tall enough to either pass within 5 feet of a conductor or strike a structure should it fall toward the transmission line. Fee title, i.e., ownership, for the land within the right-of-way remains with the landowner, and a number of activities may be continued on the property by the landowner. However, the easement agreement prohibits

certain activities such as the construction of buildings and any other activities within the right-of-way that could interfere with the transmission line or create a hazardous situation.

In addition to the upgraded right-of-way rights that would be purchased on the existing transmission line, a new 100-foot right-of-way easement (1.7 acres) would be purchased at the proposed Northeast Benton 161-69-kV Substation alongside of the existing 150-foot right-of-way of the Apalachia-East Cleveland #1 161-kV Transmission Line. This section of 250-foot right-of-way would then be used to loop the existing transmission lines into the substation and provide a location for three possible future transmission lines into the substation.

A new 75-foot right-of-way easement would also be purchased to relocate the existing Ocoee #1-Etowah Switching Station 69-kV Transmission Line from over a highway bridge near the Etowah District Substation.

Because of the need to maintain adequate clearance between tall vegetation and transmission line conductors, as well as to provide access for construction equipment, some reclearing of the existing right-of-way and newly identified danger trees may be required. Equipment used during this right-of-way clearing would include chain saws, skidders, bulldozers, 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 right-of-way 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. TVA Right-of-Way Clearing Specifications, Environmental Quality Protection Specifications for Transmission Line Construction, and Transmission Construction Guidelines Near Streams (Appendices II, III, and IV) would be followed in clearing and construction activities.

Subsequent to clearing and construction, the right-of-way would be restored as much as is 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 species. Erosion controls would remain in place until the plant communities become fully established. Streamside areas would be revegetated as described in Appendices II through IV.

2.4.1.2. Access Roads

Existing permanent access roads along the Ocoee #1-Etowah Switching Station 69-kV Transmission Line would be used for vehicle and equipment access to each structure and other points along the right-of-way during construction and maintenance. Twenty-six access roads totaling 4.4 miles were identified along the proposed transmission line and were included in the environmental field review. TVA would obtain the necessary rights for these access roads from landowners. These existing roads include farm and field roads, some of which may need upgrading. Access roads used for transmission lines are located on the right-of-way 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, they would be left or removed, depending on the wishes of the landowner or any permit conditions that might apply.

2.4.1.3. Construction Assembly Areas

A construction assembly area (laydown area) would be required for worker assembly, vehicle parking, and material storage. The proposed site identified for this project was previously used as a borrow area and is located 1 mile south of State Route (SR) 163 on the east side of U.S. Highway (US) 411 (Figure 1-1). This site is approximately 4 acres in size and would be leased for the duration of the construction period, approximately 28 months. Depending on site conditions, some minor grading and installation of drainage structures may be required. The area would be graveled and fenced to accommodate trailers used during the construction process for material storage and for temporary office space. Following the completion of construction activities, all trailers, unused materials, and construction debris would be removed from the site. Removal of the fence and restoration would be at the discretion of the landowner. No environmental impacts were identified with using this site as the construction assembly area, and no other site in the vicinity appears to have better features for such a use.

2.4.1.4. Structures and Conductors

The existing steel tower transmission line originally constructed in 1917 would be demolished. The steel would be recycled. Ceramic insulators in good condition would be either reused or disposed of as surplus material. Nonusable ceramic material would be discarded.

The transmission line conductors (the cables that carry the electrical current) are mostly aluminum but have steel strands imbedded in the cable for strength. Because the aging conductors are typically not suitable for reuse, the metal would be scrapped and recycled. Likewise, the steel overhead ground wires, or static wires, that are used for lightning protection would be recycled.

Following the demolition and removal of the existing structures, transmission line conductors, etc., single steel-pole structures would be constructed to support the new transmission line (Figure 2-1). Structure heights would vary according to the terrain and would average between 90 and 100 feet. At river or highway crossings, taller structures may be used in order to meet clearance requirements.



Figure 2-1. Single-Pole 161-kV Transmission Structures

Three conductors are required to make up a circuit in alternating current transmission lines. For 161-kV transmission lines, each conductor is made up of a single cable. The conductors are attached to fiberglass or ceramic insulators suspended from the structure crossarms. A smaller overhead ground wire is attached to the top of the structures. This ground wire may contain fiber-optic communication cables.

Poles at angles in the transmission line may require supporting guy wires. Most poles would be imbedded directly in holes augured into the ground to a depth equal to 10 percent of the pole's length plus an additional 2 feet. The holes would normally be back-filled with the excavated material. In some cases, gravel or a cement and gravel mixture might be necessary. Some structures may be self-supporting (nonguyed) poles fastened to a concrete foundation that is formed and poured into an excavated hole.

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

2.4.1.5. Conductor and Ground Wire Installation

Reels of conductor and ground wire would be delivered to various staging areas along the right-of-way, and temporary clearance poles would be installed at road and railroad crossings to reduce interference with traffic. Installation of conductors would begin with a small rope being pulled from structure to structure. This rope would then be connected to the conductor and ground wire and used to pull them down the line through pulleys suspended from the insulators mounted on the structures. A bulldozer and specialized tensioning equipment would be used to pull conductors and ground wires to the proper tension. Finally, the wires would be clamped to the insulators and the pulleys removed.

2.4.2. Operation and Maintenance

2.4.2.1. Inspection

Periodic inspections of TVA's transmission lines are performed from the ground and by aerial surveillance using a helicopter. These inspections, which occur on approximately 5-year cycles after operation begins, are conducted to locate damaged conductors, insulators, or structures, and to detect any abnormal conditions that might hamper the normal operation of the line or adversely impact the surrounding area. During these inspections, the condition of vegetation within the right-of-way, as well as immediately adjoining the right-of-way, is noted. These observations are then used to plan corrective maintenance or routine vegetation management.

2.4.2.2. Vegetation Management

Management of vegetation along the right-of-way would be necessary to ensure access to structures and to maintain an adequate distance between transmission line conductors and vegetation. The transmission line would be designed to meet a 24-foot minimum clearance as required by the National Electric Safety Code standards for a 161-kV transmission line.

Management of vegetation along the right-of-way would consist of two different activities: namely, the felling of danger trees adjacent to the cleared right-of-way, as described in Section 2.4.1.1, and the control of vegetation within the cleared right-of-way.

Management of vegetation within the cleared right-of-way would use an integrated vegetation management approach designed to encourage the low-growing plant species and discourage tall-growing plant species. A vegetation-reclearing plan would be developed for each transmission line segment based on the results of the periodic inspections described above. Given the land use in the area of this project, right-of-way maintenance is expected to be minimal. The two principal management techniques are mechanical mowing, using tractor-mounted rotary mowers, and herbicide application. Herbicides are normally applied in areas where heavy growth of woody vegetation is occurring on the right-of-way and mechanical mowing is not practical. Herbicides would be selectively applied from the ground with backpack sprayers or vehicle-mounted sprayers.

Any herbicides used would be applied in accordance with applicable state and Federal laws and regulations and the commitments listed in this document. Only herbicides registered with the United States Environmental Protection Agency (USEPA) would be used. A list of the herbicides and adjuvants (ingredients added to the herbicide solution to increase its effectiveness) currently used by TVA in right-of-way management is presented in Appendix V. This list may change over time as new herbicides are developed or new information on presently approved herbicides becomes available.

Other than vegetation management, little other maintenance work would normally be required. The transmission line structures and other components typically last several decades. In the event that a structure must be replaced, the structure would normally be lifted out of the ground by crane-like equipment and the replacement structure inserted into the same hole or an immediately adjacent hole. Access to the structures would be on existing roads. Replacement of structures may require leveling the area surrounding the replaced structures, but there would be little, if any, additional area disturbance when compared to the initial installation of the structure.

2.4.3. Substation Site Preparation

The proposed substation site would be cleared and graded to promote proper site drainage. A storm water permit would be obtained prior to initiation of grading. Best Management Practices or BMPs (Muncy, 1999) would be used to minimize erosion and sedimentation. Adequate fill material exists at the site to have a balanced cut and fill on the site. The substation yard would be stabilized with gravel, and the balance of the site would be revegetated.

2.4.4. Substation Structures and Equipment

At the proposed Northeast Benton 161-69-kV Substation, TVA would install a loop connection in the Apalachia-East Cleveland #1 161-kV Transmission Line. TVA would design and construct a standard substation capable of reducing the voltage from 161-kV to 69-kV. The substation would use a steel framework and buses (solid electrical connectors). Circuit breakers would provide protection for the high-voltage side. Other equipment would include isolating switches, grounding, lightning protection, a 161-69-kV transformer bank, protective relays, controls, full-time SCADA, and communication equipment that would allow remote operation. The substation would be equipped with two circuit breakers on the low-voltage (i.e., 69-kV) side of the transformers. This 69-kV power would then be delivered to the Etowah area over the Ocoee #1-Etowah Switching Station 69-kV Transmission Line.

To convert the 69-kV transmission line to 161-kV, additional 161-kV circuit breakers would need to be installed at the substation. In addition, the Ocoee #1-Etowah Switching Station 69-kV Transmission Line loop into the substation would be retired, and 1,000 feet of new 161-kV transmission line would be constructed within the proposed 100-foot right-of-way expansion at the substation site.

2.5. Project and Siting Alternatives

The process of siting this substation and transmission line adhered to the following basic steps used by TVA to determine a transmission line route:

- Determine potential existing power sources to supply the substation.
- Define the study area.
- Collect data to minimize potential impacts to cultural and natural features.
- Develop general route options and potential routes.
- Gather public input.
- Incorporate public input into the final identification of the transmission line route.

The proposed Northeast Benton 161-69-kV Substation would be used to provide another 161-69-kV power source for the 69-kV transmission line serving the Etowah area. The existing substandard transmission line would be rebuilt from the proposed substation location to the Etowah District Substation. The proposed substation and upgraded transmission line would be used to provide a second reliable power source to supply the various 69-kV substations in the Etowah, Tennessee, area. To accomplish this, the proposed substation would need to be located near to the source 161-kV transmission line and to the 69-kV transmission line it would feed in order to minimize the property easements required for the connections. In the proposed project area, only one transmission line crossing meets these criteria. The Apalachia-East Cleveland #1 161-kV

Transmission Line and the Ocoee #1-Etowah Switching Station 69-kV Transmission Line intersect near Antioch Church Road in Polk County, Tennessee. Four potential substation sites were identified for the proposed project; however, three of the sites were eliminated from further study because they would intrude on the airspace for two nearby airports. The remaining location consists of mostly pastureland that bordered a wetland area. This site would require more grading than the other locations, but it was determined that it would be an acceptable location for the proposed substation. In addition, the owner would be agreeable to the sale of this site.

2.6. Identification of the Preferred Alternative

Alternative 2: Build a Substation and Rebuild 9 Miles of 69-kV Transmission Line is TVA's preferred alternative for this proposed project. TVA would build the Northeast Benton 161-69-kV Substation with the associated upgrades to the Apalachia-East Cleveland #1 161-kV Transmission Line. TVA would also rebuild the existing Ocoee #1-Etowah Switching Station 69-kV Transmission Line between the Northeast Benton 161-69-kV Substation and the Etowah District Substation (Figure 1-1). The proposed substation and transmission line rebuild affects approximately 90.5 acres.

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CHAPTER 3

3. AFFECTED ENVIRONMENT

3.1. Introduction

Chapter 3: Affected Environment succinctly describes the existing condition of the environmental resources and factors of the McMinn and Polk Counties, Tennessee, project area that would affect or that would be affected by implementing either Alternative 1 or Alternative 2.

This description of the existing environment in Chapter 3, the description of the activities of Alternative 1: Do Not Upgrade Transmission Line (No Action) in Chapter 2 and the predicted effects of Alternative 1 in Chapter 4 combine to establish the baseline conditions against which the decision maker and the public can compare the potential effects of Alternative 2: Build A Substation and Rebuild 9 Miles of 69-kV Transmission Line.

3.2. Alternative 1 – Do Not Upgrade Transmission Line (No Action)

If TVA decided not to build the proposed substation or rebuild the existing transmission line, the current transmission capabilities would continue. Outage rates, measured as the average number of minutes a typical customer experiences in a year, would not improve. In addition, with current growth projections, an overloading of the transmission line system is likely due to the increasing load demands. This would result in an increase in system outages, especially at times of high electricity use.

3.3. Alternative 2 – Build a Substation and Rebuild 9 Miles of the Ocoee #1-Etowah Switching Station 69-kV Transmission Line (Action)

3.3.1. *Terrestrial Ecology*

3.3.1.1. **Terrestrial Plants**

The proposed project area lies within the Valley and Ridge Physiographic Province (Fenneman, 1938). The Valley and Ridge Province lies between the Blue Ridge Mountains and the Cumberland Plateau and is characterized by prominent, northeast-trending ridges and their associated valleys. The Tennessee River flows through this province, roughly paralleling the alignment of the valleys. The ridges are occasionally bisected by creeks or rivers flowing into the Tennessee River from adjacent provinces.

Botanically, the portion of the Valley and Ridge Physiographical Province spanned by the proposed project area coincides with the Ridge and Valley of the Oak-Chestnut Forest Region (Braun, 1950). Forests of this region have a large component of various oak, pine, and hickory species. More specifically, pines dominate the canopy in younger forests, with deciduous species replacing the pines in older stands. The deciduous components of these forests are characterized by southern red oak, white oak, red maple, sweet gum, sourwood, sassafras, tulip poplar, dogwood, and beech. Evergreen components of these forests in the project area include eastern red cedar, loblolly pine, and Virginia pine.

Generally, in this region the valleys and lower ridge slopes have been cleared for agricultural use. The broader valleys support the more productive farms. Lower slopes and some ridges have been cleared for pasture or hay production. Row crops are typically restricted to the broad valley floors. The ridges are forested, except for the occasional remote cove and ravine, although repeated timber harvests have occurred on most sites.

Plant communities observed in the project area include herbaceous field habitats, thickets intergrading to immature forest, stream and associated wetland (bottomland along creeks and rivers). In addition, less than 1 percent of the existing route lacks vegetation, being in existing roads and parking lots.

To service the transmission line route, 26 existing roads or access points have been identified along the existing transmission line route; therefore, no additional habitat alterations would be required. Herbaceous species found in the vicinity of most of the existing access roads include the lawn species Bermuda grass, crab grass, and fescue, as well as Johnson grass, sericea lespedeza, tall ironweed, and spreading sunflower. Some of the access roads that would require upgrades would be constructed through existing old fields comprised of Johnson grass, tall ironweed, purple top tridens, spreading sunflower, tall fescue, crab grass, and Bermuda grass. In addition, one access road located near the Etowah District Substation is comprised of both wetland species such as American elm, Chinese privet, winged elm, and sweet gum, as well as less hydric species such as redbud, honeysuckle, Johnson grass, and sericea lespedeza.

In addition to the proposed project transmission line route, substation, and access roads, an approximate 4-acre laydown area would be required during the construction of the proposed project. The identified area is currently a mowed grass/forbs area consisting mainly of crab grass, fescue, and Johnson grass with pockets of nonvegetated, exposed soil and/or gravel deposits.

Herbaceous field habitats occupy approximately 60 percent of the project area. This community is dominated by grasses. Old fields and lawns are most prevalent, while kudzu patches and hayfields are the least prevalent. Most of these areas are heavily dominated by Johnson grass, Bermuda grass, fescue, and crab grass. Additional grass species present include broom sedge, Indian grass, and purple top tridens. Several species of forbs also occur within this vegetation type including tall ironweed, spreading sunflower, common ragweed, sweet goldenrod, Queen Anne's lace, common dodder vine, dog fennel, sericea lespedeza, and partridge pea.

Thickets intergrading to immature forest occupy approximately 35 percent of the proposed project area. Characteristic species of this community are smooth sumac, southern mountain mint, spreading sunflower, downy lobelia, sericea lespedeza, Japanese honeysuckle, plume grass, butterfly weed, common ragweed, partridge pea, and blackberry. Tree species include tulip poplar, redbud, white ash, sweet gum, post oak, loblolly pine, and willow oak. In this community type along the existing easement, adjacent communities at most of the locations consist of more mature forests comprised of the same species of trees.

Stream and associated wetland communities occupy approximately 5 percent of the proposed project area. In forested areas, characteristic trees include green ash, sycamore, sweet gum, honey locust, winged elm, and American elm. Characteristic understory trees and woody perennials are silky dogwood, Chinese privet, and giant cane. Common

understory vines in these communities include Japanese honeysuckle, poison ivy, trumpet creeper, blackberry, and muscadine. Herbaceous species include false nettle, smartweed, flatsedge, and Japanese stilt grass. Nonforested areas are dominated by grasses, sedges, and forbs. Common species in these areas include spikerush, water plantain, groundnut, goldenrod, heal all, spreading sunflower, hollow Joe Pye weed, and tall ironweed.

The plant communities observed along the existing transmission line route, proposed substation, access roads, and laydown area are common and representative of the region. No uncommon plant communities were observed on the proposed project lands.

3.3.1.2. Invasive Plant Species

Native vegetation in the proposed project area has been extensively altered as a result of previous land use history (e.g., clear-cuts; grass-dominated areas maintained by mowing and grazing; roads). Invasive exotic plant species encountered along the proposed route include Johnson grass, crab grass, Bermuda grass, Chinese privet, Japanese honeysuckle, Japanese stilt grass, and sericea lespedeza. These species have the potential to impact native plant communities adversely because of their potential to spread rapidly and displace native vegetation.

3.3.1.3. Terrestrial Animals

Habitats observed in the proposed project area have been largely impacted by previous agricultural, forestry, and urban construction practices within the region. Two primary habitat types (early successional habitats and hardwood forests) were observed along the proposed transmission line corridor.

The existing transmission line route consists predominantly of early successional habitats with a combination of agricultural fields, pasturelands, old fields, clear-cuts, and residential areas. Wildlife species observed during field surveys include white-tailed deer, eastern cottontail, and black rat snake. Common bird species include red-tailed hawk, turkey vulture, killdeer, barn swallow, northern mockingbird, indigo bunting, eastern meadowlark, mourning dove, eastern bluebird, and American goldfinch. Other species commonly found in these habitats include eastern cottontail, house mouse, Virginia opossum, and big brown bat.

Several tracts of hardwood forest occur along the project corridor. White-tailed deer were observed within this habitat type. Common bird species encountered include eastern tufted titmouse, northern cardinal, yellow-billed cuckoo, American crow, blue jay, and Carolina chickadee. Other terrestrial animals likely to occur in forested areas include eastern cottontail, gray squirrel, eastern chipmunk, white-footed mouse, red bat, eastern mole, wild turkey, slimy salamander, ground skink, five-lined skink, black rat snake, and eastern box turtle.

No unusual or unique wildlife habitats, including caves, were observed in the immediate project area.

3.3.2. Threatened and Endangered Terrestrial Species

3.3.2.1. Terrestrial Plants

The TVA Natural Heritage database indicated that two federally listed plant species are reported from Polk County. Twelve Tennessee state-listed plant species have been reported from within 5 miles of the proposed substation, transmission line route, access roads, and laydown area (Table 3-1). TVA's Natural Heritage database catalogs information that TVA maintains about listed and sensitive species in coordination with the United States Fish and Wildlife Service (USFWS) and state agencies' Divisions of Natural Heritage.

Table 3-1. Federally and State-Listed Plant Species Reported From Within 5 Miles of the Proposed Transmission Line Route in McMinn and Polk Counties, Tennessee

Common name	Scientific name	Federal status	State status
American ginseng	<i>Panax quinquefolius</i>		S-CE
Ash-leaved bush-pea	<i>Thermopsis fraxinifolia</i>		THR
Bittercress	<i>Cardamine flagellifera</i>		THR
Catfoot	<i>Gnaphalium helleri</i>		SPCO
Dwarf filmy-fern	<i>Trichomanes petersii</i>		THR
Horsesugar	<i>Symplocos tinctoria</i>		SPCO
Lake quillwort	<i>Isoetes lacustris</i>		END
Naked-fruited rush	<i>Juncus gymnocarpus</i>		SPCO
Pink lady-slipper	<i>Cypripedium acaule</i>		E-CE
Ruth's golden aster	<i>Pityopsis ruthii</i>	END	END
Sweet pinesap	<i>Monotropsis odorata</i>		THR
White fringeless orchid	<i>Platanthera integrilabia</i>	C	END

Status abbreviations: S-CE = Special Concern Commercially Exploited; THR = Threatened; SPCO = Special Concern; END = endangered; E-CE = Endangered Commercially Exploited; C = Candidate

During field surveys, no occurrences of these or other rare plant species were observed on or immediately adjacent to the proposed substation, transmission line route, access roads, or laydown area.

3.3.2.2. Terrestrial Animals

The TVA Natural Heritage database indicated that twelve federally or Tennessee state-listed animal species have been reported from McMinn and Polk Counties, Tennessee (Table 3-2).

Table 3-2. Federally and State-Listed Terrestrial Animal Species Reported From McMinn and Polk Counties, Tennessee

Common name	Scientific name	Federal status	State status
Amphibian			
Eastern hellbender	<i>Cryptobranchus alleghaniensis alleghaniensis</i>	-	NMGT
Seepage salamander	<i>Desmognathus aeneus</i>	-	NMGT
Tennessee cave salamander	<i>Gyrinophilus palleucus</i>	-	THR
Bird			
Swainson's warbler	<i>Limnothlypis swainsonii</i>	-	END
Red-cockaded woodpecker	<i>Picoides borealis</i>	END	Extirpated
Mammals			
Woodland jumping mouse	<i>Napaeozapus insignis</i>	-	NMGT
Southern Appalachian woodrat	<i>Neotoma floridana haematoreia (floridana)</i>	-	NMGT
Smoky shrew	<i>Sorex fumeus</i>	-	NMGT
Southeastern shrew	<i>Sorex longirostris</i>	-	NMGT
Southern bog lemming	<i>Synaptomys cooperi</i>	-	NMGT
Reptiles			
Northern coal skink	<i>Eumeces anthracinus anthracinus</i>	-	NMGT
Northern pine snake	<i>Pituophis melanoleucus melanoleucus</i>	-	THR

Status abbreviations: NMGT = Deemed In Need of Management; THR = Threatened; END = Endangered;

Eastern hellbenders are found in large and mid-sized, fast-flowing, rocky rivers at elevations below 2,500 feet (Petranka, 1998). Hellbenders have been collected in the Hiwassee River near the existing transmission line crossing.

Seepage salamanders inhabit deciduous forests in and around seepages or in terrestrial habitats adjoining small streams (Petranka, 1998). Frequently found under moist leaf litter, this species has also been found beneath logs, moss mats, and other surface objects. There have been eight recorded occurrences of this species southeast of the transmission line in Polk County. All but two of these records are from within the Cherokee National Forest.

Tennessee cave salamanders inhabit caves and sinkholes within a few counties of eastern Tennessee. One population has been reported near Athens, Tennessee. No habitat for this species was observed in the project area.

Swainson's warblers nest in river cane and rhododendron thickets typically along rivers and streams. In East Tennessee, they have also been located in areas with dense deciduous

and coniferous saplings and occasionally cane (Nicholson, 1997). Swainson's warbler habitat occurs along the existing transmission line.

Red-cockaded woodpeckers inhabit old-growth pine stands. In Tennessee, they have been found nesting in stands of shortleaf, Virginia, and pitch pines. A colony of red-cockaded woodpeckers occurred near Parksville Reservoir in the late 1980s; however, the species is now considered extirpated from Tennessee.

Woodland jumping mice inhabit mesic habitats typically with dense herbaceous growth. They can be found in bogs and swamps (Linzey, 1998). Rhododendron-lined streams in the project area provide excellent habitat for this species.

Southern Appalachian woodrats typically occur among forested rock ledges in higher elevations. They are also known to occupy rocky, timbered regions and, to a lesser extent, swampy or open lands (Schwartz and Schwartz, 1981). No suitable habitat for this species was observed in the project study area.

Two protected shrews have been recorded from within the project area. Smoky shrews inhabit cool, damp hemlock and spruce forests as well as deciduous forests with a deep layer of leaf mold on the ground. They have also been taken in bogs and swamps (Linzey, 1998). Southeastern shrews are found in mostly moist situations in woods or fields (Linzey, 1998). All previous records of this species are from forested areas east of the existing transmission line. Although, no suitable habitat for smoky shrews was observed in the project study area, suitable habitat for southeastern shrews does exist.

Southern bog lemmings are usually found in boggy habitats such as moist areas in pastures, grassy openings in woods, clear-cuts, and transmission line rights-of-way (Linzey, 1983). This species has been reported from Mecca Bog in the Cherokee National Forest.

Northern coal skinks are located on humid hillsides typically near the vicinity of springs and rocky bluffs overlooking creek valleys (Conant and Collins, 1998). All coal skink records are from the higher elevations of Polk County.

Northern pine snakes inhabit sandy pine barrens, dry ridges, and hillsides. This species has been found in thickets dominated by Virginia pine, mountain laurel, and rhododendron. All records of this species are south or southeast of the existing transmission line. No suitable habitat for this species was observed in the study area.

No other federally or state-listed species or their habitats are expected to occur within the project area.

3.3.2.3. Aquatic Animals

The TVA Natural Heritage database indicated that several federally and Tennessee state-listed aquatic animal species are known to occur in the Hiwassee River in the vicinity of the proposed transmission line upgrade (Table 3-3). These species are also known to be present in larger tributary streams of the Hiwassee River. With the possible exception of Tennessee dace, habitat for these species is not present in the tributary streams crossed by the transmission line corridor, and the species, therefore, are not expected to be present.

Table 3-3. Federally and State-Listed Aquatic Animal Species Reported From McMinn and Polk Counties, Tennessee

Common name	Scientific name	Federal status	State status
Fish			
Highfin carpsucker	<i>Carpionodes velifer</i>	-	NMGT
Tangerine darter	<i>Percina aurantiaca</i>	-	NMGT
Blotchside logperch	<i>Percina burtoni</i>	-	NMGT
Snail darter	<i>Percina tanasi</i>	THR	THR
Tennessee dace	<i>Phoxinus tennesseensis</i>	-	NMGT
Snails			
Knotty elimia	<i>Elimia interrupta</i>	-	NOST
Smooth mudalia	<i>Leptoxis virgata</i>	-	NOST
A freshwater snail	<i>Somatogyryus sp 2</i>	-	NOST
Cohutta slitmouth	<i>Stenotrema cohuttense</i>	-	NOST
Mussels			
Tan riffleshell	<i>Epioblasma florentina walkerii</i>	END	END
Slabside pearl mussel	<i>Lexingtonia dolabelliformis</i>	C	NOST
Tennessee clubshell	<i>Pleurobema oviforme</i>	-	NOST
Cumberland bean	<i>Villosa trabalis</i>	END	END

Status abbreviations: NMGT = Deemed In Need of Management; THR = Threatened; NOST = On state list, but no state status assigned; END = Endangered; C = Candidate

3.3.3. Wetlands

Activities in wetlands are regulated under the Clean Water Act. Section 404 implementation requires authorization through either a Nationwide General Permit or an Individual Permit from the USACE in order to conduct specific activities in wetlands. Section 401 gives states the authority to certify whether activities permitted by the Federal government are in accordance with state water quality standards (Strand, 1997). Additionally, EO 11990 (Protection of Wetlands) provides that all Federal agencies should minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands, in carrying out the agency's responsibilities.

Wetland determinations were performed in the project area according to USACE standards (Environmental Laboratory, 1987), which require documentation of hydrophytic vegetation (Reed, 1997), hydric soil, and wetland hydrology. Broader definitions of wetlands, such as the classification of wetlands and deepwater habitats (Cowardin et al., 1979) used by the USFWS and the TVA Environmental Review Procedures (TVA, 1983), were also considered in this review.

Ten wetland areas, totaling 6.49 acres, were delineated in the project area (Table 3-4). One wetland, W01, occurs on the Northeast Benton 161-69-kV Substation site. One wetland (BSSW02) is located in both the Apalachia-East Cleveland #1 161-kV Transmission Line right-of-way and the Ocoee #1-Etowah Switching Station 69-kV Transmission Line easement. The remaining eight wetlands are located on the Ocoee #1-Etowah Switching Station 69-kV Transmission Line easement (Table 3-4). All but one of these occurs in existing transmission line right-of-way. The proposed widening of the right-of-way near the Etowah Substation would result in the inclusion of an additional 0.48 acre

of wetland. All of the wetlands identified in the proposed project area occur in floodplains, riparian zones, and headwater areas associated with tributaries of the Hiwassee River, including Pell Branch, Culpepper Branch, Conasauga Creek, and Cane Creek.

Table 3-4. Wetlands Located at the Northeast Benton 161-69-kV Substation Site or Within the Existing and Proposed Ocoee #1–Etowah Switching Station 69-kV Transmission Line (L3314) and Apalachia-East Cleveland Transmission Line (L5179) Rights-of-Way

Wetland identification	Wetland classification ¹	Watershed location	Approximate linear feet and acreage in right-of-way
W01	PEM1/PSS1	Floodplain/ Pell Branch / Substation site	1.84+ acres ²
BSSW02	PEM1/ PFO1A	Floodplain and unnamed tributary / Pell Branch / L3314 ³ and L5179 ⁴	427.6 feet / 0.74 acre and ~280 feet / 1.6 acre, respectively
BSSW03	PEM1/PSS1	Siccowee Branch headwaters / L3314	48.6 feet / 0.08 acre
BSSW05	PEM1/PSS1	Floodplain/ Culpepper Branch / L3314	194 feet / 0.33 acre
BSSW06	PSS1/PEM1	Floodplain/ Coleman Spring Branch / L3314	400 feet / 0.69 acre
BSSW07	PEM1	Wet-weather conveyance to Culpepper Branch / L3314	110.1 feet / 0.19 acre
BSSW08	PEM1	Floodplain/ Conasauga Creek / L3314	117.5 feet / 0.20 acre
BSSW09	PSS1	Floodplain/ Conasauga Creek / L3314	200 feet / 0.34 acre
BSSW10	PFO1	Floodplain/ Cane Creek / L3314 ⁵	203.4 feet / 0.35 acre
BSSW11	PEM1	Floodplain/ Cane Creek / L3314	76 feet / 0.13 acre

~ = approximately

¹As defined by Cowardin, et al. (1979). PEM = emergent; PSS = scrub-shrub; PFO = forested.

²Acreage calculated from surveyed wetland boundary.

³Acreage of wetlands in existing transmission line L3314 easement are calculated from surveyed easement intercept length multiplied by 75-foot width.

⁴Acreage of the wetland in the existing transmission line L5179 150-foot right-of-way and the possible future expanded 100-foot right-of-way section is calculated from surveyed right-of-way intercept length multiplied by the proposed 250-foot right-of-way width.

⁵This section is proposed new right-of-way.

Wetland BSSW02 lies within part of a large wetland that also includes Wetland W01 located at the Northeast Benton 161-69-kV Substation site. The majority of the BSSW02 wetland area is dominated by emergent and scrub-shrub vegetation that is grazed by cattle or

periodically mowed for right-of-way maintenance. Two transmission line structures are currently located within this wetland and would likely both be replaced with new structures. Within the wetland, a narrow band of trees along Pell Branch is classified as forested wetland on the National Wetland Inventory. The amount of past tree clearing and grazing impacts in the entire wetland has significantly reduced the size and the structural and functional quality of the forested section. In addition, the forested section meets only the USFWS wetland criteria and does not meet USACE parameters for a jurisdictional wetland. Impacts to this wetland would be limited to clearing approximately 0.1 acre of the forested section in order to expand the existing right-of-way.

Eight wetlands are located in the Ocoee #1-Etowah Switching Station 69-kV Transmission Line easement and are already periodically cleared by mowing and other methods during routine maintenance. These wetlands would continue to be periodically maintained under the proposed right-of-way project. There is an existing structure in Wetland BSSW03, which is in a sinkhole depression. No existing or proposed structures are located in Wetlands BSSW05, BSSW06, BSSW07, BSSW08, BSSW09, or BSSW11.

Wetland BSSW10 is located along a proposed new right-of-way alignment of the existing Ocoee #1-Etowah Switching Station 69-kV Transmission Line. Clearing the proposed new right-of-way alignment would convert approximately 0.35 acre of jurisdictional forested wetlands to emergent or scrub-shrub habitat.

Seven of the ten delineated wetlands in the proposed project area met USACE parameters for jurisdictional wetlands, which may be regulated under the Clean Water Act. Three of the wetland areas (BSSW07, BSSW08, BSSW09) are atypical situation wetlands according to the USACE criteria, and may not qualify as Federal or state jurisdictional wetlands. All of the delineated wetlands in the proposed project area would require a jurisdictional determination by USACE and Tennessee Department of Environment and Conservation (TDEC) before TVA could initiate any action that would occur in these areas.

The functions performed by the project area wetland include attenuation of flood flows, nutrient cycling, contaminant removal and transformation, sediment retention, wildlife habitat, and maintenance of biological and landscape diversity. The ecological and economic values provided by these functions include sustaining wildlife and aquatic resources, flood control, water quality improvement and maintenance, preservation of biodiversity, and ecosystem support (via nutrient cycling, biomass production, and nutrient export).

TVA has developed a version (TVARAM) of the Ohio Rapid Assessment Method (Mack, 2001) specific to the TVA region for use in guiding wetland mitigation decisions consistent with TVA's independent responsibilities under the National Environmental Policy Act and EO 11990. Only wetlands that would be subject to new disturbance were evaluated with TVARAM; wetlands already subject to routine right-of-way maintenance were not evaluated. The Ohio Rapid Assessment Method is designed to distinguish between three categories of wetlands. These are identified as Categories 1, 2, and 3.

Category 1 wetlands are described as "limited quality waters." They are considered to be a resource that has been degraded, has limited potential for restoration, or is of such low functionality, that lower standards for avoidance, minimization, and mitigation can be applied. One Category 1 wetland (BSSW12) was identified in areas likely to be affected by the proposed action.

Category 2 includes wetlands of moderate quality and wetlands that are degraded but could be restored. Avoidance and minimization are the first lines of mitigation. Two Category 2 wetlands were identified in areas that would be affected by the proposed action: Wetland W01 (which is part of a larger wetland that includes Wetland BSSW02) and BSSW10 (Table 3-4).

Category 3 generally includes wetlands of very high quality and wetlands that are of concern regionally and/or statewide, such as wetlands that provide habitat for threatened or endangered species. No Category 3 wetlands were identified in the areas affected by this proposed action.

3.3.4. Aquatic Ecology

Streams of the Ridge and Valley Physiographic Province typically have trellis (tributaries join at right angles) drainage patterns. Small streams are low to medium gradient with numerous riffles over chert gravel, limestone rubble and bedrock substrates interspersed with pool areas of silty sand. Larger rivers of the area also have extensive sand and gravel shoals. The relatively productive waters and frequently abundant vegetation supports a very diverse fish fauna (Etnier and Starnes, 1993).

The project and existing transmission line lie within the Hiwassee River watershed, crossing the river once. A TVA monitoring site at Hiwassee River Mile (HRM) 37.0, approximately six miles downstream of this crossing, collected 40 fish species and found the fish community rated as “fair/good” in June 1995. Sampling at the same site in May 2001 indicated the benthic invertebrate assemblage rated as “good.” These ratings were based on species diversity and the occurrence of species intolerant or tolerant of degraded conditions. Although no trout were collected in June 1995, the Tennessee Wildlife Resources Agency (TWRA) stocks trout in the Hiwassee River upstream and downstream of US 411. Trout probably also enter the river from other stocked tributaries in the Cherokee National Forest.

TVA has also evaluated fish and benthic invertebrate communities in Conasauga Creek and Cane Creek. The proposed project on the existing transmission line would cross both of these streams. Collections in Conasauga Creek at River Mile 29.8 in April 1995 found 21 fish species, which rated the fish community as “fair,” and a benthic invertebrate assemblage rated as “good.” Collections in Cane Creek in August 1999 at River Mile 6.7 found ten fish species, and the fish and benthic invertebrate assemblages were both rated as “fair.”

Twenty-four watercourse crossings were identified during a survey conducted in September 2004 (Appendix VI). Thirteen crossings of perennial streams were observed within the project area. Typically, perennial streams can support a permanent assemblage of aquatic life including invertebrates, reptiles, amphibians, and fish. The remaining 11 stream channels present within the project corridor are classified as ephemeral streams or wet-weather conveyances. These ephemeral streams typically only flow for approximately 24 to 48 hours after a rain event, receive negligible subsurface flow, and maintain weak to moderate bed and bank structure. These factors make it difficult for aquatic life to survive in these channels.

3.3.5. Managed Areas

The TVA Natural Heritage database indicated that the proposed substation and associated transmission line would cross two managed areas and that the construction laydown area would be located within one of these. In addition, one of these managed areas located in Polk County is also listed on the Nationwide Rivers Inventory (NRI). These two managed areas are as follows:

The existing transmission line crosses the Hiwassee River, which is designated as a State Scenic River and is listed on the NRI. From HRM 65 at the Tennessee-North Carolina state line to US 411 north of Benton (HRM 42.5), the river has been rated a Class III partially developed river area by TDEC. TDEC actively attempts to prevent the further loss of and improve the scenic aspects of the river's surroundings and to restore the quality of its water through acquisition, conservation easements, and other similar means. The section of river from the confluence with the Ocoee River (HRM 34) to the Tennessee-North Carolina state line (HRM 65) is listed on the NRI (0.7 mile west of the proposed substation) by the National Park Service for its scenic and recreational values. It is noted as a popular scenic float stream with numerous rapids.

The existing transmission line also crosses within the proclamation boundaries of Cherokee National Forest. The United States Forest Service (USFS) manages Cherokee National Forest for multiple uses including water quality, forest products, and recreation. Hiking, camping, driving for pleasure, horseback riding, swimming, boating, and whitewater sports are popular activities on these lands, which include areas of ecological, geological, and scenic importance. The proposed laydown area and the proposed substation are approximately 0.2 mile and 0.5 mile from the Cherokee National Forest, respectively.

Two additional managed areas are located within 3 miles of the proposed project area as follows:

The Cherokee (South) State Wildlife Management Area (WMA), a subunit of the Cherokee National Forest, is administered by the TWRA for the hunting of small and big game. It is 1.4 miles east of the existing transmission line and 1.5 miles east of the laydown area.

Gee Creek Wilderness Area/Gee Creek Wilderness Potential National Natural Landmark in Polk and Monroe Counties, Tennessee, is a subunit of the Cherokee National Forest. Managed by the USFS, this 2,493-acre area is a roadless area of rough mountains. It was designated as a National Wilderness Area by the United States Congress in 1975. The National Natural Landmark Program was established in the 1970s by the National Park Service to identify nationally significant examples of ecologically pristine or near pristine landscapes. This tract, while meeting the criteria for listing, has not to date been registered as a National Natural Landmark. It is 1.4 miles east of the transmission line and 1.5 miles east of the laydown area.

3.3.6. Recreation

Recreation resources, facilities, and activities within the project area include a glider airport about 2 miles from the proposed substation, the Hiwassee State Scenic River, a boat ramp on the upstream side of the US 411 bridge, Gee Creek Campground, Quinn Springs Recreation Area, the edge of the designated boundary of the Cherokee National Forest, and Conasauga Creek. These facilities support gliding, parasailing, canoeing, fishing (bank and boat), picnicking, and hiking.

3.3.7. Floodplains

The proposed Northeast Benton 161-kV Substation would be located at the northeast corner of US 411 and Antioch Church Road. The proposed laydown area for the project is located east of US 411 about 1 mile south of SR 163. Construction of the proposed Northeast Benton 161-69-kV Switching Station and laydown area would not involve work within the 100-year floodplain. The portion of the existing Ocoee Hydro #1-Etowah Switching Station 69-kV Transmission Line that would be rebuilt would cross the identified 100-year floodplain of the Hiwassee River and several minor floodplain areas in Polk County, and the identified 100-year floodplains of Conasauga and Cane Creeks and several minor floodplain areas in McMinn County.

3.3.8. Groundwater

Geologically, the transmission line right-of-way is underlain by Ordovician and Cambrian aged rocks of the Valley and Ridge aquifer (TDEC, 2002). The Valley and Ridge aquifer consists of folded and faulted carbonate, sandstone, and shale. Soluble carbonate rock and some easily eroded shale underlie the valleys in the province, and more erosion-resistant siltstone, sandstone, and cherty dolomite underlie ridges (Lloyd and Lyke, 1995).

Groundwater in the Valley and Ridge aquifers primarily is stored in and moves through fractures, bedding planes, and solution openings in the rocks. These aquifers are typically present in valleys and rarely present on the ridges. Most of the carbonate-rock aquifers are directly connected to sources of recharge, such as rivers or lakes, and solution activity has enlarged the original openings in the carbonate rocks. In the carbonate rocks, the fractures and bedding planes have been enlarged by dissolution of part of the rocks. Slightly acidic water dissolves some of the calcite and dolomite that compose the principal aquifers. Most of this dissolution takes place along fractures and bedding planes where the largest volumes of acidic groundwater flow (Lloyd and Lyke, 1995).

Groundwater movement in the Valley and Ridge Province is localized, restricted by the repeating lithology created by thrust faulting. Older rocks, primarily the Conasauga Group and the Rome Formation, have been displaced upward over the top of younger rocks (the Chickamauga and the Knox Groups) along thrust fault planes, thus forming a repeating sequence of permeable and less permeable hydrogeologic units. The repeating sequence, coupled with the stream network, divides the area into a series of adjacent, isolated, shallow groundwater flow systems. The water moves from the ridges where the water levels are high toward lower water levels adjacent to major streams that flow parallel to the long axes of the valleys. Most of the groundwater is discharged directly to local springs or streams (Lloyd and Lyke, 1995).

The carbonate rocks that form the valleys of the Valley and Ridge aquifer are typical of karst systems. The term karst refers to carbonate rocks (limestone and dolostone) in which groundwater flows through solution-enlarged channels and bedding planes within the rock. Karsts are characterized by sinkholes, springs, disappearing streams, and caves. Karst systems are quite easily contaminated, since the waters can travel long distances through conduits with no chance for natural filtering processes of soil or bacterial action to diminish the contamination (TDEC, 2002). The chemical quality of water in the freshwater parts of the Valley and Ridge aquifers is similar for shallow wells and springs. The water is hard, is a calcium-magnesium-bicarbonate type, and typically has a dissolved-solids concentration of 170 milligrams per liter or less. In places where the residuum that overlies the carbonate

rocks is thin, the Valley and Ridge aquifers are susceptible to contamination by human activities (USGS, 1995).

Sources for public water supply in the region are from both groundwater and surface water. There are several springs located near the proposed transmission line project. In Polk and McMinn Counties, groundwater sources for public water supply are far outside the vicinity of the project area. However, several noncommunity wells are used for drinking water in the area (TDEC, 2003). Total fresh groundwater withdrawals during 1995 from McMinn County, Tennessee, were about 2.52 million gallons per day and from Polk County 1.16 million gallons per day (USGS, 1995).

The project area is located near several springs. Most of these springs are located approximately 0.5 mile or more to the east of the existing transmission line easement, along the base of Starr Mountain, Chestnut Mountain, and Bean Mountain. Several other springs are located at least a mile or more to the west of the easement. At least one sinkhole is located along the existing transmission line east of US 411 and approximately 0.5 mile southwest of Kimsey Highway. A transmission line pole is currently located within a wetland which is in this sinkhole depression. Several other sinkholes are located just east of the existing transmission line.

3.3.9. Surface Water

Precipitation in the proposed project area averages about 58 inches per year with the wettest month in March at 6.3 inches and the driest month in October at 3.7 inches. The average annual air temperature is 57 degrees Fahrenheit (°F), ranging from a monthly average of 35°F in January to 76°F in July. Stream flow varies with rainfall and averages about 27 inches of runoff per year or approximately 2.0 cubic feet per second per square mile of drainage area.

The proposed project area drains to the Hiwassee River of the Tennessee River via direct runoff, Pell Branch, Siccowee Branch, and Conasauga Creek and its tributaries Cane Creek and Culpepper Branch. The Hiwassee River upstream of the Ocoee River is designated a State Scenic River and is highly utilized for rafting and canoeing. The Hiwassee River and Conasauga Creek are classified by the state (TDEC, 2004) for domestic and industrial water supply, fish and aquatic life, recreation, irrigation, livestock watering and wildlife, and as a trout stream. Conasauga Creek does not have the trout stream designation between Cog Hill Mill Dam and Ruralville Dam. The remaining streams are classified for fish and aquatic life, recreation, irrigation, and livestock watering and wildlife. The Hiwassee River in Bradley and McMinn Counties, several miles downstream of the project area, is on the state 303 (d) list as partially supporting its designated uses due to pathogens from agriculture.

3.3.10. Visual Resources

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

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

Landscape character gives a geographical area its visual and cultural image and consists of the physical, biological, and cultural attributes that make each landscape identifiable and unique. The general landscape character of the study area is described in this section with additional details in Section 4.3.10.

The rebuilt transmission line would begin at the proposed Northeast Benton 161-69-kV Substation on an existing easement and follow a northeasterly route traversing existing pasturelands and a few private residential driveways. As the transmission line route continues northeast, it would cross Boyd Road, traverse existing open pastureland, a few private residential driveways, cross the Hiwassee River, Savannah Shores Drive, and then Spring Creek Road. A variety of topographic features, ranging from relatively flat to mildly sloping along this portion of the transmission line route, would put views of the proposed transmission line and structures in the foreground for motorists traveling on US 411 and local road crossings. The traffic along US 411 and local roads is light and consists of area residents, a mixture of commercial vehicles, and tourists. Scenic attractiveness is common, and scenic integrity is moderate along the proposed transmission line route.

From Spring Creek Road to County Road (CR) 890 on existing right-of-way, the proposed transmission line route traverses railroad tracks, Gee Creek Road, Wilcox Lane, Stewart Street, England Road, CRs 875 (three times), 964, and 891 and CR 890 again. There are varieties of topographic features ranging from relatively flat to mildly sloping along this section of the route. The views from local roads would be in the foreground. The traffic along local roads is light and consists mainly of area residents.

The proposed rebuilt transmission line route would continue from CR 890 to the crossing of CR 495. It would then parallel CR 892, traverse CR 894, twice cross East Cemetery Road, CRs 905, 906, paralleling CR 908, cross CR 475, and parallel and cross CR 495 again. There are a variety of topographic features ranging from relatively flat to very steep along this section of the route. The views of the proposed transmission line and structures would be primarily from the homes of residents and from local roads and would be in the foreground. The traffic along local roads is light and consists mainly of area residents.

From the last crossing of CR 495, the transmission line route would continue on a new right-of-way section and traverse Cane Creek and SR 310 before it would turn sharply westward and then sharply northeast and end at the existing Etowah District Substation. There are varieties of topographic features ranging from steep slopes to relatively flat floodplain. The view of the proposed transmission line and structures would be from the local roads and SR 310. The traffic along local roads is light, and the traffic along SR 310 is moderate. Scenic attractiveness is common, and scenic integrity is moderate along this section of the transmission line route.

3.3.11. Cultural Resources

East Tennessee has been an area of human occupation for the last 12,000 years. This includes five broad cultural periods: Paleo-Indian (11000-8000 B.C.), Archaic (8000-1600 B.C.), Woodland (1600 B.C.-1000 A.D.), Mississippian (1000-1700 A.D.), and Historic (1700 A.D.-to present). Prehistoric land use and settlement patterns vary during each period, but short- and long-term habitation sites are generally located on floodplains and alluvial terraces along rivers and tributaries. Specialized campsites tend to be located on older alluvial terraces and in the uplands. In East Tennessee, during the seventeenth and eighteenth centuries, Europeans and Native Americans began interacting through the fur trading industry. European-American settlement increased in the early nineteenth century as the Cherokee were forced to give up their land. In 1819, McMinn County was established by the Tennessee Legislature, and 20 years later, neighboring Polk County, was established.

In McMinn County, the Hiwassee Railroad began construction of one of Tennessee's first railroads in 1837. With the arrival of the railroad came the new towns of Riceville, Sanford, and Mouse Creek, which developed on the line. The railroad proved to be a vital link for transporting troops and supplies between the lower and upper South during the Civil War. Following the war, the economy of McMinn County was poor; however, the railroad again spurred growth in the area. Jellico Junction and Etowah became new railroad towns with some 20 trains passing through Etowah daily. Soon the boom days of the railroad town were over as the county suffered severe economic hardship during the Great Depression. Following World War II, McMinn County experienced rapid growth and economic development as existing industries and businesses expanded and several corporations, including Bowater, the largest newsprint producer in the United States, established major plants in the area (Atkins and Wiggins, 1998).

Polk County's economy improved with the discovery of copper in Ducktown in 1843. Sustained development of the Copper Basin began in the late 1850s after transportation improvements and company consolidation. For example, many of the smaller mining companies were combined to form the Union Consolidated Mining Company. In 1865, 24 million pounds of copper was mined, and 50 square miles of the Copper Basin area was stripped of its timber to fuel smelters and build mines. During the Civil War, no battles were fought within the county. However, the county provided five companies for the Confederacy and two for the Union Army. After 1891, production by the open-roasting process of removing copper from the ore, an environmentally disastrous method, killed vegetation for miles and left the landscape open to erosion. In 1984, TVA and its partners initiated the Cooperative Copper Basin Land Reclamation Project to help remedy the devastation still apparent from the mining. It is estimated reclamation work in the Copper Basin will be completed in 2005. Today, TVA operates three hydroelectric plants on the Ocoee River and one on the Hiwassee River; TVA owns more than 3,000 acres of land in Polk County. Agriculture continues to be the major factor in the economy with the leading products being poultry, dairy products, cattle, hogs, soybeans, forestry products, and corn (Bailey, 1998).

The archaeological Area of Potential Effect (APE) is the geographic area or areas in which an undertaking either may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. This means all areas in which land-disturbing activities would take place, such as the proposed transmission line right-of-way, substation, laydown area, and access roads. The historic structures' APE are those areas from which the transmission line would be visible in a 0.5-mile radius. An archaeological and historic structures survey was conducted between June and October of 2004 for the

proposed Ocoee #1-Etowah Switching Station 69-kV Transmission Line and Northeast Benton 161-69-kV Substation in Polk and McMinn Counties, Tennessee.

3.3.11.1. Archaeological and Historic Sites

The archaeological survey identified four archaeological sites (40PK10, 40PK268, 40PK627, and 40MN48) located within the APE; two of these sites (40PK10 and 40PK268) were previously identified (D'Angelo and Karpynec, 2004). Sites 40PK268 and 40PK627 are prehistoric lithic scatters that contain no intact buried deposits. Both of these sites are unlikely to yield important information about human history and are recommended ineligible for listing in the National Register of Historic Places (NRHP). Site 40PK10 is a low-density lithic scatter situated on a natural levee and floodplain above the Hiwassee River. Site 40MN48 is a low-density lithic and ceramic scatter with artifacts collected from 4-16 inches below surface. Both sites are recommended potentially eligible for listing in the NRHP.

3.3.11.2. Historic Structures

For historic structures, the APE was determined to be those areas from which the transmission line would be visible within a 0.5-mile radius. A records' search revealed three NRHP-listed properties (Etowah Depot, Etowah Historic District, and Etowah Carnegie Library) and three previously recorded historic properties (PK113-115) are located within the proposed project's APE. As a result of adjacent modern development, the viewshed from the Etowah Depot, the Etowah Historic District, the Etowah Carnegie Library, or historic properties PK113-PK115 toward the proposed transmission line has been compromised. The historic architectural survey identified 37 previously unrecorded historic resources (HS1-HS37) within the proposed APE (D'Angelo and Karpynec, 2004). Additionally, the Etowah Commercial District and the TEPCO transmission line towers were evaluated for NRHP eligibility. The Etowah Commercial District is ineligible for listing in the NRHP due to the loss of integrity caused by alterations and damage. There are 22 miles of TEPCO transmission line structures that comprise the Ocoee #1-Etowah Switching Station 69-kV Transmission Line and are eligible for listing on the NRHP. The transmission line was constructed in 1917, and all of the original TEPCO towers that comprise the transmission line still exist.

CHAPTER 4

4. ENVIRONMENTAL CONSEQUENCES

4.1. Introduction

Chapter 4: Environmental Consequences and Chapter 3: Affected Environment form the detailed scientific and analytic basis for the summary comparisons presented in Chapter 2, Section 2.5 Project and Siting Alternatives.

Section 2.5 contains by option the predicted attainment and nonattainment of the purpose and need defined in Chapter 1. This chapter presents the detailed predicted effects of implementing Alternative 1: Do Not Upgrade Transmission Line (No Action) and Alternative 2: Build a Substation and Rebuild 9 Miles of 69-kV Transmission Line (Action).

4.2. Effects of Alternative 1: Do Not Upgrade Transmission Line (No Action)

In general, factors outside of TVA's control are expected to continue to influence the landscape of the region. These include reasonable foreseeable private and public activities associated with industrial and residential development and associated infrastructure.

Should the proposed substation not be constructed and the transmission line not be rebuilt, the TEPCO section of the Ocoee #1-Etowah Switching Station 69-kV Transmission Line would continue to be unreliable. Outages in the Athens supply transmission line to the project area would impact the project area. To maintain adequate voltages, the existing transmission line system would not support the load demands, and outages would be likely.

4.3. Effects of Alternative 2: Build a Substation and Rebuild 9 Miles of the Ocoee #1-Etowah Switching Station 69-kV Transmission Line (Action)

4.3.1. Terrestrial Ecology

4.3.1.1. Terrestrial Plants

No Action Alternative

Adoption of the No Action Alternative would not result in any project-related impacts to the terrestrial ecology of the region.

Action Alternative

No uncommon plant communities were encountered along the proposed project route. Because the vegetation occurring along the transmission line and on the substation site is common and representative of the region, project-related impacts to the terrestrial ecology of the region are expected to be insignificant as a result of the proposed Action Alternative.

4.3.1.2. Invasive Plant Species

No Action Alternative

Adoption of the No Action Alternative would not result in any project-related impacts due to the introduction or spread of invasive terrestrial plant species.

Action Alternative

The entire proposed project area has been altered by previous land use history. Therefore, any project-related impacts due to the introduction and spread of invasive terrestrial plant species are expected to be insignificant as a result of the proposed Action Alternative.

4.3.1.3. Terrestrial Animals

No Action Alternative

Under the No Action Alternative, the Northeast Benton 161-69-kV Substation and associated Ocoee #1-Etowah Switching Station 69-kV Transmission Line would not be constructed, and the project area would likely remain in its current state. Therefore, terrestrial animals and their habitats would not be affected.

Action Alternative

The majority of the proposed project area consists of fragmented and previously disturbed habitats; therefore, the construction of the proposed substation and the rebuilding of the associated transmission line would displace very little wildlife. Also, because the work to complete this project would take place mostly within the existing transmission line easement, the proposed project would not increase the loss and fragmentation of forested habitats.

4.3.2. Threatened and Endangered Species

4.3.2.1. Terrestrial Plants

No Action Alternative

No project-related impacts to rare plant species would result from the adoption of the No Action Alternative.

Action Alternative

No occurrence of federally or state-listed plant species were encountered in or adjacent to the proposed project substation, transmission line route, access roads, or laydown area. Therefore, no impacts to any federally or state-listed plant species are anticipated as a result of the proposed action.

4.3.2.2. Terrestrial Animals

No Action Alternative

Under the No Action Alternative, the proposed substation and transmission line would not be constructed, and the project area would likely remain in its current state. Therefore, this alternative would not result in adverse impacts to protected terrestrial animal species or their habitats.

Action Alternative

The TVA Natural Heritage database indicated four state-listed species are reported from within a 3-mile radius of the proposed substation and transmission line.

Suitable habitat for Tennessee cave salamanders, seepage salamanders, red-cockaded woodpeckers, southern Appalachian woodrats, smoky shrews, woodland jumping mice, northern coal skinks, and northern pine snakes does not occur along the transmission line. Therefore, these species were excluded from further analysis.

Eastern hellbenders have been found in the Hiwassee River near the transmission line crossing. Sedimentation could occur in the Hiwassee River as a result of erosion during construction of Structures 152 and 153. This could potentially result in impacts to this species. The use of erosion control measures and other BMPs at this stream crossing would eliminate impacts to this and other aquatic species.

Habitat typical of Swainson's warblers was found along the transmission line corridor. The closest location record of this species occurs from an island within the Hiwassee River approximately 2.7 miles from the existing transmission line. Low quality habitat for the Swainson's warbler occurs at the existing transmission line crossing of the Hiwassee River. Better quality habitat exists at the transmission line crossing of a small Hiwassee River tributary near proposed Structure 189. Since the right-of-way would not be expanded at this crossing, no habitat would be destroyed.

Southeastern shrews and southern bog lemmings can be located in moist fields. The Northeast Benton 161-69-kV Substation would be built in a wet pasture near Antioch Church Road. This site is presently degraded due to cattle grazing and extensive exotic plant growth. The construction of this substation would destroy potential habitat for these two species. However, due to the degraded state of the habitat at this site, these impacts are expected to be minimal and insignificant.

No federally listed terrestrial species were identified on or near identified transmission line routes, and no effect on such species is anticipated.

4.3.2.3. Aquatic Animals

No Action Alternative

Under the No Action Alternative, the Northeast Benton 161-69-kV Substation and associated Ocoee #1-Etowah Switching Station 69-kV Transmission Line would not be constructed, and the project area would likely remain in its current state. Therefore, aquatic animals and their habitats would not be affected.

Action Alternative

No federally or state-listed aquatic species would be directly affected by the construction, operation, and maintenance of the proposed substation and transmission line upgrade. This proposed action could indirectly affect local populations of aquatic animals in the Hiwassee River, if it resulted in an increased sediment load or other changes in physical habitat of the affected streams. Increased sediment loading, extensive disruption of the canopy cover, or changes in the water temperature could disrupt or eliminate nearby populations of these species.

However, because the proposed project would be a transmission line rebuild on an existing transmission line easement and because the new transmission line structures at the Hiwassee River crossing would be located farther from the river, with BMPs and stream protection measures as described in Section 4.3.9, no impacts to protected aquatic animals or to the viability of any aquatic species' populations in the project area are anticipated as a result of the proposed project.

4.3.3. Wetlands

No Action Alternative

Adoption of the No Action Alternative would not result in any project-related impacts to wetlands. The proposed project would not be constructed, and the project area would likely remain in its current state. The wetlands located at the proposed Northeast Benton 161-69-kV Substation site and at the new transmission line alignment of the Ocoee #1-Etowah Switching Station 69-kV Transmission Line near Etowah would not be disturbed. The remaining wetlands identified in the affected project area are located in the existing transmission line rights-of-way. These areas would continue to be periodically cleared by mowing and other methods to keep the rights-of-way free from tall, woody vegetation that could interfere with the transmission lines.

Action Alternative

Wetland W01 lies within the proposed Northeast Benton 161-69-kV Substation site. To support a temporary transmission line structure that would be placed outside of the wetland, guy wires would be temporarily placed in the wetland area. Guy wire placement in the wetland would be authorized under USACE Nationwide Permit #12. The guy wires would be removed and preconstruction conditions would be restored following project completion. The impacts of temporary guy wire placement would be minor and insignificant with the implementation of BMPs. Potential indirect impacts to Wetland W01 include sedimentation and contaminants from storm water runoff, increased volume and rate of storm water runoff, and litter. These impacts would be avoided by site design specifications and implementing appropriate pre- and post-construction BMPs.

Wetland BSSW02 lies within both of the transmission line rights-of-way and is part of a large wetland that includes Wetland W01. The widening of the existing Ocoee #1-Etowah Switching Station 69-kV Transmission Line right-of-way would result in the inclusion of an additional 0.48 acre of wetland in the right-of-way. Also, two structures are currently located within the wetland of the existing Ocoee #1-Etowah Switching Station 69-kV Transmission Line right-of-way. These structures would be replaced at the same location with one 3-pole angle structure that would turn the transmission line section into the substation loop. At the edge of the wetland, an additional 3-pole angle structure to turn the substation loop toward Etowah and back into the existing transmission line would be required. These actions would be authorized under USACE Nationwide Permit #12. The forested wetland impacts were determined to be insignificant because of the small size of the area of impact (less than 0.1 acre) and the diminished functional quality of the forested section of the wetland. Overall impacts to this wetland were also determined to be insignificant because, except for the trees along the banks of Pell Branch, no new vegetation clearing would be required, appropriate BMPs would be implemented, and all Federal and state permit conditions would be met.

Eight wetlands are located in the Ocoee #1-Etowah Switching Station 69-kV Transmission Line proposed right-of-way and are already periodically cleared by mowing or other methods during routine right-of-way maintenance. Impacts to these right-of-way emergent wetlands and emergent/scrub-shrub wetlands are expected to be minor and insignificant with implementation of BMPs (Muncy, 1999), TVA Environmental Quality Specifications, minimization of vehicle or equipment entry into the wetlands, and compliance with any applicable Federal and state permits.

Wetland BSSW10 is located along a proposed new right-of-way alignment of the existing Ocoee #1-Etowah Switching Station 69-kV Transmission Line. Clearing the proposed new right-of-way alignment would convert approximately 0.35 acre of jurisdictional forested wetlands to emergent or scrub-shrub habitat. Activities in this wetland may be conducted under Nationwide Permit #12. Impacts to this wetland were determined to be insignificant because of the small total area of impact (less than 0.5 acre) and the absence of any factors such as a rare or critical habitat, sensitive ecological feature, or the presence of any state- or federally listed as threatened or endangered species.

4.3.4. Aquatic Ecology

No Action Alternative

Under the No Action Alternative, the proposed project would not be constructed, and the project area would likely remain in its current state. Therefore, aquatic ecology would not be affected.

Action Alternative

Watercourses in the project area considered to convey only surface water during storm events (i.e., wet-weather conveyances or ephemeral streams) would be protected by standard BMPs as identified in Muncy (1999). These BMPs are designed to minimize erosion and subsequent sedimentation in streams. Appendix VI lists the approximate locations of wet-weather conveyances.

With the exception of the Hiwassee River, perennial streams and their riparian habitats that occur within the project area would qualify for Standard Stream Protection (Category A) as designated by TVA Transmission Construction Guidelines Near Streams (Muncy, 1999). The Standard Stream Protection designation is based on the variety of species and habitats that exist in intermittent and perennial streams and the state and Federal requirements to avoid harming them. Criteria for the Standard Stream Protection designation included evidence of aquatic life and/or the presence of a well-defined channel with rock or soil substrate. Because the Hiwassee River harbors trout and is recognized as an important regional recreational resource, it would qualify for Protection of Important Permanent Streams (Category B). SMZ width is determined by category and slope of land adjacent to the stream (Muncy, 1999). Streams identified for Standard Stream Protection and Protection of Important Streams along the proposed transmission line right-of-way and the SMZ boundaries as determined from the surveyed project centerline are noted in Appendix VI.

By following the appropriate stream protection requirements on streams identified in Appendix VI, the design, construction, and maintenance of the proposed project would not result in significant impacts to aquatic life. Support structures are normally located as far as possible from surface waters to minimize water-related impacts. All construction and

maintenance work, especially near streams, would be conducted following the requirements and recommendations presented in TVA's guidelines for environmental protection during transmission line construction (Muncy, 1999).

Road access to transmission line construction sites would be planned and constructed to minimize erosion and sedimentation effects. Use of existing access points would reduce access-related impacts. If no practicable alternative exists, trees along streams within the transmission line corridor and danger trees adjacent to the corridor would be cut; however, their stumps would not be removed, and understory vegetation would be disturbed as little as possible. These initial clearing/felling activities (including danger trees) within the SMZ areas along streams would be accomplished by using either hand-held equipment or other appropriate clearing equipment (e.g., feller-buncher), which would result in minimal soil disturbance and damage to low-lying vegetation. During transmission line maintenance activities, trees and other vegetation within the SMZ would be controlled with backpack-applied, spot-use herbicide to remove tree seedlings and other regrowth. Maintenance activities along streams would be by mechanical cutting or by selective use of USEPA-registered herbicides. Permanent and temporary stream crossings would comply with appropriate Federal and state permitting requirements as well as any applicable designations and BMPs. Where herbicides are used, these chemicals would be applied following USEPA label restrictions and TVA BMPs.

Invasive Aquatic Species

No Action Alternative

Adoption of the No Action Alternative would not result in any project-related impacts due to the introduction or spread of invasive aquatic species.

Action Alternative

Due to the nature of this action, there would likely be no potential impacts from invasive aquatic animal species.

4.3.5. Managed Areas

No Action Alternative

Under the No Action Alternative, the substation would not be built, the associated transmission line would not be rebuilt, and no laydown yards would be required. Therefore, no impacts would occur to the Managed Areas or to the NRI-listed stream in this area.

Action Alternative

Under the Action Alternative, the proposed substation would be built. Because the distances from the proposed substation are sufficient (approximately 0.5 mile west of the proclamation boundaries of Cherokee National Forest and 0.7 mile east of the NRI listed and State designated Scenic Hiwassee River), no impacts to these areas are anticipated as a result of building the substation.

Also under the Action Alternative, the existing transmission line would be rebuilt and would cross the Hiwassee River. Because the Hiwassee River at the transmission line crossing is designated both as a State Scenic River and as an NRI stream, BMPs for stream crossings would be followed to avoid impacts to this river (Muncy, 1999). Potential impacts to the scenic qualities of the Hiwassee River as a result of the taller transmission line structures

would be reduced compared to those of the existing 69-kV transmission line by placing the new structures farther from the Hiwassee River. The south structure would be approximately 360 feet and north structure approximately 200 feet from the Hiwassee River's edge. The new structures would initially be brighter than the existing structures, but would become less contrasting over time as they weather and the finish becomes a darker gray. The length of the transmission line span across the river would increase to 820 feet, and the height of the transmission line sag (the point at which the conductors are closest to the ground or water) would increase by 12.5 feet. With these design measures, no significant impacts to the scenic qualities of the Hiwassee River are anticipated.

The proposed transmission line would also pass within the proclamation boundaries of the Cherokee National Forest. Because the proposed project would be a rebuild of an existing transmission line, with an existing easement and access roads, impacts to this area are anticipated to be minimal and temporary, and no lands owned by the USFS would be affected.

The proposed laydown area would also be located in the proclamation boundaries of the Cherokee National Forest. Because this site has already been disturbed by previous use, no impacts are anticipated as a result of the proposed project.

Because the distance from the Gee Creek Wilderness Area/Gee Creek Potential National Natural Landmark and Cherokee (South) State WMA to the proposed substation, transmission line, and laydown area is sufficient, no impacts to this area are anticipated as a result of the proposed project.

4.3.6. Recreation

No Action Alternative

Under the No Action Alternative, the proposed project would not be constructed, and the project area would likely remain in its current state. Therefore, recreation would not be affected.

Action Alternative

Because the proposed substation would not be in close proximity to any public recreation resources and it would be aligned with the take-off and landing patterns of the glider airport, there would be no impact on recreation. Because Gee Creek Campground and Quinn Springs Recreation Area are 3,000 feet and 5,000, respectively, from the existing transmission line, there would be no significant impacts to campers or day users of these facilities. However, there could be some temporary minor impacts as a result of road closures during the transmission line placement above the roads that lead to these facilities.

The public ramp at the US 411 bridge should not be impacted. In addition, only temporary, insignificant impacts to the recreation use of the State Scenic River are anticipated as a result of structure placement adjacent to the Hiwassee River. From Old Patty Road to Conasauga Creek, the transmission line would run along the edge of the Cherokee National Forest proclamation boundary; however, there are no trailheads or other developed facilities that would be impacted. Any impacts associated to the recreation use of Conasauga Creek would be considered insignificant and temporary. The overall direct, indirect, and cumulative impacts to public recreation resources, facilities, and activities as a

result of implementation of the proposed project are anticipated to be temporary and insignificant.

4.3.7. Floodplains

No Action Alternative

Under the No Action Alternative, the proposed Northeast Benton 161-69-kV Substation and associated Ocoee #1-Etowah Switching Station 69-kV Transmission Line would not be constructed, and the project area would likely remain in its current state. Therefore, no floodplains would be affected.

Action Alternative

Under the Action Alternative, construction of the proposed Northeast Benton 161-69-kV Substation and laydown area would not involve work within the 100-year floodplain, which would be consistent with EO 11988. The existing transmission line rebuild would cross several floodplain areas. Rebuilding the transmission line could involve the replacement of existing structures or construction of new structures in the 100-year floodplain. Under EO 11988, an overhead transmission line and related support structures are considered a repetitive action in the 100-year floodplain. The construction of the support structures would not be expected to result in any increase in flood hazard either due to increased flood elevations or in changes in flow-carrying capacity of the streams being crossed. To minimize adverse impacts on natural and beneficial floodplain values, the right-of-way would be revegetated where natural vegetation is removed and the removal of unique vegetation would be avoided. BMPs would be used during construction activities. The TVA subclass review criteria for transmission line location in floodplains would be followed to ensure floodplain impacts would be minimized.

4.3.8. Groundwater

No Action Alternative

Under the No Action Alternative, the proposed project would not be implemented, and the project area would likely remain in its current state. Therefore, groundwater would not be affected.

Action Alternative

Under the Action Alternative, BMPs as described in Muncy (1999) would be used to avoid contamination of groundwater in the proposed project area. Construction activities would seek to avoid springs as practicable. Structures that would be located on or next to sinkholes would be subject to a Class V Underground Injection Control Permit. A transmission line pole is currently located within a wetland that is in this sinkhole depression. The proposed transmission line structure for the rebuilt transmission line would be moved approximately 248 feet from the edge of the wetland to higher ground and would be located well away from the sinkhole depression; therefore, no structures would be located on or next to sinkholes.

Contaminants such as herbicides and fertilizers could easily be transported to groundwater by storm water runoff. During revegetation and maintenance activities, fertilizers and herbicides would be avoided in areas that flow to springs or would be used sparingly to avoid contamination of groundwater. With the use of these BMPs, impact on groundwater from this action would be insignificant.

4.3.9. Surface Water

No Action Alternative

Under the No Action Alternative, the proposed project would not be constructed. Therefore, no surface waters would be affected.

Action Alternative

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

However, TVA routinely includes precautions in the design, construction, and maintenance of its transmission line projects to minimize these potential impacts. Permanent stream crossings 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). 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 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.

4.3.10. Visual Resources

No Action Alternative

Under the No Action Alternative, the proposed project would not be constructed. Therefore, no visual impacts would occur.

Action Alternative

Visual consequences are examined in terms of visual changes between the existing landscape and proposed actions, sensitivity of viewing points available to the general public, their viewing distances, and visibility of proposed changes. Scenic integrity indicates the degree of intactness or wholeness of the landscape character. These measures help identify changes in visual character based on commonly held perceptions of landscape beauty and the aesthetic sense of place. The foreground, middleground, and background viewing distances were previously described in Section 3.3.10 Visual.

Visual/aesthetic impacts from the construction, operation, and maintenance of the rebuilt transmission line would be insignificant. The new structures and transmission lines would replace existing towers and transmission lines for most of the route. Views of the rebuilt transmission line by motorists and others would differ from those of the existing line because the structures would be taller, and both the structures and conductors would be brighter. Consequently, they would be visible from longer distances. The new structures and conductors would become less contrasting over time as they weather and the finish becomes a darker gray. The incremental changes to area views would contribute to

reduced visual coherence and harmony. However, these changes are not individually significant.

The proposed Northeast Benton 161-69-kV Substation would be briefly viewed by the few motorists along Antioch Church Road. These views would be visually similar to towers and other structures seen along the existing transmission line route north of Antioch Church Road. The transmission lines and structures along this portion of the route would be partially obscured from US 411 by existing vegetation growing along the right-of-way fence line for a short distance, then would be visible in the foreground from US 411 due to the open pastureland with intermittent screening by existing plant material.

Most of the land in this area is open pastureland characterized by few homes located sparsely along minor, lightly traveled roadways.

The new transmission line would cross Boyd Road and continue to the Hiwassee River. Views of the new transmission line by the few area residents would be from homes and the Boyd Road and Kingsley Road crossings by motorists and would be in the foreground. There are few homes in this area and views for area residents would be intermittent among dense vegetative cover and obscured by elevation differences in the landscape. Views of the transmission line along US 411 by motorists would be in the foreground. These views are of mostly rural landscape seen under the transmission lines and between poles. The new transmission line may be seen briefly by recreation users along the Hiwassee River. These views would be under the much higher transmission lines, minimizing the potential for reduction in visual quality, particularly in the immediate foreground. Motorists along US 411 would briefly view the new transmission line as it crossed the Hiwassee River.

After crossing the Hiwassee River, the new transmission line would cross Savannah Shores Drive and Spring Creek Road. Views of the transmission line by the few area residents would be from their homes and the road crossings and would be in the foreground. There are few homes in this area and views for area residents would be intermittent among vegetative cover. Views of the transmission line along US 411 by motorists would be in the foreground. These views are of mostly rural landscape seen under the transmission lines and between poles.

The transmission line would continue past Spring Creek Road to CR 890 on existing right-of-way with several road crossings. The road crossings would be separated by wide expanses of dense vegetative cover, occasional open pastureland, and very few homes. Views of the new transmission line by area residents would be in the foreground, mainly from road crossings and would be of short durations. The views of the proposed transmission lines and structures by motorists traveling on US 411 are obscured by vegetation and topographical features.

After crossing CR 890, the transmission line would continue to the crossing of CR 495 through intermittent dense woodlands, small pasturelands, local road crossings, and residential neighborhoods. Views of the new transmission line by area residents would be in the foreground. The new transmission lines and structures would parallel some local roads. The replacement of the existing towers with new taller structures would increase the vertical adverse contrast in the foreground; however, with potentially fewer poles, there would be less of an overall impact.

The transmission line would continue from the CR 495 crossing to the existing Etowah District Substation. Much of this portion of the transmission line would be on new right-of-way. Views of the new transmission line would be brief by motorists along SR 310. Although the right-of-way in this area would be cleared of existing trees, these views would provide a small amount of visual contrast due to the vertical profile of the existing tree line.

Operation, construction, and post-construction maintenance activities such as right-of-way clearing, structure, and transmission line maintenance for the proposed project would be visually insignificant. There may be some minor visual discord during the construction and subsequent post-construction maintenance period due to an increase in personnel and equipment and the use of laydown and materials storage areas. These minor visual obtrusions would be temporary until the right-of-way and laydown areas have been restored through the use of TVA standard BMPs (Muncy, 1999). Therefore, impacts to visual resource associated with this project would be insignificant.

4.3.11. Cultural Resources

The Phase I cultural resources survey and report of the proposed Ocoee #1-Etowah Switching Station 69-kV Transmission Line, substation, access roads and laydown area found:

- Archaeological sites 40PK10 and 40PK48 were determined eligible for listing in the NRHP. Measures would be put into place to avoid affecting these sites adversely during the construction of the transmission line. Such measures would include: No transmission line structures would be placed within the sites' boundaries; only equipment with low-pressure tires would be used when traversing the sites; and all work would be conducted when the ground conditions are dry and firm. These protective measures are described in more detail in Section 4.8 and in a Memorandum of Agreement between TVA and the Tennessee SHPO signed in January 2005 (Appendix I).
- HS1-HS37, PK113-PK115, and the Etowah commercial district are not eligible for listing in the NRHP due to lack of unique architectural features and modifications to the original structures, which undermines their integrity.
- The Etowah Depot and the Etowah Historic District would be visually affected, but not adversely, because the viewsheds have already been compromised by a commercial building. The viewsheds would be partially shielded by mature tree growth, and the undertaking would not affect these properties' architectural integrity.
- There would be no effect to the Etowah Carnegie Library because the viewshed has already been compromised by a commercial building and would also be partially shielded by mature tree growth.
- The existing TEPCO transmission line structures would be adversely impacted since the proposed project would demolish 9 miles of these transmission line structures. Pursuant to Section 106 of the NHPA and its implementing regulations, at 30 CFR Part 800, TVA has coordinated with the Tennessee State Historic Preservation Officer (SHPO) and outlined measures to minimize these adverse effects to the Ocoee #1-Etowah Switching Station 69-kV Transmission Line corridor. These measures are summarized below and described in more detail in a Memorandum of

Agreement between TVA and the Tennessee SHPO signed in January 2005 (Appendix I).

1. Photographs of two views of an A-frame tower, including both overall views and details, would be taken.
2. Archival negatives and archival, 4x5, black-and-white prints would be provided to the Tennessee SHPO.
3. An Index to Photographs of the views taken would be provided to the Tennessee SHPO.
4. Background research would be conducted to document the history of the towers.
5. A copy of an original schematic drawing of the A-frame towers indicating design measurements would be provided to the Tennessee SHPO.

4.4. Post Construction Impacts

4.4.1. *Electric and Magnetic Fields*

TVA recognizes there is public concern about whether any adverse health effects are caused by electric and magnetic fields (EMF) that result from generation, transmission, distribution, and use of electricity. Many scientific research efforts and other studies that examine the potential health and other effects of EMF have been and are being done. TVA is aware of, and ensures that it stays aware of, published research and study results and directly supports some of the research and study efforts.

Studies, interpretations, and research to date are far from conclusive about potential associations between EMF and possible health impacts. A few studies have been interpreted as suggesting a weak statistical relationship between EMF and some rare forms of cancer. During the summer of 2001, the International Association for Research on Cancer reviewed available epidemiological studies and concluded that childhood leukemia appears to be associated with magnetic fields but that there was not a cause-and-effect relationship. It was concluded that the risk is small but may in some circumstances of higher exposure result in one type of childhood leukemia. The association also concluded that electric fields do not have a connection with cancer.

However, equal or greater numbers of similar studies show no association or cannot reproduce data interpreted as demonstrating an association. No laboratory research has found cause-and-effect health impacts from EMF and certainly none that are adverse. Neither has any concept of how these fields could cause health effects achieved scientific consensus.

There is also no agreement in the scientific or EMF-research community as to what if any electric or magnetic field parameters might be associated with potential health effects. There are no scientifically or medically defined safe or unsafe field strengths, although state regulatory bodies in Florida and New York have established edge of right-of-way magnetic field strength limits for 230-kV and larger power transmission lines.

TVA has analyzed and continues to analyze the fields associated with its typical line designs using the best available models and has measured actual fields for a large number of locations along its transmission line easements. Both model data and measurements show that the field strengths for TVA transmission lines are well within Florida and New York limits. Based on such models, expected field strengths for the proposed lines discussed in this document would also be within those existing state guidelines.

TVA's standard location practice has the effect of minimizing continuous public exposures to transmission line EMF. The transmission line route selection team uses a constraint model that places a 300-foot radius buffer around occupied buildings except schools, for which a 1,200-foot buffer is used. The purpose of these buffers is to reduce potential land use conflicts with yard trees, outbuildings, and ancillary facilities and potential visual impacts as well as exposures to EMF. Although not absolute location constraints, these buffers weigh heavily in location decisions, influencing selection of route options and alignments. Because EMF diminishes quickly with distance from the conductors, the routing of transmission lines using constraint buffers effectively reduces potential continuous public exposure to EMF. Crossing under lines or otherwise being near them for short periods may increase overall EMF exposure but only minutely.

4.4.2. Other Impacts

No significant impacts are expected to result from the relatively short-term activities of construction, such as noise, solid waste, etc. Appendices II and III contain procedures for dealing with these issues.

4.5. Irreversible and Irretrievable Commitment of Resources

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

The rights-of-way used for the transmission lines would not be irreversibly committed and could be returned to other uses upon retirement of the line. In the interim, compatible uses of the right-of-way could continue.

Forest products and related wildlife that might have grown on the presently forested portions of the right-of-way would be lost for the life of the project. No locally or regionally significant lost forest or agricultural production would be expected.

4.6. Unavoidable Adverse Effects

After completion of the transmission line:

- Trees would not be permitted to grow within the right-of-way or to a determined height adjacent to the right-of-way that would endanger the transmission line.
- Clearing and construction would result in the disruption of some wildlife, but no permanent habitat changes would occur except in the wooded areas previously described.

- Any burning of cleared material would result in some short-term air pollution.
- Clearing, tree removal, and excavation for pole erection would result in a small amount of localized siltation.
- Transmission line visibility would be minimized through the location; however, there would be some degree of visual effect on the landscape in the project area.

4.7. Relationship Between Local Short-Term Uses of the Environment and Long-Term Productivity

The construction and operation of the proposed transmission line would supply electricity to meet the present and foreseeable expected loads in the Etowah area of McMinn and Polk Counties. This would be accomplished by a localized shift of a small amount of land to use for electric power transmission. If, during the useful life of the transmission line, it is no longer needed or technology renders it obsolete, it can be removed with relatively little difficulty. The land encumbered by the right-of-way could be returned to its previous use or used for other purposes.

The principal change in short-term use of the right-of-way would be the exclusion of trees and permanent structures. Because the project would involve the rebuilding of a transmission line on an existing pole line easement, no forested areas would be impacted. In addition, no forested areas would be impacted at the proposed substation site which is a previously disturbed location. The right-of-way cannot support building construction for the life of the project, but the social and economic benefits of the project should outweigh this small loss.

4.8. Summary of TVA Commitments and Proposed Mitigation Measures

To support the preceding conclusions, TVA would commit to the following additional actions to avoid or mitigate possible environmental impacts:

Protection of Aquatic Resources

- With the exception of the Hiwassee River, all perennial watercourse crossings would be designated as Category A, Standard Stream Protection, as outlined in Muncy (1999). The Hiwassee River would be designated Category B, Protection of Important Permanent Streams (Muncy, 1999).
- Watercourses that convey only surface water during storm events (i.e., wet-weather conveyances or ephemeral streams) and that could be affected by the proposed transmission line route would be protected by standard BMPs as identified in Muncy (1999). These BMPs are designed to minimize erosion and subsequent sedimentation in streams.

Cultural Resources

- TVA, in consultation with the SHPO and other concurring parties, would ensure that adverse effects to historic properties determined eligible for listing in the NRHP

would be avoided whenever prudent and feasible. The following measures would be taken to avoid adverse effects to historic properties:

1. TVA would avoid locating any transmission line structure, substation, or infrastructure within the identified boundaries of NRHP-eligible archaeological sites.
 2. Sensitive archaeological areas within the transmission line's right-of-way would be noted on the transmission line's Plan and Profile sheets that are used in construction and maintenance operations. Any special conditions placed on that area for construction and maintenance of the transmission line would be detailed on these sheets.
 3. To the extent practicable, TVA would avoid locating any transmission line structure, substation, or infrastructure within the viewshed of identified NRHP-eligible or NRHP-listed historic structures. Such measures would include: No transmission line structures would be placed within the sites' boundaries; only equipment with low-pressure tires would be used when traversing the sites; and all work would be conducted when the ground conditions are dry and firm.
- TVA would ensure that the silhouette of the transmission line would be minimized as much as practicable to ensure the undertaking does not further compromise the visual setting of the Etowah Depot and the Etowah Historic District, as in the use of single-pole steel structures within the boundaries of the Etowah Depot and the Etowah Historic District and within the viewsheds of historic structures.
 - The following measures would be taken to mitigate adverse effects (i.e., demolition) to the 9 miles of the TEPCO 69-kV transmission line from the Northeast Benton 161-69-kV Substation to the Etowah District Substation:
 1. Photographs of two views of an A-frame tower, including both overall views and details, would be taken.
 2. Archival negatives and archival, 4x5, black-and-white prints would be provided to the Tennessee SHPO.
 3. An Index to Photographs of the views taken would be provided to the Tennessee SHPO.
 4. Background research would be conducted to document the history of the towers.
 5. A copy of an original schematic drawing of the A-frame towers indicating design measurements would be provided to the Tennessee SHPO.
 - Should there be changes in the project design that could adversely affect NRHP-eligible or listed properties, TVA, in consultation with the SHPO and other concurring parties, would develop and implement an archaeological data recovery plan for eligible archaeological sites that cannot be feasibly avoided by the transmission line, substation, or infrastructure construction.

General Best Management Practices for Clearing, Construction, and Maintenance

TVA practices detailed in Appendices II, III, IV, V, and Muncy (1999) would be used during clearing, construction, and maintenance. EO 13112 directs all Federal agencies to prevent and control the introduction and spread of invasive species resulting from their activities. TVA would use reseeding mixes that are certified free of invasive, exotic plant seeds when replanting disturbed areas.

CHAPTER 5

5. SUPPORTING INFORMATION

5.1. List of TVA Preparers

John T. Baxter

Position: Biologist - Aquatic
Involvement: Threatened and Endangered Species - Aquatic Animals

W. Nannette Brodie

Position: Environmental Specialist, Professional Geologist
Involvement: Groundwater

J. Leo Collins

Position: Senior Botanist
Involvement: Terrestrial Ecology - Terrestrial Plants; Threatened and Endangered Species - Terrestrial Plants

Jimmy P. Groton

Position: Contract Wetlands Biologist
Involvement: Wetlands

John M. Higgins

Position: Water Quality Specialist
Involvement: Surface Water

George M. Humphrey

Position: Land Use and Recreation Specialist
Involvement: Recreation

Marianne M. Jacobs

Position: Archaeologist Technician
Involvement: Cultural Resources

Marvin Jarrett

Position: Environmental Engineer - Siting and Environmental Design
Involvement: Purpose of and Need for Action; Alternatives Including Proposed Action

Anita E. Masters

Position: Senior NEPA Specialist
Involvement: NEPA Compliance and Document Preparation

Allen Miller

Position: Civil Engineer - Siting and Environmental Design
Involvement: Project and Siting Alternatives

Roger A. Milstead

Position: Floodplain Specialist
Involvement: Floodplains

David T. Nestor

Position: Contract Biologist
Involvement: Terrestrial Ecology - Terrestrial Plants; Threatened and Endangered Species - Terrestrial Plants

W. Chett Peebles

Position: Senior Landscape Architect
Involvement: Visual

Don Richardson

Position: Contract Landscape Architect
Involvement: Visual

Eric D. Romaniszyn

Position: Contract Aquatic Biologist
Involvement: Aquatic Ecology

Barbara Rosensteel

Position: Contract Wetlands Biologist
Involvement: Wetlands

Jan K. Thomas

Position: Contract Natural Areas Specialist
Involvement: Managed Areas

Allan J. Trently

Position: Contract Zoologist
Involvement: Terrestrial Ecology - Terrestrial Animals; Threatened and Endangered Species - Animals

W. Richard Yarnell

Position: Archaeologist
Involvement: Cultural Resources

5.2. List of Agencies and Persons Consulted

Federal Agencies

U.S. Army Corp of Engineers, Nashville, Tennessee
U.S. Fish and Wildlife Service, Cookeville, Tennessee

State Agencies

Tennessee Conservation League, Nashville
Tennessee Department of Agriculture, Nashville
Tennessee Department of Economic and Community Development, Nashville
Tennessee Department of Environment and Conservation, Nashville
Tennessee Department of Transportation, Nashville
Tennessee Historical Commission, Nashville
Tennessee Wildlife Resources Agency, Nashville

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APPENDIX I – CORRESPONDENCE

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September 21, 2004, Correspondence From Deputy Commissioner for Tennessee
Department of Agriculture

Marvin N. Jarrett
Tennessee Valley Authority
Transmission Line Projects
Siting and Environmental Design Department
1101 Market Street, MR 4G-C
Chattanooga, Tennessee 37402-2801

SEP 21 2004

Benton/Etowah Area Power Improvement Project

Dear Mr. Jarrett:

This is in reference to Tennessee Valley Authority's project that was mailed to me on
September 3, 2004.

The project as described by the project summary creates no incompatibility in our area of
planning at this time.



Signature

DEPUTY COMMISSIONER

Title

Tennessee Department of Agriculture
Agency

440 Hogan Rd.

Address

Nashville, Tennessee 37220

Undated Correspondence From Director of Special Projects for Tennessee Economic and Community Development

Marvin N. Jarrett
Tennessee Valley Authority
Transmission Line Projects
Siting and Environmental Design Department
1101 Market Street, MR 4G-C
Chattanooga, Tennessee 37402-2801

Benton/Etowah Area Power Improvement Project

Dear Mr. Jarrett:

This is in reference to Tennessee Valley Authority's project that was mailed to me on September 3, 2004.

The project as described by the project summary creates no incompatibility in our area of planning at this time.

Wilton Burnett Jr.
Signature

DIR. OF SPECIAL PROJECTS
Title

TN ECD
Agency

312 8TH AVE. N., 11TH FLR
Address

NASHVILLE, TN 37243-0405

Undated Correspondence From Transportation Manager for Tennessee Department of Transportation

Marvin N. Jarrett
Tennessee Valley Authority
Transmission Line Projects
Siting and Environmental Design Department
1101 Market Street, MR 4G-C
Chattanooga, Tennessee 37402-2801

Benton/Etowah Area Power Improvement Project

Dear Mr. Jarrett:

This is in reference to Tennessee Valley Authority's project that was mailed to me on September 3, 2004.

The project as described by the project summary creates no incompatibility in our area of planning at this time.

Dee Hart
Signature

Trans. Manager
Title

TDOT
Agency

Suite 900
James K. Polk Bldg.
Address

Nash. TN 37243

September 24, 2004, Correspondence From Fish and Wildlife Environmentalist for
Tennessee Wildlife Resources Agency



TENNESSEE WILDLIFE RESOURCES AGENCY

ELLINGTON AGRICULTURAL CENTER
P. O. BOX 40747
NASHVILLE, TENNESSEE 37204

September 24, 2004

Marvin N. Jarrett
Tennessee Valley Authority
Transmission Line Projects
Siting and Environmental Design Department
1101 Market Street, MR 4G-C
Chattanooga, TN 37402-2801

Re: Comments Concerning the Proposed Rebuild of a 161-kV Switching Station and 69-kV
Transmission Line in Polk and McMinn Counties

Dear Mr. Jarrett:

The Tennessee Wildlife Resource Agency requests that the proposed rebuild of a 161-kV switching station and 69-kV transmission line in Polk and McMinn Counties be constructed using BMP's, minimizing impacts to sensitive wetland areas within the project footprint during the removal and installation of transmission poles, spanning the Hiwassee River and the Conasauga Creek, and maintaining a 50-foot vegetative buffer on all rivers and creeks. These vegetative buffers provide bank stabilization and refuge areas for amphibians. The Hiwassee River and Conasauga Creek are inhabited by several rare (some are listed species) amphibians, crustaceans, fishes, and mollusks.

Thank you for the opportunity to comment on this project.

Sincerely,

A handwritten signature in cursive script that reads "Robert M. Todd".

Robert M. Todd
Fish and Wildlife Environmentalist

cc: Bobby Brown
Clarence Coffey
USFWS, EPA, WPC

The State of Tennessee

AN EQUAL OPPORTUNITY EMPLOYER

Memorandum of Agreement Between Tennessee Valley Authority and the Tennessee State Historic Preservation Officer - Page 1 of 11

MEMORANDUM OF AGREEMENT
PURSUANT TO 36 CFR PART 800 BETWEEN THE TENNESSEE VALLEY AUTHORITY AND
THE TENNESSEE STATE HISTORIC PRESERVATION OFFICER

WHEREAS, the Tennessee Valley Authority (TVA) proposes to construct a 161-kV transmission line (TL) with a 9 mile long and 100 ft wide right-of-way (ROW) easement to replace the existing Ocoee Hydro #1 – Etowah 69-kV switching station TL and includes construction of the Northeast Benton 161-kV switching station; and

WHEREAS, TVA's preferred routing for the proposed TL from the Etowah substation to the proposed Benton substation is depicted in Figure 1; and

WHEREAS, TVA has determined that the construction of the Etowah-Benton TL and substation will have an effect upon the existing 22 miles of the Tennessee Electric Power Company (TEPCO) 69-kV TL located in Polk and McMinn Counties, as well as the potential to affect other historic properties that are eligible for inclusion in the NRHP; and

WHEREAS, TVA has consulted with the Tennessee State Historic Preservation Officer (SHPO) pursuant to 36 CFR Part 800, the regulations of the Advisory Council on Historic Preservation (Council) implementing Section 106 of the National Historic Preservation Act (NHPA) (16 U.S.C. 470f); and

WHEREAS, TVA has also consulted with the Eastern Band of Cherokee Indians and the Muscogee (Creek) Nation of Oklahoma; the Eastern Band of Cherokee Indians and the Muscogee (Creek) Nation of Oklahoma are concurring parties to this Agreement; and

WHEREAS, TVA in consultation with the SHPO has determined that the proposed TL and substation would have an adverse effect on the existing 22 miles of the TEPCO 69-KV TL since the proposed project would demolish approximately 9 miles of that line; and

WHEREAS, the proposed TL also has the potential to affect archaeological resources 40PK10 and 40MN48, which are both potentially eligible for listing in the NRHP; and

WHEREAS, the area of potential effect (APE) of the proposed Etowah-Benton TL route and substation, and historic properties eligible for or listed in the NRHP within the APE are clearly delineated in "Documentation of Identified Historic Properties" and the report titled *Phase I Cultural Resources Survey of the Proposed TVA Etowah-Benton 161-KV Transmission Line and Substation, Polk and McMinn Counties, Tennessee* and these documents are made a part of this Agreement by reference as Appendices A and B respectively; and

NOW THEREFORE, TVA and the SHPO agree that the undertaking shall be implemented in accordance with the following stipulations in order to take into account the effect of the undertaking on historic properties.

Stipulations

TVA shall ensure that the following stipulations are carried out:

1. IDENTIFICATION:

- a. Phase I archaeological and historic architectural surveys have been conducted for the proposed TL ROW and substation. Should the proposed TL and substation be altered in the course of design within the designated ROW, TVA, in consultation with the SHPO and other concurring parties, shall conduct a survey to identify any previously unrecorded historic properties within the revised APE. The survey shall be carried out in a manner

Memorandum of Agreement Between Tennessee Valley Authority and the Tennessee State Historic Preservation Officer - Page 2 of 11

consistent with the Secretary of the Interior's Standards and Guidelines for Identification (48 FR 44720-23) and the Tennessee SHPO Standards and Guidelines for Architectural and Archaeological Resource Management Studies. TVA shall submit draft and final reports to the SHPO and all concurring parties for comment within a thirty (30) day period.

2. EVALUATION:

TVA, in consultation with the SHPO and other concurring parties, shall conduct investigations to evaluate the significance of the following historic resources:

- a. Only those archaeological sites which have been determined potentially eligible for listing in the NRHP and would be adversely affected by the construction of the TL, substation, and its accompanying infrastructure; and
- b. Only those above-ground historic resources which have not been previously evaluated or require further evaluation.

Should potentially eligible archaeological sites be adversely affected, a Phase II site evaluation shall be conducted in a manner consistent with the Secretary of the Interior's Standards and Guidelines for Identification (48 FR 44720-23) and the SHPO Standards and Guidelines for Architectural and Archaeological Resource Management Studies. The SOW will be developed in consultation with the SHPO and other concurring parties prior to the implementation of the survey. TVA shall submit draft and final reports to the SHPO and all concurring parties for comment within a thirty (30) day period.

Properties which have been evaluated and have been found to meet NRHP criteria shall be considered historic properties. Should a dispute arise on the eligibility of a historic property, TVA will consult with the SHPO to resolve the objection. If TVA and the SHPO do not agree, or if the Council or the Secretary of the Interior (Secretary) so request, TVA shall obtain a determination of eligibility from the Secretary pursuant to 36 CFR Part 63. If an Indian tribe that attaches religious and cultural significance to a property off tribal land does not agree, it may ask the Council to request the TVA Federal Preservation Officer to obtain a determination of eligibility.

3. TREATMENT PLAN:

a. AVOIDANCE:

TVA, in consultation with the SHPO and other concurring parties, shall ensure that adverse effects to historic properties determined eligible for listing in the NRHP shall be avoided whenever prudent and feasible. The following measures shall be taken to avoid adverse effects to historic properties:

1. TVA will avoid locating any TL structure, substation, or infrastructure within the identified boundaries of NR eligible archaeological sites.
2. Sensitive archaeological areas within the TL's ROW will be noted on the line's Plan and Profile sheets that are used in construction and maintenance operations. Any special conditions placed on that area for construction and maintenance of the line would be detailed on these sheets.
3. TVA will to the extent practicable avoid locating any TL structure, substation, or infrastructure within the viewshed of identified NR eligible or listed historic structures.

Memorandum of Agreement Between Tennessee Valley Authority and the Tennessee State Historic Preservation Officer - Page 3 of 11

b. HISTORIC STRUCTURES MITIGATION:

The following measures shall be taken to minimize and mitigate adverse effects to historic properties:

1. TVA will ensure that the silhouette of the TL will be minimized as much as practicable to ensure the undertaking does not further compromise the visual setting of the Etowah Depot and the Etowah Historic District, as in the use of single pole steel structures within the boundaries of the Etowah Depot and the Etowah Historic District and within the viewsheds of historic structures.
2. The following measures shall be taken to mitigate adverse effects (i.e. demolition) to the 9 miles of the TEPCO 69-kV TL from the Benton Substation to the Etowah Substation:
 - a. Photographs of two views of an A-frame tower, including both overall views and details, will be taken.
 - b. Archival negatives and archival, 4x5, black-and-white prints will be provided to the Tennessee SHPO.
 - c. An Index to Photographs of the views taken will be provided to the Tennessee SHPO.
 - d. Background research will be conducted to document the history of the towers.
 - e. A copy of an original schematic drawing of the A-frame towers indicating design measurements will be provided to the Tennessee SHPO.

c. ARCHAEOLOGICAL DATA RECOVERY:

Should there be changes in the project design that could adversely affect NRHP eligible or listed properties, TVA, in consultation with the SHPO and other concurring parties, shall develop and implement an archaeological data recovery plan for eligible archaeological sites that cannot be feasibly avoided by the TL, substation, or infrastructure construction.

4. REPORTS:

TVA shall ensure that all historical and archaeological investigations undertaken for compliance with this Agreement are recorded in formal written reports that meet the Secretary of Interior's Standards and Guidelines for Identification (48 FR 44720-23) and the Tennessee SHPO Standards and Guidelines for Architectural and Archaeological Resources Management Studies.

The SHPO and other concurring parties shall be afforded thirty (30) days to review and comment on any archaeological or historical reports submitted by TVA in accordance with this Agreement.

5. CHANGES IN PROJECT DESIGN:

Should any changes to the project occur subsequent to this agreement, TVA will determine the new APE in consultation with the TN SHPO, identify historic properties within the APE, and further consult with the TN SHPO and other concurring parties.

6. TREATMENT OF HUMAN REMAINS:

- a. Whenever feasible, the preferred treatment of Native American human remains and non-Native American human remains shall be preservation in place. TVA shall assess revisions in the proposed TL design and construction methods to determine whether

Memorandum of Agreement Between Tennessee Valley Authority and the Tennessee State Historic Preservation Officer - Page 4 of 11

preservation *in situ* is feasible. Whenever TVA determines that preservation of Native American human remains *in situ* is not feasible, TVA will seek the opinion of concurring Indian tribes regarding TVA's determination.

b. When preservation in place is not feasible, TVA, in consultation with the SHPO and other concurring parties shall ensure that the treatment of any human remains discovered within the project area complies with all state and federal laws, including the Native American Graves Protection and Repatriation Act (NAGPRA), concerning archaeological sites and treatment of human remains. Should human remains be encountered during historic properties investigations or post-review discovery, all ground disturbing activities will be ceased immediately.

TVA shall immediately notify the Polk or McMinn County Coroner, the State Archaeologist, the TN SHPO, the Eastern Band of Cherokee Indians, and the Muscogee (Creek) Nation of Oklahoma should any human remains and/or associated funerary objects be encountered in connection with the undertaking covered by this Agreement. TVA will notify all concurring parties within forty-eight (48) hours and invite them to comment on any plans developed to treat the human remains. TVA, in consultation with the SHPO and other concurring parties, shall ensure that those remains be treated in a manner that is consistent with the Advisory Council on Historic Preservation's "Policy Statement Regarding the Treatment of Human Remains and Grave Goods" (1988), and in accordance with Tennessee Code Annotated (T.C.A.) 46-4-101 et seq. "Termination of Use of Land as a Cemetery," and T.C.A. 11-6-116b, "Notification and Observation," and T.C.A. 11-6-119 "Reinterment" with implementing Tennessee Rules and Regulations Chapter 0400-9-1 "Native American Indian Cemetery Removal and Reburial."

7. TIMETABLE FOR COMPLIANCE

a. Consistent with Stipulation 5, TVA shall ensure that the identification, evaluation and treatment of historic properties are implemented in consultation with the SHPO and other concurring parties prior to any changes in the project design.

b. The SHPO and other concurring parties shall have thirty (30) days upon receipt to review and comment on all reports of investigation and treatment plans.

8. ADMINISTRATIVE CONDITIONS

a. If Stipulations 1 - 7 have not been implemented within three (3) years from the date of this Agreement's execution, this Agreement shall be considered null and void, unless the concurring parties have agreed in writing as provided in Paragraph 8.b. below to an extension for carrying out its terms. Upon this Agreement becoming null and void, TVA, the SHPO, and other concurring parties will resume consultation pursuant to 36 CFR Part 800.

b. If Stipulations 1 - 7 have not been implemented within three (3) years from the date of this Agreement's execution TVA, the SHPO, and other concurring parties shall review the Agreement to determine whether the Agreement should be extended. If an extension is deemed necessary, TVA, the SHPO, and other concurring parties will consult in accordance with 36 CFR Part 800.6(c) to make appropriate revisions to the Agreement.

c. The signatories to this Agreement may agree to amend the terms of the Agreement. Such amendment shall be effective upon the signatures of both signatories to this Agreement, and the amendment shall be appended to the Agreement as an attachment.

d. Should any consulting party object within thirty (30) days after receipt of any documents provided for review pursuant to this Agreement, TVA shall consult with the objecting party to resolve the objection.

Memorandum of Agreement Between Tennessee Valley Authority and the Tennessee State
Historic Preservation Officer - Page 5 of 11

e. If either signatory to this Agreement determines that the terms of the Agreement cannot be carried out, the signatories shall consult to seek an amendment to the Agreement. If the Agreement is not amended, either signatory may terminate the Agreement. TVA shall either execute a new Agreement pursuant to 36 CFR Part 800.6(c)(1) or request the comments of the Council pursuant to 36 CFR Part 800.7(a).

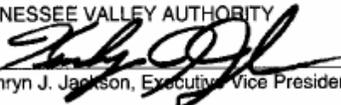
Memorandum of Agreement Between Tennessee Valley Authority and the Tennessee State Historic Preservation Officer - Page 6 of 11

MEMORANDUM OF AGREEMENT
PURSUANT TO 36 CFR PART 800 BETWEEN THE TENNESSEE VALLEY AUTHORITY AND
THE TENNESSEE STATE HISTORIC PRESERVATION OFFICER
ETOWAH-BENTON 161-KV TRANSMISSION LINE, MCMINN AND POLK COUNTIES

Execution of this Agreement by TVA and the SHPO, and implementation of its terms, evidence that TVA has taken into account the effects of the undertaking on historic properties, and TVA has complied with its obligations under Section 106 of NHPA.

SIGNATORIES:

TENNESSEE VALLEY AUTHORITY

By: 
[Kathryn J. Jackson, Executive Vice President, RSO&E]

Date: 1.24.05

THE TENNESSEE STATE HISTORIC PRESERVATION OFFICER

By: 
Date: 1/27/05

Memorandum of Agreement Between Tennessee Valley Authority and the Tennessee State
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MEMORANDUM OF AGREEMENT
PURSUANT TO 36 CFR PART 800 BETWEEN THE TENNESSEE VALLEY AUTHORITY AND
THE TENNESSEE STATE HISTORIC PRESERVATION OFFICER
ETOWAH-BENTON 161-KV TRANSMISSION LINE, MCMINN AND POLK COUNTIES

CONCURRENCE BY OTHERS:

THE EASTERN BAND OF THE CHEROKEE INDIANS

By: _____ Date: _____

THE MUSCOGEE (CREEK) NATION OF OKLAHOMA

By: _____ Date: _____

Memorandum of Agreement Between Tennessee Valley Authority and the Tennessee State Historic Preservation Officer - Page 8 of 11

Appendix A

DOCUMENTATION OF IDENTIFIED HISTORIC PROPERTIES

Table 1. Historic and Architectural Resources

Resource	NRHP Status	Potential Effects
HS-1	Ineligible	N/A
HS-2	Ineligible	N/A
HS-3	Ineligible	N/A
HS-4	Ineligible	N/A
HS-5	Ineligible	N/A
HS-6	Ineligible	N/A
HS-7	Ineligible	N/A
HS-8	Ineligible	N/A
HS-9	Ineligible	N/A
HS-10	Ineligible	N/A
HS-11	Ineligible	N/A
HS-12	Ineligible	N/A
HS-13	Ineligible	N/A
HS-14	Ineligible	N/A
HS-15	Ineligible	N/A
HS-16	Ineligible	N/A
HS-17	Ineligible	N/A
HS-18	Ineligible	N/A
HS-19	Ineligible	N/A
HS-20	Ineligible	N/A
HS-21	Ineligible	N/A
HS-22	Ineligible	N/A
HS-23	Ineligible	N/A
HS-24	Ineligible	N/A
HS-25	Ineligible	N/A
HS-26	Ineligible	N/A
HS-27	Ineligible	N/A
HS-28	Ineligible	N/A
HS-29	Ineligible	N/A
HS-30	Ineligible	N/A

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Table 1. Historic and Architectural Resources (continued)

Resource	NRHP Status	Potential Effects
HS-31	Ineligible	N/A
HS-32	Ineligible	N/A
HS-33	Ineligible	N/A
HS-34	Ineligible	N/A
HS-35	Ineligible	N/A
HS-36	Ineligible	N/A
HS-37	Ineligible	N/A
PK113	Ineligible	N/A
PK114	Ineligible	N/A
PK115	Ineligible	N/A
Etowah Commercial District	Ineligible	N/A
Etowah Depot	Listed	Visual effect – Not adverse
Etowah Historic District	Listed	Visual effect – Not adverse
Etowah Carnegie Library	Listed	No effect
Existing TEPCO 69-kV TL	Eligible	Adverse effect

Table 2. Archaeological and Cultural Resources

Resource	NRHP Status	Potential Effects
40PK10	Potentially eligible	Potential effect
40PK268	Not eligible	N/A
40PK627	Not eligible	N/A
40MN48	Potentially Eligible	Potential effect
CR-1	Not eligible	N/A

Memorandum of Agreement Between Tennessee Valley Authority and the Tennessee State
Historic Preservation Officer - Page 10 of 11

Appendix B

D'Angelo, Karpynec
2004 Phase I Cultural Resources Survey of the Proposed TVA Etowah-Benton 161-KV
Transmission Line and Substation, Polk and McMinn Counties, Tennessee. Report
submitted to the Tennessee Valley Authority, Cultural Resources, Norris, Tennessee

Memorandum of Agreement Between Tennessee Valley Authority and the Tennessee State Historic Preservation Officer - Page 11 of 11

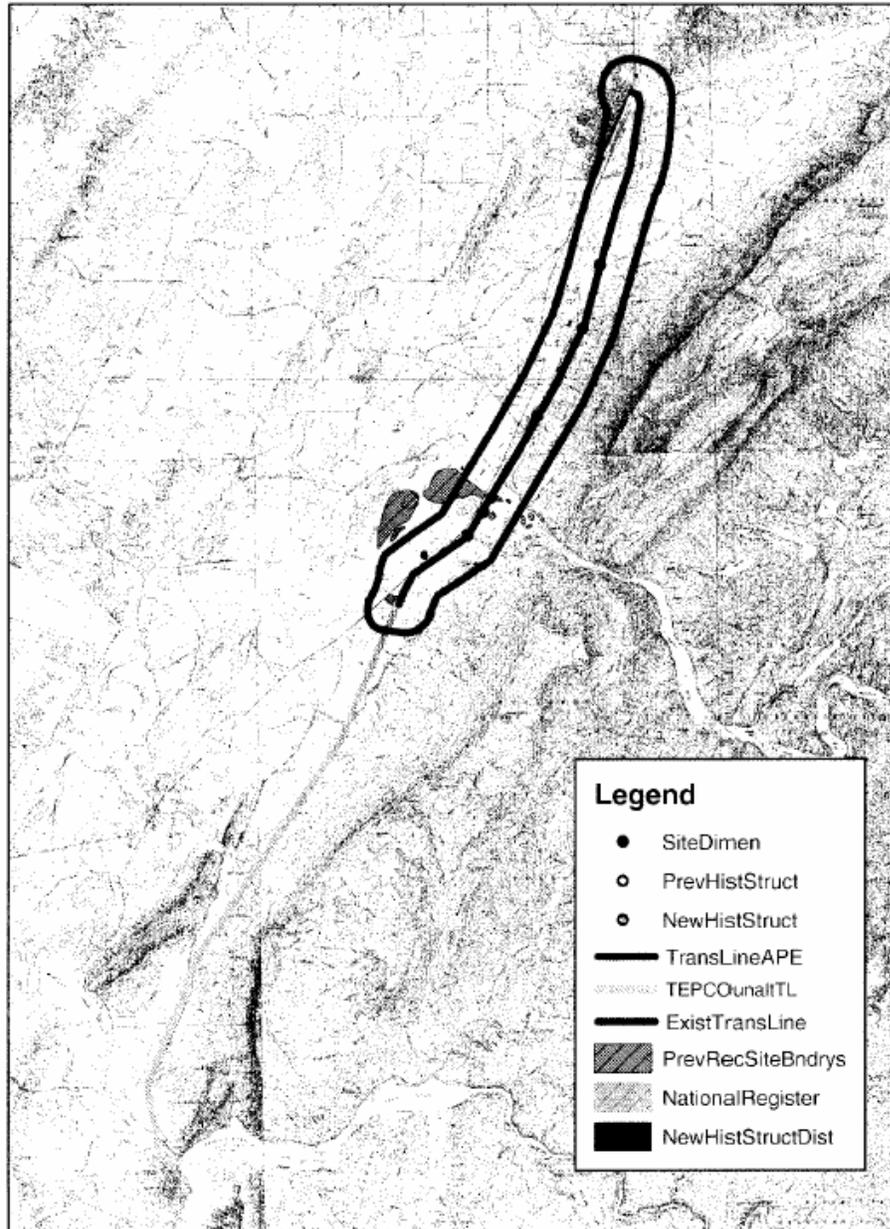


Fig. 1
Etowah-Benton TL



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APPENDIX II – 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 Practice (BMP) 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 Electric 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 the TVA's Transmission, Operations, and Maintenance 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 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 III – 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 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 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.

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APPENDIX IV – 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 TVA Construction and Maintenance Activities.”

Three Levels of Protection

During the preconstruction review of a proposed transmission line, TVA Resource Stewardship 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 TVA 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 TVA 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 Resource Stewardship 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 Electric 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 TVA 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 Resource Stewardship 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 Resource Stewardship 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 Resource Stewardship 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.

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Comparison of Guidelines Under the Three Stream and Waterbody Protection Categories (page 1)

Guidelines	A: Standard	B: Important Permanent Streams	C: Unique Water Habitats
<p>1. Reference</p>	<ul style="list-style-type: none"> All TVA 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 TVA Construction and Maintenance Activities," especially Chapter 6, BMP Standards and Specifications. 	<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 "A Guide for Environmental Protection and Best Management Practices for TVA Construction and Maintenance Activities," especially Chapter 6, BMP Standards and Specifications.</p>	<ul style="list-style-type: none"> 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 TVA Construction and Maintenance Activities," especially Chapter 6, BMP Standards and Specifications.
<p>2. Equipment Crossings</p>	<ul style="list-style-type: none"> All crossings of streams must comply with appropriate state and Federal 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. 	<ul style="list-style-type: none"> All crossings of streams must comply with appropriate state and 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 Resource Stewardship 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. 	<ul style="list-style-type: none"> All crossings of streams also must comply with appropriate state and Federal permitting requirements. All construction activity in and within 30 meters (100 feet) of the unique habitat must be approved in advance by Resource Stewardship 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.

Comparison of Guidelines Under the Three Stream and Waterbody Protection Categories (page 2)

Guidelines	A: Standard	B: Important Permanent Streams	C: Unique Water Habitats
3. Cutting Trees	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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. • Cutting of trees near permanent streams must be limited to those meeting National Electric Safety Code and danger tree requirements. • Stumps can be cut close to ground level but must not be removed or uprooted. 	<ul style="list-style-type: none"> • Cutting of trees within 30 meters (100 feet) of the unique habitat must be discussed in advance with Resource Stewardship 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 one foot above the ground line.
4. Other Vegetation	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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 Resource Stewardship staff

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APPENDIX V – TENNESSEE VALLEY AUTHORITY RIGHT-OF-WAY VEGETATION MANAGEMENT

Tennessee Valley Authority (TVA) must manage 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 ensure National Electrical Safety Code electrical clearances between tall-growing vegetation and any other structures. Trees located off right-of-way trees that could fall or be cut into a transmission line are also very important.

These requirements are imperative to the maintenance of the transmission system and, in some cases, underbuilt distribution lines. It is seldom understood by customers or the general public that electricity must continuously be produced and transmitted on an instant-to-instant basis to serve the demand placed on the system by continuously changing electrical load. When a switch is turned on, electricity must flow instantaneously. With increasingly complex and diverse electronic equipment controlled by computers, microchips, and other systems that respond to microsecond interruptions, any disturbance on transmission or distribution lines instantaneously affects the overall reliability of critical devices, especially production devices; security systems; process controls; medical devices; water purification and sewage treatment systems; fire and safety protection systems; communication and control systems; etc. These systems have little tolerance of even a few microseconds of interruption.

Each year, TVA must assess the conditions of the vegetation on and along its rights-of-way. This is accomplished by aerial inspections of each line, periodic walking inspections, information from aerial photographs, information from TVA field personnel, property owners, and the general public. Information is developed regarding vegetation species present, the mix of 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 that may be adjacent to the right-of-way and that may be a danger to the line or structures. TVA right-of-way program administrators develop a vegetation-reclearing plan that is specific to each line segment; it is based on terrain conditions, species mix, growth, and density. They evaluate accessibility, right-of-way, and adjacent sensitive areas, land use and development, and a series of additional parameters. To the maximum extent possible, line segments from substation busbar to substation busbar should be recleared in the same year so a line can be made as reliable as reasonably possible.

Complicating factors are the rich diversity of tall-growing and climbing vegetation species in the power service area. The long growing season with abundant rain greatly accelerates growth in the moderate to rich soils of the TVA power service area. In addition, many rapid growing species are accelerated growers when competing vegetation is removed or reduced. Diverse geographic features, slopes, and conditions along line easements create many sensitive environmental and public interest areas on or adjacent to rights-of-way.

For the above reasons, TVA uses an integrated vegetation management approach. In farming areas of right-of-way crops and pasture, TVA encourages property owner management of the right-of-way using low-growing crops year after year. In dissected terrain with rolling hills and interspersed woodlands traversed by the rights-of-way, TVA uses mechanical mowing to a large extent.

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 segments of tall-growing vegetation are present but accessibility along the right-of-way is difficult or the path to such segments is very long compared to the amount present, herbicides may be used.

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 Health and Safety Administration. For that reason, TVA is actively looking at better control methods including use of low-volume herbicide applications, occasional singletree injections, and tree-growth regulators.

TVA does not encourage individual property owner tree reclearing activity 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.

TVA's experience initially was completely with hand clearing. World War II manpower shortages forced TVA to look toward developments in herbicide research. An era of near exclusive use of herbicides existed. Then, because of the discovery of residue accumulations with many pesticides and price increases of herbicides, high-volume applications lost favor, and TVA sought other modes of vegetation control. Farm equipment of greater power and efficiency allowed use of tractor-mounted rotary mowers. These mowers not only cut the tall saplings and seedlings on the right-of-way, they 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 produce a multistem dense stand in the immediate area. Repeated use of the mowers on short-cycle reclearing with many original stumps regrowing in the above manner creates a single-species thicket or monoculture. With the original large root system and multiple stems, the resistant species can and usually do 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 created, dense, monoculture stands can become nearly impenetrable for even large tractors. Such stands have low diversity, little wildlife food or nesting potential, and become a property owner concern. They tend to spread off the right-of-way into more desirable species areas. Increasingly, TVA is receiving complaints about the shatter sapling debris density. The potential exists for insect invasion or fungus infection resulting from the easy invasion of damaged specimens or debris. Once started, such infestations or invasions can spread into valuable timber of the same or related species off the right-of-way.

Therefore, TVA has been working with universities (such as Mississippi State University, University of Tennessee, Purdue University, and others), chemical companies, other utilities, and personnel of the U.S. Department of Transportation, U.S. Fish and Wildlife Service, and U.S. Forest Service to explore other means of dealing with problem vegetation. 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.

The above-named universities strongly recommend low-volume herbicide applications since their research demonstrates much wider plant diversity after such applications. They report better ground erosion protection and the development of more wildlife food plants and cover plants. 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.

Wildlife managers are specifically requesting the use of herbicides in place of rotary mowing in order to avoid damage to nesting and tunneling wildlife. This method retains groundcover 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).

Property owners interested in tree production are requesting 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 rights-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.

Some property owners have special interests. In those cases, TVA attempts to work with them to either have them sign agreements in which they maintain the right-of-way in right-of-way crops or pasture or they do the actual right-of-way maintenance. Some may choose to use low-growing trees or fruit trees, sod, vegetable crops, or other low vegetation types.

TVA discusses with property owners the potential to sign an agreement to manage their land for wildlife under the auspices of "Project Habitat," a joint TVA/American Cyanamid wildlife organization. The property owner maintains the right-of-way in wildlife food and cover with emphasis on quail, turkey, deer, or related forms. 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.

TVA places strong emphasis on developing 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 and vegetation effective and efficient manner possible.

Approved Herbicides for Usage 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
Escort	Metsulfuron Methyl/dry flowable	Caution
Garlon	Triclopyr/Liquid	Caution
Garlon 3A	Triclopyr/Liquid	Danger
Diuron	Diuron/Flowable powder	Caution
Spike 40P	Tebuthiuron/Pellet	Caution
Spike 80W	Tebuthiuron/Wettable powder	Caution
Transline	Clopyralid/Liquid	Caution
Pathfinder II	Triclopyr/RTU	Caution
Krenite UT	Fosamine Ammonium	Warning
Vanquish	Diglycolamine	Caution

Approved Herbicides for Bare Ground Areas

<u>Trade Name</u>	<u>Active Ingredients</u>	<u>Label Signal Word</u>
Chopper	Imazapyr/RTU	Caution
Topsite	Diuron/Imazapyr	Caution
Roundup	Glyphosate/Liquid	Caution
SpraKil SK-26	Tebuthiuron and Diuron	Caution
Sahara	Diuron/Imazapyr	Caution
Roundup Pro	Glyphosate	Caution
Endurance	Prodiamine	Caution
Predict	Norflurazon	Caution

Tree growth regulators (TGRs) are being considered for use on tall trees that have special circumstances where they must be trimmed on a regular cycle.

Approved TGRs for Use on TVA Property

<u>Trade Name</u>	<u>Active Ingredients</u>	<u>Label Signal Word</u>
TGR	Flurprimidol	Caution
Profile 2SC	TGR-paclobotrazol	Caution

The herbicide Pathway is being considered for use following initial clearing. Test plots have been established to determine the effectiveness of Pathway. Pathway is a mix of Picloram and 2,4-D and carries a "Warning" signal word.

These herbicides have been evaluated in extensive studies at universities in support of registration applications and label requirements. Most have been reviewed in the U.S. Forest Service (USFS) Vegetation Management Environmental Impact Statements (EISs), and those evaluations are incorporated here by reference. 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 to resources (including buffer zones for listed threatened or endangered species) when applied by trained applicators following the label and registration procedures.

Those not addressed in the USFS EISs or their supporting research have been peer reviewed in university research, addressed in U.S. Environmental Protection Agency (USEPA) literature reviews, or are discussed in documents on file at USEPA and U.S. Fish and Wildlife Service libraries. On the basis of this literature and TVA's reviews, the approved list above has been compiled and is reviewed again each year as new information is published.

The rates of application utilized are those listed on the USEPA-approved label and consistent with the revised application rates of the USFS Vegetation Management EIS Record of Decision. These typical application rates, in pounds/acre of active ingredient, are as follows:

Herbicide	Application Method					
	Aerial Liquid	Aerial Granule	Mechanical Liquid	Mechanical Granule	Manual Hand	Manual Foliar
2,4-D amine	2.0		2.5			2.0
2,4-D ester	2.5		4.0			2.0
2,4-DP	3.0		4.0			1.0
Dicamba			2.0			2.0
Krenite	6.0		7.8			
Glyphosate	1.5		1.5			1.0
Hexazinone	4.0	4.0	4.0	4.0	4.0	4.0
Imazapyr	0.75		0.75			0.75
Fuel oil	0.5		2.0			1.5
Limonene	0.9		0.9			0.9
Picloram	0.5		0.7			0.4
Sulfomet	0.13		0.17			0.06
Tebuthiuron	1.0	1.0	1.0	1.0		4.0
Triclopyr amine	4.0		4.0			4.0
Triclopyr ester	4.0		4.0			4.0

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.

Accord, labeled for vegetation management in forestry and utility rights-of-way applications, has a full aquatics label and can be applied to emergent weeds in all bodies of fresh and brackish water. There is no restriction on the use of treated water for irrigation, recreation, or domestic purposes.

Accord is applied to the foliage of actively growing plants. The active ingredient is absorbed through the leaves and rapidly moves throughout the plant. Glyphosate prevents the plant from producing amino acids that are unique to plants and are building blocks of plant proteins. The plant, unable to make proteins, stops growing and dies.

The favorable environmental fate characteristic of Accord herbicide and its major metabolite (breakdown product) aminomethylphosphonic acid (AMPA) is well known. Continuing research is underway with more than 400 studies conducted to date in the laboratory and under field use conditions. These studies show rapid breakdown, little soil or plant debris retention, and little vertical movement into soil below the surface.

Glyphosate is naturally degraded by microbes in soil and water under both aerobic (with oxygen) and anaerobic (without oxygen) conditions. AMPA is further degraded in soil and sediments to phosphorus, nitrogen, hydrogen, and carbon dioxide. Glyphosate binds

rapidly and completely to a wide range of soils and sediment when introduced into the environment. This essentially eliminates movement in the soil. The average half-life of glyphosate in soils is less than 45 days. Half-life for the dissipation of glyphosate in environmental waters ranges from 1.5 to 14 days.

Glyphosate is nontoxic to birds, mammals, and bees and has been shown not to bioaccumulate since it acts in plants through an enzyme system that does not exist in animals or humans.

Arsenal (Imazapyr) has been similarly tested, and it is found to have low-leaching potential in soils. When available on or in the soil, it is broken down rapidly by soil microbes to naturally occurring compounds. When not available, Imazapyr is bound tightly to soil colloids and is unavailable for movement. The half-life in soil is 25 to 65 days.

Extensive chronic and acute toxicity studies have made Arsenal a USEPA-classified herbicide as practically nontoxic to humans, mammals, birds, fish, aquatic invertebrates, and insects. The chronic studies demonstrate that Imazapyr is non-teratogenic, non-mutagenic, and not a carcinogen.

The mode of action suppresses amino acids of the plant via an enzyme system containing acetohydroxy acid synthase. This enzyme system does not exist in other forms of life including humans and animals.

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APPENDIX VI – APPROXIMATE LOCATIONS AND LEVELS OF PROTECTION FOR WATERCOURSES WITHIN THE RIGHT-OF-WAY OF THE PROPOSED TRANSMISSION LINE PROJECT

Crossing Number	Approximate Watercourse Location/Station Numbers	Watercourse Type*	Commitments	SMZ Widths (feet)
1	Structure not on map, prior to STR 131	Pell Branch	Category A SMZ	50
2	134 + 00	Pond	Category A SMZ	50
3	139 + 500	Pond	Category A SMZ	50
4	152 + 400	Hiwassee River	Category B SMZ	100
5	152 + 600	WWC	Standard BMPs	N/A**
6	164 + 150	WWC	Standard BMPs	N/A
7	165 + 25	Unnamed Perennial	Category A SMZ	50
8	167 + 125	WWC	Standard BMPs	N/A
9	170 + 400	Culpepper Branch	Category A SMZ	50 North; 75 South
10	171 + 150	Coleman Spring Branch	Category A SMZ	50 North; 75 South
11	173 + 00	WWC	Standard BMPs	N/A
12	184 + 300	Unnamed Perennial	Category A SMZ	50
13	184 + 650	Unnamed Perennial	Category A SMZ	50
14	185 + 450	WWC	Standard BMPs	N/A
15	189 + 300	Conasauga Creek	Category A SMZ	50
16	190 + 150	Unnamed Perennial	Category A SMZ	50
17	193 + 250	WWC	Standard BMPs	N/A
18	193 + 400	WWC	Standard BMPs	N/A
19	194 + 750	WWC	Standard BMPs	N/A
20	203 + 650	WWC	Standard BMPs	N/A

Crossing Number	Approximate Watercourse Location/Station Numbers	Watercourse Type*	Commitments	SMZ Widths (feet)
21	205 + 425	WWC	Standard BMPs	N/A
22	208 + 25	WWC	Standard BMPs	N/A
23	208 + 500	Unnamed Perennial	Category A SMZ	50
24	211 + 425	Cane Creek	Category A SMZ	75 North; 50 South

*WWC=wet-weather conveyance. Perennial or intermittent stream type determined by level of flow and evidence of aquatic life at time of site visit in September 2004.

** N/A = not applicable.