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ENVIRONMENTAL ASSESSMENT

HOLLY SPRINGS-MILLER 161-KV TRANSMISSION LINE TAP TO COLDWATER SUBSTATION

Marshall County, Mississippi

TENNESSEE VALLEY AUTHORITY

AUGUST 2007

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ACRONYMS, ABBREVIATIONS, AND SYMBOLS

APE	Area of Potential Effect
AADT	Annual Average Daily Traffic
BMP(s)	Best Management Practice(s)
CFR	Code of Federal Regulations
EMF	Electric and Magnetic Fields
EO	Executive Order
GIS	Geographic Information System
HSUD	Holly Springs Utility Department
HUC	Hydrologic Unit Code
I-	Interstate Highway
kV	Kilovolt
MDEQ	Mississippi Department of Environmental Quality
n.d.	No Date (pertains to date Web site was accessed)
NEPA	National Environmental Policy Act
NRHP	National Register of Historic Places
NRI	Nationwide Rivers Inventory
OSHA	Occupational Safety and Health Administration
ROW(s)	Right(s)-of-Way
SHPO	State Historic Preservation Officer
SMZ(s)	Streamside Management Zone(s)
SR	State Route
TVA	Tennessee Valley Authority
TVARAM	TVA Rapid Assessment Method, a version of the Ohio Rapid Assessment Method designed specifically for the TVA region
US	U.S. Highway
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey

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CHAPTER 1

1. PURPOSE OF AND NEED FOR ACTION

1.1. Proposed Action: Improve Power Supply

Tennessee Valley Authority's (TVA) proposed action is to serve Holly Springs Utility Department's (HSUD) planned Coldwater Substation in the Mt. Pleasant area of Marshall County, Mississippi, by building an approximately 5.6-mile, 161-kilovolt (kV) transmission line connection from the existing Holly Springs-Miller 161-kV Transmission Line to the new substation by June 2008 (Figure 1-1). The transmission line would utilize both existing and new right-of-way (ROW), mostly 75 feet in width (700 feet would be 100-foot width) and would occupy approximately 53 acres.

TVA would install two switch structures within the Holly Springs-Miller Transmission Line between Structures 71 and 72, and one switch structure within the new tap line ROW. The switches would be owned and manually operated by TVA. An access road to the switches would be located on the existing ROW off Marshview Lane. TVA would provide HSUD revenue-metering equipment for installation at its Coldwater Substation. TVA would add Coldwater Substation information to the map board at TVA's System Operations Center.

1.2. Need

HSUD is committed to providing efficient and reliable power to its customers in the Mt. Pleasant and Slayden areas. The present power system relies heavily on the Slayden 46-kV Substation that is supplied by a 15-mile-radial 46-kV line from the Holly Springs 161-46-13-kV Substation. The electric load in the Mt. Pleasant area has been growing rapidly over the past several years due to growth from Collierville/Memphis, Tennessee. The distributor expects growth in this area to increase in the future due to planned road development including the new Interstate (I) 269 that will connect to I-40 and I-55 and U.S. Highway (US) 78 (future I-22). This anticipated increase in load due to additional growth is projected to cause a thermal problem with the transformers at the Slayden Substation during the summer months. HSUD plans to build the Coldwater Substation to supply the growing power needs of the area. To avoid power supply disruptions, the substation is required to be in-service by 2008.

1.3. Decisions

The primary decision before TVA is whether to connect the planned Coldwater Substation to the TVA system and help to improve the electrical service in the northeastern HSUD service area by building a new 161-kV transmission line. If the transmission line is built, other secondary decisions are involved. These include the following considerations:

- The timing of improvements
- The best route for a transmission line
- Determining any necessary mitigation and/or monitoring measures to implement to meet TVA standards and minimize potential damages to resources

Figure 1-1. The Preferred Route for the Proposed Holly Springs-Miller 161-kV Transmission Line Tap to Coldwater Substation in Marshall County, Mississippi

1.4. Public Involvement

The following federal and state agencies have been contacted to date by TVA concerning this project:

- U.S. Army Corps of Engineers
- Mississippi Department of Agriculture and Commerce
- Mississippi Department of Archives and History
- Mississippi Department of Environmental Quality
- Mississippi Department of Transportation
- Mississippi Development Authority
- Mississippi Public Service Commission

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, Endangered Species Act, Sections 401 and 404 of the Clean Water Act, and EO 12372 (Intergovernmental Review). Correspondence received related to this coordination is contained in Appendix I.

TVA developed a plan for communicating to the public details of the proposed project. The plan included a Web site that provided project information, a map with the route alternatives, and a feedback mechanism to allow the public to provide comments. TVA also held a public meeting in Mt. Pleasant, Mississippi, on July 27, 2006, to present three potential transmission line route options for this project utilizing seven route segments. These routes are described in Section 2.5.3 of this document as Routes 1 through 3 (Figure 1-2).

Public officials and potentially affected property owners within these corridors were specifically invited to the meeting. TVA also invited other interested members of the public through newspaper advertisements and local news outlets. Total public attendance at the meeting was 56.

During a 30-day public comment period following the open house, TVA accepted public comments on potential transmission line routes and other issues. A toll-free phone number and facsimile number were made available to facilitate comments. Many commenters provided information and land use updates that enhanced TVA's understanding of route issues and usage constraints.

Many property owners along proposed Route 3 were opposed because of their concern that the transmission line would reduce property values. However, they readily recognized the need for new power facilities to stabilize the power in their rapidly growing community. Most input regarding the proposed project favored the maximum reuse of existing power line easements in the area, and specifically asked that TVA use either proposed Routes 1 or 2. Additionally, two properties crossed by the proposed Routes 1 and 2 were also crossed by an existing easement in different locations. These property owners requested that the new transmission line follow the old easement if it were to cross their properties. TVA considered this request; however, this portion of easement does not belong to TVA and did not meet the environmental and engineering considerations TVA follows in locating new transmission lines. Additionally, making use of this portion of easement would require crossing forested wetlands and building the transmission line out into the deepest part of the Little Coldwater Creek floodplain, where the guyed angle structures would routinely be subject to flooding.

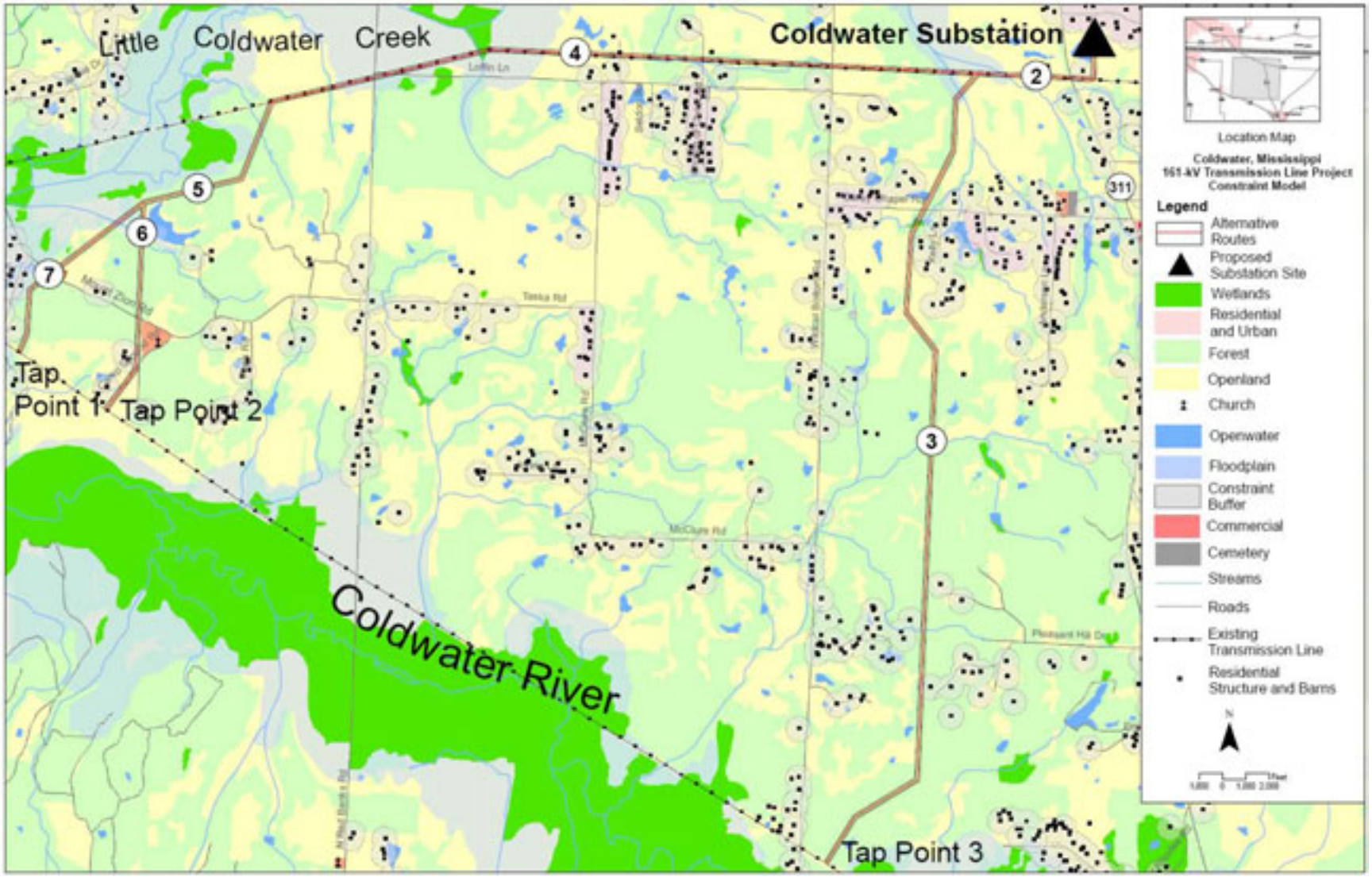

Figure 1-2. Proposed Constraints and Alternative Route Segments for the Proposed Holly Springs-Miller 161-kV Transmission Line Tap to Coldwater Substation in Marshall County, Mississippi

1.5. Necessary Permits or Licenses

A permit would be required from the Mississippi Department of Environmental Quality (MDEQ) for construction site storm water discharge for the transmission line construction. TVA's Transmission Construction organization would 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. TVA has received concurrence from Mississippi State Historic Preservation Officer (SHPO).

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CHAPTER 2

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1. Introduction

A description of the various alternatives considered is provided in this chapter. Additional background information about transmission line construction, operation, and maintenance is also provided. 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.

2.2. Description of Alternatives

2.2.1. Alternative 1 - Do Not Build the Holly Springs-Miller 161-kV Transmission Line Tap to the Coldwater Substation (No Action)

Under the No Action Alternative, TVA would not construct a 161-kV transmission line to serve the planned Coldwater Substation. To address the current problems, HSUD could increase capacity at their Slayden Substation by upgrading to a larger transformer or construct a new 46-kV substation. These efforts would require HSUD to build 5 to 12 miles of 13-kV distribution circuits, and rebuild 15 miles of 46-kV transmission line. These options would resolve the capacity issue at the Slayden Substation, but would not reduce losses or address the reliability problems in the HSUD service area. Additionally, besides being the most expensive option, it would involve constructing a greater length of transmission line. If HSUD implemented this action, the potential impacts resulting would be similar to those of the Action Alternative as described in Chapter 4 and perhaps more severe depending on the route chosen and the construction methods used by HSUD. With these considerations, it was determined that this alternative would not meet the identified needs in the HSUD service area.

2.2.2. Alternative 2 - Construct and Operate the Holly Springs-Miller 161-kV Transmission Line Tap to the Coldwater Substation (Action)

Under the Action Alternative, TVA would construct and operate a new 5.6-mile 161-kV transmission line connecting the Holly Springs-Miller 161-kV Transmission Line with HSUD's planned Coldwater Substation in Marshall County, Mississippi (Figure 1-1). The transmission line would be built on 3.8 miles of existing ROW 75 feet wide, currently occupied by approximately 2.7 miles of HSUD 46-kV transmission line and 1.1 miles of HSUD 13-kV transmission line. Additionally, 1.7 miles of the proposed transmission line would be built on a new 75-foot-wide ROW between the Holly Springs-Miller 161-kV Transmission Line tap and the existing HSUD ROW, and 700 feet of new 100-foot-wide

ROW would be built between the Coldwater Substation and Taska Road. The additional 25-foot ROW in this section would be needed because the TVA transmission line would share the ROW coming out of the substation with HSUD's 46-kV transmission line.

HSUD would be responsible for removing/disposing of the existing 46-kV transmission line equipment. Between State Route (SR) 311 and Taska Road, approximately 1.1 miles of the proposed transmission line would carry an underbuilt circuit belonging to HSUD. TVA would install three switch structures near the tap point between Structures 71 and 72 on the Holly Springs-Miller Transmission Line. TVA would provide metering and protection equipment at the Coldwater 161-kV Substation and would also provide connections to transmit process data and equipment status from the substation to the TVA transmission and generation dispatchers. This alternative would meet the growing power needs in the Mt. Pleasant area by providing a new higher capacity source of power and improve the transmission line system's reliability.

2.3. Alternative Eliminated From Detailed Study - Construct Slack Span to HSUD Planned Substation

Besides Alternatives 1 and 2, TVA also considered other possible alternative solutions. As an additional alternative, HSUD would build the substation adjacent to its existing transmission line, and TVA would construct a slack span connection to the substation. Depending upon the type of new substation, HSUD would construct 5 miles of new 46-kV transmission line and convert 2 miles of 13-kV circuit to 13-kV double circuit or construct 9 miles of two, 13-kV double circuit, 8 miles of 13-kV circuit, and convert 2 miles of 13-kV circuit to 13-kV double circuit. HSUD's new substation would be located away from the load center. This alternative would not solve the capacity problem at the Slayden Substation and would not meet the growing power needs in the Mt. Pleasant area as well as Alternative 2 would. Therefore, HSUD decided to build a 161-kV substation in the Mt. Pleasant Community instead, and this alternative was eliminated from further study.

2.4. Description of Construction, Operation, and Maintenance of the Proposed 161-kV Transmission Line

2.4.1. Transmission Line Construction

2.4.1.1. Right-of-Way Acquisition and Clearing

Between the existing Holly Springs-Miller Transmission Line and Coldwater Substation, approximately 3.8 miles of an existing 75-foot-wide ROW easement would be utilized for the proposed transmission line. HSUD would be responsible for removing/disposing of the existing 46-kV transmission line equipment. The remaining section of the proposed transmission line would require approximately 1.7 miles of a new ROW easement that would also be 75 feet wide, and a 700-foot section north of the existing ROW to the Coldwater Substation that would be 100 feet wide.

TVA would purchase easements from landowners for the new ROW on private land. These easements would give TVA the right to construct, operate, and maintain the transmission line, as well as remove danger trees off the ROW. Danger trees are those trees that are located away from the cleared ROW, but are tall enough to pass within 10 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 ROW 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 ROW that could interfere with the transmission line or create a hazardous situation.

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

Streamside management zones (SMZs) would be established along intermittent and perennial streams; their width would be based on stream characteristics, slope, soil types, and other factors (Muncy 1999). Vegetation removal in SMZs and wetlands would be restricted to trees tall enough, or with the short-term potential 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, vegetative cover on the ROW 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 III.

2.4.1.2. Access Roads

Permanent access roads would be needed to allow vehicle access to each structure and other points along the ROW. New access roads were identified along the proposed transmission line and were included in the environmental field review. An access road to the switches would be located on the existing ROW off Marshview Lane. TVA would obtain the necessary rights for these access roads from landowners. Existing roads including privately built, farm and field roads, some of which may need upgrading, would be used where possible. Upgrading would consist of minor grading and placement of gravel. New access roads used for transmission lines are located on the ROW wherever possible and are designed to avoid severe slope conditions and to minimize stream crossings. Access roads are typically about 20 feet wide and are surfaced with dirt or gravel.

Culverts and other drainage devices, fences, and gates would be installed as necessary. Culverts installed in any permanent streams would be removed following construction. However, in wet-weather conveyances (i.e., streams that run only following a rainfall), they would be left or removed, depending on the wishes of the landowner or on any permit conditions that might apply. If desired by the property owner, new temporary access roads

would be restored to previous conditions. Additional applicable ROW clearing and environmental quality protection specifications are listed in Appendices II and IV.

2.4.1.3. Construction Assembly Areas

A construction assembly area (laydown area) would be required for worker assembly, vehicle parking, and material storage. This area would typically be 5 to 10 acres in size, previously cleared, relatively flat, and adjacent to a paved road near the proposed transmission line. The laydown area would be leased for the duration of the construction period. The area would be graveled and fenced, and trailers, used for material storage and office space, would be parked at this location. *Site Clearing and Grading Specifications* (Appendix V) would be followed in clearing and construction activities. 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.

2.4.1.4. Structures and Conductors

The proposed 161-kV transmission line would be built primarily using single steel-pole structures similar to that shown in Figure 2-1(a). Structure type and heights would vary according to the terrain and would range between 60 and 120 feet. Taller poles may be used at river or highway crossings in order to meet clearance requirements. Between SR 311 and Taska Road, approximately 1.1 miles of the proposed transmission line would carry an underbuilt circuit belonging to HSUD (Figure 2-1[b]). TVA would install the cross arms, and HSUD would provide and install the insulators and conductor.

(a) (b)

Figure 2-1. Single-Pole (a) and Single-Pole With Underbuild (b) 161-kV Transmission Structures

Three conductors (the cables that carry the electrical current) 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 cross arms. A smaller overhead ground wire(s) 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. Some structures for larger angles could require two or three poles. 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 backfilled with the excavated material. In some cases, gravel or a cement and gravel mixture might be necessary. Screw and rock-anchored guys would be installed for angle and tap structures. Some structures may be self-supporting (non-guyed) poles fastened to a concrete foundation that is formed and poured into an excavated hole. The three switch structures would require concrete foundations. Six-foot diameter holes would be excavated for each leg of the structure. The spoil from the foundation holes would be spread within the ROW.

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

2.4.1.5. Conductor and Ground Wire Installation

Reels of conductor and ground wire would be delivered to various staging areas along the ROW. 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, occurring on approximately five-year cycles after operation begins, are conducted to locate damaged conductors, insulators, or structures, and to report 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 ROW, as well as immediately adjoining the ROW, 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 ROW 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 ROW would consist of two different activities: the felling of danger trees adjacent to the cleared ROW, as described in Section 2.4.1.1, and the control of vegetation within the cleared ROW.

Management of vegetation within the cleared ROW 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, ROW 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 ROW and mechanical mowing is not practical. Herbicides would be applied aerially using helicopters or 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 U.S. Environmental Protection Agency (USEPA) would be used. A list of the herbicides currently used by TVA in ROW management is presented in Appendix VI. 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, it would normally be lifted out of the ground by crane-like equipment, and the replacement structure would be inserted into the same hole or an immediately adjacent hole. Access to the structures would be on existing roads where possible. 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.

2.5. Project and Siting Alternatives

TVA's transmission line siting evaluation is used to identify reasonable transmission line route alternatives and to select a preferred route. The preferred route can then be further adjusted in response to comments TVA receives from landowners, other stakeholders, and officials during the public review. TVA's transmission line siting process is comprehensive and takes into account a large number of criteria, including potential environmental impacts to narrow down the typically large number of possible transmission line routes.

When TVA proposes to serve some location (a new substation as is the case here), it begins by identifying a study area and within that study area, transmission line route options or corridors. These corridors can be broad (miles wide). After assessing the feasibility of the identified corridors, the siting process typically rates one or two corridors as preferable options for routing the proposed transmission line, and further analysis of these corridors continues. TVA then identifies one or more feasible transmission line routes within the remaining corridors and presents these to the public.

As such, the process of siting the proposed transmission line adhered to the following basic steps used by TVA:

- 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.

2.5.1. Definition of Study Area

The first task in defining the study area was to identify the power sources that could supply the identified objective. The most practical power source was identified as the TVA Holly Springs-Miller 161-kV Transmission Line, which is located approximately 5 to 6 miles south/southwest of the planned substation. Based on this information, the study area was defined as an area in Marshall County that is roughly triangular, bounded by the planned substation on the east, the Holly Springs-Miller Transmission Line and Coldwater River on the south, and Little Coldwater Creek on the north and west.

A geographic information system- (GIS) based routing map and color orthophotography were developed. The GIS data generated a "constraint" model that served to guide the siting process by identifying obvious routing conflicts or sensitive areas including, but not limited to, houses, rivers, historical sites, and wetlands (Figure 1-2). Following is a brief description of other aspects of the study area.

- *Transportation*: There is one major transportation feature in the study area. SR 311 crosses in a north to south direction near the east boundary. Other roads within the study area are Loftin, Wildcat Bottom, Carey Chapel, McClure, Taska, and Mount Zion. The oldest and heaviest concentrations of residential development are along these roads. Most of the new residential development is occurring in the eastern part of the study area.

- *Natural Features*: Soils in the study area are wind-blown silt loess, known for eroding easily. The study area consisted of forestland and openland. Some areas of the forestland are steep (greater than 11 percent). The predominant water features defining the edge of three sides of the study area are the Little Coldwater Creek and Coldwater River. Little Coldwater Creek flows into Coldwater River. The widths of the floodplains of the river and creek vary with the terrain. The majority of the larger known wetland areas occur in these two floodplains.

- *Cultural Features*: There are churches and cemeteries in the study area. These features can be easily avoided by possible line routes.

2.5.2. Collect Data

Geographic data, such as topography, land use, existing ROW information, transportation, environmental features, cultural resources, near-term future development, and land conservation information were collected for the entire study area. Analysis of the data was aided by using GIS. This system allowed the multitude of factors of the study area to be examined simultaneously to develop and evaluate numerous options and scenarios to determine the route or routes that would best meet project needs, including avoiding or reducing potential environmental impacts.

Maps were created to show regional opportunities and constraints clearly (Figure 1-2). Sources included 1 inch = 500 feet aerial photography, county tax maps/property boundaries, U.S. Geological Survey (USGS) digital line graphs, digital elevation models, National Wetlands Inventory, and cultural resource data, among others. Aerial photography was interpreted to obtain land use and land cover data, such as forests, agriculture, wetlands, houses, barns, commercial and industrial buildings, churches, and cemeteries. Data were analyzed both manually and with GIS. Manual calculations from aerial photographs, tax maps, and other sources included the number of road crossings, stream

crossings, and property parcels. For this project, a 1:100,000 GIS database was developed and used for regional opportunity and constraint analysis, while a 1:24,000 database was developed for more complex computations, such as acreage of wetlands.

2.5.3. Develop General Route Options and Potential Transmission Line Routes

From the information gathered during the system's studies and data development phases, three tap point locations were identified on the Holly Springs-Miller 161-kV Transmission Line. These locations were selected because they were the only locations where the existing transmission line could be accessed in all weather (or flood) conditions. The locations were also close to existing public roads.

Proposed Tap Points 1 and 2, respectively, are located in the western portion of the study area, and in a somewhat rural area. From these tap points, lines to the planned substation would each be about 5.5 miles long and would use about 3.8 miles of an existing easement. Proposed Tap Point 3 is located near Wildcat Bottom Road and would begin a tap line totaling about 4.5 miles long to the planned substation.

Possible transmission line route segments from these tap points were developed utilizing data that included current aerial photography of the study area, 7.5-minute USGS topographic maps, as well as a constraint model of the study area. The constraint maps were produced by interpretation of aerial photographs as well as a search of existing records of environmental, historical, and archaeological locations (Figure 1-2). Three routes consisting of seven transmission line route segments were identified for study and analysis (Figure 1-2). Tap Point 1 or Route 1 consisted of Route Segments 1, 2, 4, 5, and 7. Tap Point 2 or Route 2 consisted of Route Segments 1, 2, 4, 5, and 6. Tap Point 3 or Route 3 consisted of Route Segments 1, 2, and 3.

Route 1 would begin at a tap point accessible from Marshview Lane near Structure 71 in the Holly Springs-Miller 161-kV Transmission Line. It would use approximately 1.7 miles of new ROW skirting just outside the floodplain and wetland confluence of Little Coldwater Creek and Coldwater River to reach the old Nesbitt-Miller-Slayden Transmission Line ROW at the point that ownership changes hands to HSUD. The last 1,500 feet of this section of new ROW would overbuild a Holly Springs three-phase distribution power line feeding a hog lot operation. The proposed transmission line would then reuse an existing ROW section for 3.8 miles to the vicinity of the planned Coldwater Substation that will be built east of SR 311 near Melissa Lane. Approximately 1.1 miles of the reused ROW falls within the margins of the 100-year floodplain of Little Coldwater Creek, and about 200 feet crosses a wetland area at the edge of a field. The remaining 700-foot section of new ROW tying to the substation would run along property lines to the new substation.

Route 2 would begin at a tap point near Structure 69 in the Holly Springs-Miller 161-kV Transmission Line. It would use about 1.7 miles of new ROW, utilizing an area along the western property line of Mount Zion Church (adjacent to the cemetery), crossing Mount Zion Road, and continuing north along a property line to pass just west of a new 14-acre pond. The new ROW would then join the same route as Route 1 turning eastward and passing north of a pond (Figure 1-2). Access to the tap point switches would be from Camp Road.

Route 3 would begin at a tap point between Structures 52 and 53 and proceed north mostly along the back property lines along a half-section line for 3.8 miles to intersect the old

Nesbitt-Miller-Slayden Transmission Line ROW easement. The new ROW would span over about 200 feet of a wetland pond just south of Carey Chapel Road. Route 3 would reuse about 0.5 mile of the old easement to cross SR 311. The remaining section of new ROW would run along property lines to the new substation. Access to the tap point switches would be from Wildcat Bottom Road.

2.5.4. Establish and Apply Siting Criteria

TVA utilizes a set of evaluation criteria that represent opportunities and constraints for development of transmission line routes. The criteria are oriented toward factors such as existing land use, ownership patterns, environmental features, cultural resources, and visual quality. Cost is also an important factor, with engineering considerations and ROW acquisition costs being the most important economic elements. Information gathered and comments made at the public meeting and during the subsequent comment period were also taken into account.

Each of the transmission line route options was evaluated according to these criteria relating to engineering, environmental, land use, and cultural concerns. Specific criteria are described below. For each category described, a higher score means a bigger constraint. For example, a greater number of streams crossed, a longer transmission line route length, or a greater number of historic resources affected would give a transmission line route option a worse score.

- *Engineering Criteria*: Total length of the transmission route, length of new ROW and rebuilt ROW, primary and secondary road crossings, pipeline and transmission line crossings, and total line cost

- *Environmental Criteria*: Slopes greater than 11 percent with these soils (steeper slopes mean more potential for erosion and potential water quality impacts), visual aesthetics, forested areas, open water crossings, sensitive stream (those supporting endangered or threatened species) crossings, perennial and intermittent stream crossings, wetlands, floodplains, rare species habitat, natural area crossings, and wildlife management areas

- *Land Use Criteria*: The number of fragmented property parcels, schools, houses, commercial or industrial buildings, barns, and parkland crossings

- *Cultural Criteria*: Archaeological and historic sites, churches, and cemeteries

Scores for each of the route options were calculated by adding individual criterion values for each potential transmission line route. The resulting sum values were evaluated using standard statistical techniques and were assigned a ranking for each route in each subcategory (engineering, environmental, land use, and cultural).

A weighted score was produced for each transmission line route option in each subcategory. This made it possible to understand which routes would have the lowest and highest impacts on engineering, environmental, land use, and cultural resources. Finally, to determine total impacts, the scores from each category were combined for an overall score.

2.5.5. Route Evaluation and Identification

Following the public open house and subsequent comment period, each route was evaluated using the updated constraint model along with the modified routing criteria obtained during the public involvement. Based on comments received from property owners, public officials, and resource experts, as well as field surveys and available data sources, the preferred alternative transmission line route was modified to minimize overall project impacts further (Figure 1-1). TVA's preferred route includes the following adjustments to the segments previously described in Section 2.5.3:

Minor modifications were made to the route segments. The original Route Segment 2 was adjusted slightly to the west on the northern portion near the substation to allow the transmission line to align with the substation equipment. Modifications were made to original Route Segments 4 and 5 in an attempt to satisfy two property owners. In Route Segment 4, the adjusted proposed transmission line would continue along the existing ROW for about 900 feet then turn south and parallel a 25-kV tap line, or reuse its centerline if the distributor agreed to remove the line. In Route Segment 5, the route was moved as far north as possible away from property owner's residence without entering wetlands or floodplains. The last modification involved the original Route Segment 6. The original transmission line angle was removed, which resulted in the transmission line being further away from residential development. The majority of residents at the meeting and through mailed comments favored Route 1 or Route 2 because these alternatives would maximize the reuse of existing power line easements in the area.

Routes 1 and 2 are very similar to each other, but very different from Route 3, which would require much more new ROW. Additionally, the property along this route would be more expensive and more forested than Routes 1 and 2. Routes 1 and 2, on the other hand, would use more existing ROW, but require a greater expense per mile for existing transmission line retirement and the underbuild circuit replacement. These cost differences tend to be offsetting, making the three proposed alternative routes reasonably comparable in cost. Even so, the shorter route, Route 3, would still be somewhat less expensive than the other two western routes.

Route 1 has some minor risk of flood restrictions along the proposed access road, Marshview Lane, which would be utilized to the tap point switches. Otherwise, Route 1 is preferable to Route 2, which would run close to two new homes, and would require forest clearing adjacent to a cemetery at Mount Zion Church. Route 1 would sever large parcels of property from the tap point to the area of a 14-acre pond; however, this land seems to be relatively unmanaged.

The shorter Route 3 would use ROW tracts from far more properties, and would run closer to many more homes than the other two western route alternatives. Although Route 3 would require considerably more deforestation than the western alternative routes, the existing forest has been previously impacted by fragmentation. Because there is development pressure in the area, many landowners expect their properties to develop as residential subdivisions. They were concerned that the transmission line as proposed could diminish property values or their development prospects. As a result, Route 3 generated considerably more public opposition than the two western alternative routes that would use more existing ROW.

Upon completion of the alternative route analysis, the preferred route that represented the minimum impact was determined to be Route 1 (Route Segments 1, 2, 4, 5, and 7). Along

this route, two property owners were crossed in a different location than the existing easement. Although modifications had been made as discussed above, one of the property owners continued to request that TVA consider the use of the existing easement. This section of TVA existing easement did not appear to meet TVA's environmental and engineering considerations for locating new transmission lines. Additionally, the initial environmental review process had indicated that this section of the existing transmission line route would cross forested wetlands and the deepest part of the Little Coldwater Creek floodplain, and as a result, the guyed angle structures would be subjected to routine flooding. However, with these known considerations, TVA agreed to conduct a field survey of the existing transmission line easement as an additional alternative segment (identified as Alternative Route West). This alternative utilizing Route Segments 2, 4, Alternative Route West, and 7, if used, would then utilize more of the existing easement before tying back into the original Route 1 (Figure 2-2).

The field survey along Alternative Route West segment identified that three additional perennial streams and one wet-weather conveyance would be crossed that are located within a high-quality forested wetland. Additionally, this alternative segment would result in the conversion of 3.54 acres of forested wetlands (identified as W002) that are located within the ROW easement to scrub-shrub or emergent wetland habitat. Another consideration in comparing the Alternative Route West segment with the initially identified segment 5 would be that the constructability of the Alternative Route West segment would be more difficult because it is located within a wetland. Therefore, this alternative route utilizing the Alternative Route West segment was eliminated from further consideration.

During the field survey of Route 1, an archaeological site was identified along Route Segment 7. This site is recommended eligible for listing on the National Register of Historic Places (NRHP) and would be affected by the transmission line. Therefore, a section of this transmission line segment was relocated away from the archaeological site. The route segment was directed toward the south end of the archaeological site through an eroded area. This area had been previously disturbed by dumping and construction activity of a pond dam. Upon new route selection, a complete environmental survey was conducted, and no additional issues were identified along the rerouted section.

2.6. Identification of the Preferred Alternative

Alternative 2 - Construct and Operate the Holly Springs-Miller 161-kV Transmission Line Tap to Coldwater Substation (Action) is TVA's preferred alternative. TVA would construct approximately 5.6 miles of 161-kV transmission line along a modified proposed Route 1 (Figure 1-1). The proposed project would affect approximately 53 acres of ROW; 35 acres of which are currently occupied by a transmission line.

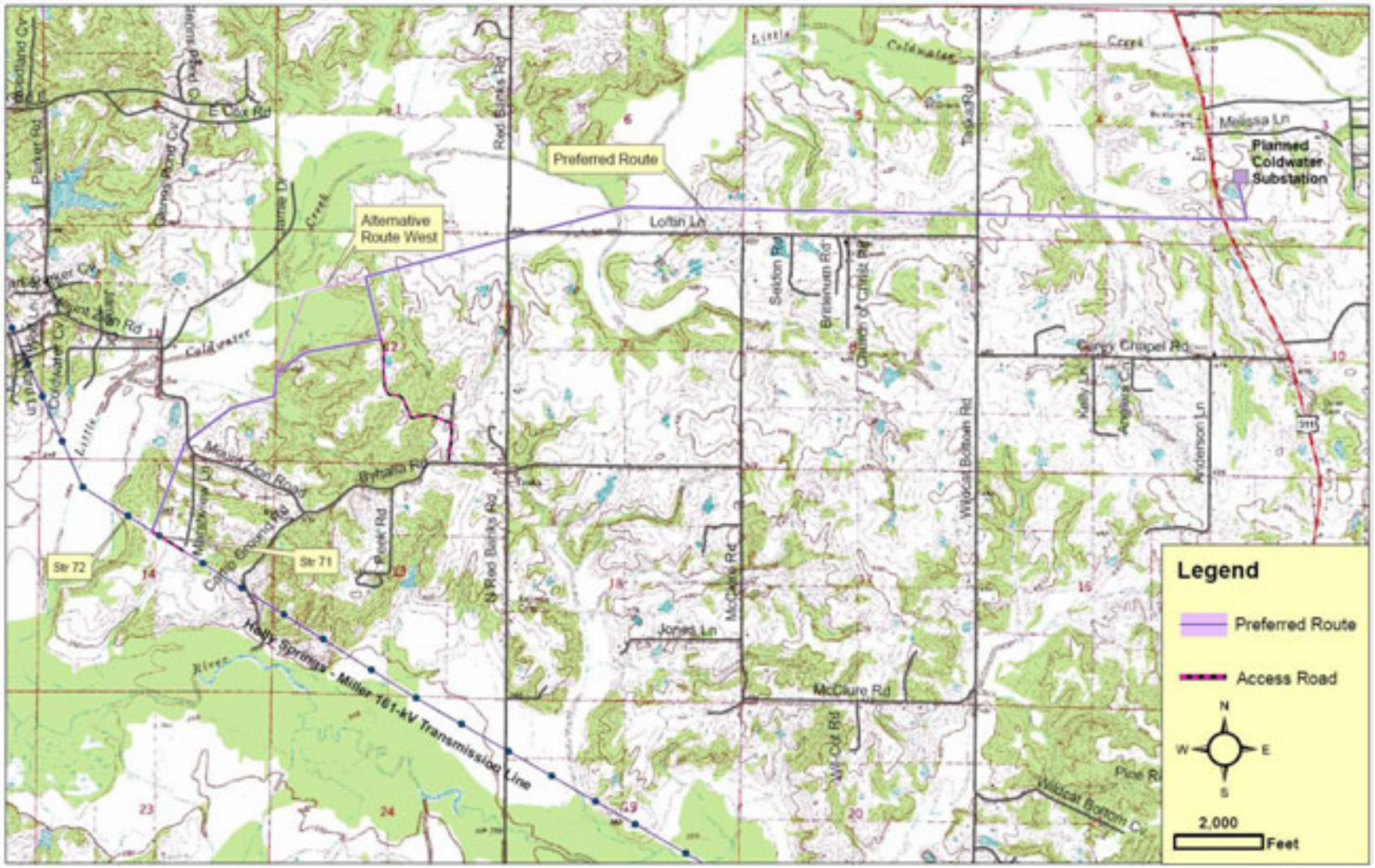

Figure 2-2. Adjusted Alternative Route 1 Segments Surveyed for the Holly Springs-Miller 161-kV Transmission Line Tap to Coldwater Substation in Marshall County, Mississippi

CHAPTER 3

3. AFFECTED ENVIRONMENT

3.1. Introduction

This chapter describes the existing condition of the environmental resources and factors of the proposed project area that would affect or that would be affected by implementing the proposed action. The affected environment descriptions below are based on field surveys conducted in 2007, on published and unpublished reports, and on personal communications with resource experts. This information establishes the baseline conditions against which the decision maker and the public can compare the potential effects of the alternatives under consideration.

3.2. Groundwater

The project area is underlain by the Tertiary units of the Mississippi embayment aquifer system and is located in the Coastal Plain Physiographic Province. The Mississippi embayment aquifer system is divided into nine hydrogeologic units of which the middle Claiborne, lower Claiborne-upper Wilcox, middle Wilcox, and lower Wilcox underlie the project area. Gravity is the principal driving force for groundwater movement within the Mississippi embayment aquifer system (Renken 1998).

A unit of the middle Claiborne aquifer, locally known as the Sparta Sand, outcrops in the project area and consists of a thick sequence of sand and interbedded clay (MDEQ 2006). The Sparta Sand is underlain by the Zilpha Clay, a confining unit. However, the Zilpha Clay is very thin or nonexistent in many of the north Mississippi counties. The Winona Sand and the Tallahatta Formation underlie the Zilpha Clay and the Sparta Sand. Together with the Meridian Sand, the Winona Sand and the Tallahatta Formation, form the lower Claiborne-upper Wilcox aquifer. The middle Wilcox and the lower Wilcox aquifers underlie the lower Claiborne-upper Wilcox aquifer, both consisting of undifferentiated sands of the Wilcox Group.

Groundwater is abundant throughout Mississippi. Deep wells are used to supply public water systems from deeper aquifers, while private wells are usually cased in shallow aquifers. Contamination of groundwater occurs when contaminants such as pesticides and fertilizers from agriculture runoff seep into the aquifer. Most public water sources are protected from contamination due to the depth of the wells, which are naturally protected by overlying clay (confining) layers. Groundwater is the primary source for public water supply in Marshall County (USEPA 2007). However, the project area is not with in a State Designated Source Water Protection Area. Additionally, privately owned well sources could occur in the project area.

3.3. Surface Water

Located in the Mississippi Valley Loess Plain ecoregion (Chapman et al. 2004), the proposed transmission line would cross streams located on the Little Coldwater Creek system. Streams in this region are generally low gradient; substrates are silty with some sand, murky, and in their natural states have extensive bottomland forests associated with

them (Etnier and Starnes 1993). However, over the past 50 to 70 years, many streams in this region have been channelized and have had riparian vegetation removed for "improved" drainage.

Precipitation in the project area averages about 55 inches per year with the wettest month in March at 5.8 inches and the driest month in August at 3.0 inches. The average annual air temperature is 62°F, ranging from a monthly average of 40°F in January to 82°F in July.

The project area drains to Little Coldwater Creek of the Coldwater River (hydrologic unit code [HUC] 08030204-010) of the Tallahatchie River in the Yazoo River Basin. Little Coldwater Creek and Coldwater River are classified by MDEQ for fish and wildlife.

3.4. Aquatic Ecology

Field surveys conducted in January 2007 documented the presence of watercourses and aquatic habitat types along the proposed transmission line ROW and access roads. The proposed route would cross 19 watercourses including seven perennial streams, three intermittent streams, seven wet-weather conveyances, and two ponds (Appendix VII). All of these streams are tributary to Little Coldwater Creek. Coldwater Creek itself would not be crossed.

All of these stream crossings suffered some level of impairment (siltation, lack of riparian habitat, and deeply incised channels) and were not representative of high-quality streams within the drainage. As such, the aquatic communities present in these stream sections are expected to contain a lower-diversity aquatic community represented by species that would be more tolerant to these types of impacts. Riparian buffer zones are also absent from approximately 4,750 feet of the existing transmission line ROW, where it crosses three perennial streams and runs parallel to one perennial stream for approximately 4,400 feet. Streams in this section of ROW are deeply incised and have had the banks of some streams altered to create heavy machinery crossings.

3.5. Vegetation

The Mississippi Valley Loess Plains region is typified by rolling to irregular plains and loess deposits of varying thickness. Land cover in this region is a patchwork of agricultural and forested land where oak-hickory and oak-hickory-pine forests dominate. Three basic vegetation types are found within the project area: herbaceous vegetation (80 percent), deciduous forests (15 percent), and mixed evergreen-deciduous forest (5 percent).

Herbaceous vegetation occurs in pastures, cropped fields, and in transmission line ROWs. These areas are regularly disturbed by grazing, mowing, and ROW maintenance and are characterized by the abundance of early successional plant species favored by these conditions. Typical grass species include broomsedge, crabgrass, foxtail, greasy grass, tall fescue, and three-awn grass. Commonly observed forbs were Carolina elephantsfoot, cudweed, dead nettle, hairy old-field aster, horse nettle, thistle, and wild garlic. Early successional woody species like blackberry, eastern redcedar, Japanese honeysuckle, sweetgum, and winged elm have colonized sections of ROW where no recent maintenance has occurred. Approximately 4,750 feet of existing ROW along the eastern section of the project area had been mechanically scraped using heavy equipment just prior to the January 2007 TVA field survey. This entire length of scraped area was approaching 100

percent bare soil with no plant cover. No attempts at revegetating the site or controlling erosion had been made at that time.

Deciduous forest occurs along the western portion of the project area where no transmission lines occur. Several types of deciduous forest would be dissected by the proposed ROW and can be described as dry oak-hickory forest, moist oak-poplar forest, and bottomland hardwood forest. The dry oak-hickory forest is found on ridgetops and south/west facing slopes and is characterized by black oak, mockernut hickory, scarlet oak, southern red oak, and white oak. The moist forest is found on flatter areas with deeper soils and includes species like black cherry, cherrybark oak, red buckeye, sweetgum, tulip poplar, and white oak. The bottomland hardwood forest is located in the floodplain of Little Coldwater Creek and includes numerous species indicative of wetter areas. Important tree species in this wetland forest type include black willow, cherrybark oak, green ash, nutmeg hickory, overcup oak, river birch, swamp white oak, sweetgum, and sycamore. Bottomland shrub species include bladdernut, buttonbush, and red buckeye. Herbaceous vegetation observed here includes longstyle sweetroot, prairie trillium, river oats, sensitive fern, soft rush, spring cress, wild blue phlox, and wood reed.

Mixed evergreen-deciduous forest found in the project area occurs on relatively dry sites and tends to have been more recently disturbed by land clearing than the other forest types. Loblolly pine is the dominant evergreen and eastern redcedar, red maple, sweetgum, and tulip poplar are the most common associates. Most of the mixed evergreen-deciduous forests observed had very dense canopies and species-poor herb layers.

Invasive exotic plant species encountered along the proposed route include Chinese privet, foxtail, Japanese honeysuckle, Japanese stilt grass, multiflora rose, and tall fescue. All of these species have the potential to impact the native plant communities adversely because of their potential to spread rapidly and displace native vegetation. Invasive plants are most prevalent in the herbaceous vegetation and mixed evergreen-deciduous forest communities, where the native vegetation has been extensively altered as a result of previous land use history.

3.6. Wildlife

Early successional habitats dominated by herbaceous vegetation make up most of the proposed transmission line route, and include pastures, cropped fields, existing transmission line ROWs, and small sections of early successional woody growth in the form of shrubs and small trees. In addition, approximately a mile of ROW along the eastern section of the project area is entirely bare soil. Birds common in early successional habitats include Carolina wren, eastern bluebird, brown thrasher, white-eyed vireo, northern cardinal, indigo bunting, blue grosbeak, common yellowthroat, dickcissel, various sparrows, and many other common songbirds. Mammals frequently observed in these habitats include Virginia opossum, eastern cottontail, striped skunk, white-tailed deer, and rodents, such as white-footed mouse and hispid cotton rat. Common reptiles include racer, black rat snake, brown snake, and eastern garter snake. Wetlands within early successional habitats provide habitats for many amphibians such as American and Fowler's toads, green frog, northern cricket frog, and eastern newts.

Fifteen percent of the proposed transmission line route is deciduous forest and includes both upland and bottomland forests. The remaining 5 percent of the project area contains mixed evergreen-deciduous forest. Upland deciduous forest provides nesting habitat for numerous neotropical migrants including wood thrushes, yellow-throated vireo, red-eyed vireo, hooded warbler, black-and-white warbler, worm-eating warbler, and Kentucky warbler. Mississippi slimy salamanders may be abundant in these forests. Common reptiles found in deciduous forests include eastern box turtle, worm snake, ring-necked snake, black rat snake, kingsnake, and copperhead. Mammals such as eastern chipmunk and eastern gray squirrel are also observed in this forest type. The mixed evergreen-deciduous forest observed was all upland habitat and provides habitat for many of the same species listed for upland deciduous forests. Additional bird species present in this forest type include sharp-shinned hawk, pine warbler, and yellow-throated warbler.

The bottomland deciduous forest is located in the floodplain of Little Coldwater Creek. Common birds found in bottomland forests include wood duck, barred owl, red-shouldered hawk, and prothonotary warbler. Low-gradient streams and vernal pools in this area provide habitat for amphibians including American and Fowler's toads, green frog, northern cricket frog, marbled salamander, red salamander, eastern newts, spotted dusky salamander, and southern two-lined salamander. Mammals frequently observed in bottomland forests include cotton mouse, swamp rabbit, muskrat, beaver, and raccoon. Reptiles found in bottomland forests include rough green snake, plain-bellied water snake, diamondback water snake, and cottonmouth.

No caves or heronries are known to occur within 3 miles of the proposed transmission line route, and none were observed during field investigations.

3.7. Threatened and Endangered Species

The TVA Natural Heritage database indicated that no federally listed and seven state-listed species are known from Marshall County, Mississippi (Table 3-1). Of the state-listed species, neither of the fish species is known to occur within the Coldwater Creek watershed, and none of the previously reported plant species are known from within 5 miles of the project area. Two other state-listed plant species were observed during field surveys in the project area (Table 3-1). Neither of these two listed plants, the longstyle sweetroot and white trout-lily, occurs within the proposed ROW. No listed terrestrial animals were previously reported from the project area, and none were observed during field surveys.

Table 3-1. Federally Listed and State-Listed Species Known From Marshall County, Mississippi

Common name	Scientific name	Status[1]	
		Federal	State
Fish			
Northern madtom	*Noturus stigmosus*	--	END (S1)
Yazoo darter	*Etheostoma raneyi*	--	NOST (S2) A
Plants			
American ginseng	*Panax quinquefolius*	--	NOST/S3
Butternut	*Juglans cinerea*	--	NOST/S2
Longstyle sweetroot[2]	*Osmorhiza longistylis*	--	NOST/S3
Monkey-flower	*Mimulus ringens*	--	NOST/S1S2

Common name	Scientific name	Status[1]	
		Federal	State
Prairie parsley	*Polytaenia nuttallii*	--	NOST/S2
Purple fringeless orchid	*Platanthera peramoena*	--	NOST/S2S3
White trout-lily[2]	*Erythronium albidum*	--	NOST/S2

-- = Not applicable

[1] Status codes: **END** = Endangered; **NOST** = Listed by the State of Mississippi but not assigned a status; **S1** = Critically imperiled in Mississippi because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it vulnerable to extirpation; **S2** = Imperiled in Mississippi because of rarity (6 to 20 occurrences or few remaining individuals or acres) making it vulnerable to extirpation; **S3** = Rare or uncommon in Mississippi (on the order of 21 to 100 occurrences)

[2] Species observed during the field surveys in January and March 2007

3.8. Wetlands

Wetlands are areas inundated by surface water or groundwater such that vegetation (hydrophytes) adapted to saturated soil conditions are prevalent. Wetland substrates consist predominantly of undrained hydric soil, soils that are saturated with water and usually deprived of oxygen. Wetland examples include palustrine areas (described as lacking flowing water, including marshes and swamps as well as bogs, fens, wet meadows, and floodplains) and lacustrine areas (described as lake-associated, including freshwater marshes, aquatic beds, and lakeshores).

The proposed transmission line would span 5.6 miles, crossing cropland, channelized streams, and secondary upland and bottomland forest. No land use/land cover data were available for this review; however, National Wetlands Inventory data indicated that approximately 9,319 acres of the Coldwater River watershed (HUC 08030204-010) in Marshall County is wetland, comprising 8 percent of the total land cover. Of this wetland amount, 6,318 acres is catalogued as forested wetland habitat, comprising 67 percent of the total mapped wetland area and 6 percent of the total land cover within the watershed in Marshall County.

Wetland determinations were performed according to the U.S. Army Corps of Engineers (USACE) standards that require documentation of hydrophytic vegetation, hydric soil, and wetland hydrology (Environmental Laboratory 1987; Reed 1997). Broader classification definitions of wetlands, such as that used by the U.S. Fish and Wildlife Service (Cowardin et al. 1979) and the TVA Environmental Review Procedures definition (TVA 1983), were also considered in this review. Using a TVA-developed modification of the Ohio Rapid Assessment Method (Mack 2001) specific to the TVA region (known as TVARAM), wetlands were categorized by their functions, sensitivity to disturbance, rarity, and irreplaceability. The categorization was used to assess significance, evaluate impacts, and determine the appropriate levels of mitigation for wetland impacts. The TVARAM is designed to distinguish between three categories of wetlands.

Category 1 wetlands are described as “limited quality waters.” They are considered 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. Category 2 includes wetlands of moderate quality and also wetlands that are degraded but exhibit reasonable potential for restoration. Avoidance and minimization are the first lines of mitigation for Category 2 wetlands. Category 3 generally includes wetlands

of very high quality and wetlands of concern regionally and/or statewide, such as wetlands that provide habitat for threatened or endangered species.

A survey was conducted in January and March 2007 within the proposed transmission line corridor and access roads to identify all potentially affected jurisdictional wetlands. Two wetlands (W001 and W003) were identified within the proposed transmission line ROW and classified according to Cowardin et al. (1979).

Wetland W001 is small fringe wetland associated with a small farm pond along Route Segment 2 near the planned Coldwater Substation site. The pond is located in the headwaters of an unnamed branch of Little Coldwater Creek. W001 is classified as a mixture of palustrine, emergent/scrub-shrub/unconsolidated bottom, wetland habitat. The emergent/scrub-shrub portion is a temporarily saturated/flooded pasture, and the unconsolidated bottom portion is permanently flooded. A small, 0.02 acre, portion of W001 extends into the ROW. Dominant vegetation includes sweetgum, sycamore, black willow, broomsedge, and water pepper. W001 scored as a low Category 2 wetland (36.5) using TVARAM, which indicates a moderate wetland condition and moderate provision of wetland functions.

Wetland W003 formed in the floodplain of another unnamed tributary to Little Coldwater Creek. Approximately 0.46 acre of W003 would be within proposed transmission line ROW. This wetland is classified as a palustrine, emergent, seasonally saturated/flooded wetland. Dominant vegetation includes a variety of herbaceous wetland plants such as swamp smartweed, soft rush, sweetgum, black willow, false nettle, brushy seedbox, and elderberry. W003 is in a highly disturbed condition as it is periodically mowed and has been recently graded with a bulldozer or similar heavy, earth-moving equipment. W003 scored as a low Category 2 wetland (31) using TVARAM, which also indicates a moderate wetland condition and moderate provision of wetland functions.

These wetlands possess the criteria for jurisdictional wetlands and may be regulated by USACE under the Clean Water Act. All wetlands identified within the proposed project area function in storm water retention, erosion control, toxicant absorption, flood control, and offer wildlife habitat. Using TVARAM, W001 and W003 scored as Category 2 wetlands, which indicates moderate wetland condition and provision of the above-listed wetland functions.

3.9. Floodplains

The proposed transmission line route crosses the identified 100-year floodplain of Little Coldwater Creek along with several minor floodplain areas in Marshall County, Mississippi. The planned Coldwater Substation site is located outside of the 100-year floodplain.

3.10. Visual Resources

Visual resources are evaluated based on existing landscape character, distances of available views, levels of constituent sensitivity from viewing positions, human perceptions of landscape beauty/sense of place (scenic attractiveness), and the degree of visual unity and wholeness of the natural landscape in the course of human alteration (scenic integrity).

The proposed transmission line route would tap the existing Holly Springs–Miller 161-kV Transmission Line, near the roadway crossing at Marshview Lane, in rural Marshall County,

Mississippi. Vegetation in the vicinity of the tap point varies from the grasses found in open lawns and pasturelands to mature trees in forestland and along wetland areas surrounding Coldwater River to areas void of vegetation, such as borrow pits and reclamation areas. In the immediate vicinity of the tap point, pastureland is interspersed with mature forest and lowland vegetation, which follow the upper limits of the Coldwater River hollow. The topography in the immediate area is moderately sloping. Existing residences, comprised of single-family stick built, mobile, and manufactured homes, are scattered along the gravel roadway. Existing transmission and distribution lines are presently visible from within the foreground viewing distance (up to 0.5 mile from the observer). The rural and pastoral landscape character, which is visible near the vicinity of the proposed tap point, is typical to the area and is preserved throughout the length of the proposed transmission line route. From this proposed point of connection, the proposed transmission line would utilize approximately 1.6 miles of a new 75-foot ROW along a northeast route toward the distributor substation location.

Near Mount Zion Road, the landscape character remains similar to that visible from positions along Marshview Lane. Views are limited to the middleground viewing distance (0.5 mile to 4 miles from the observer) due to existing changes in topography and mature vegetation, which prevent views from greater distances. From Mount Zion Road, which is an improved chip/seal roadway serving as the primary connector between the communities of Taska and Cayce, vegetation patterns vary slightly from the lower areas approaching Coldwater River. Planted pines are visible from several positions near the proposed crossing point. To the north of the roadway, a shallow borrow area is visible. Existing transmission and distribution structures are visible along the length of the roadway west and to the north amid the borrow area.

North of Mount Zion Road, changes in elevation become slightly more pronounced, and bottomland pasture is visible into the foreground, bordered by mature vegetation. Approximately 1,500 feet south of the existing HSUD ROW, the new transmission line would turn north along an existing distributor line. At this point, a constructed pond is visible to the south from within the foreground viewing distance. A residence and outbuildings are visible to the southeast intermittently from positions along the northwest corner of the constructed pond.

As the proposed transmission line turns east, it would utilize approximately 3.8 miles of existing HSUD ROW replacing 2.7 miles of 46-kV transmission line and underbuilding 1.1 miles with 13-kV transmission line. Continuing east, views are available farther into the middleground across North Red Banks Road where pastureland is visible through thin bands of vegetation along the peripheries of drainage ditches and streams that feed Little Coldwater Creek. Several residences are visible along North Red Banks Road, which is an improved chip/seal roadway serving as a primary connector between US 72 to the north and US 78 to the south. Loftin Road intersects North Red Banks Road and travels east/west. It is an unimproved, gravel roadway with a number of residences and farmsteads located to the east where Loftin Road intersects with Taska Road.

In the vicinity of Taska Road, to the south, the number of residences visible increases substantially. There are small ponds visible to the south where the Seldon, Brittenum, and Taska Cove roads intersect. Numerous single-family stick-built, mobile, and manufactured homes line the roadways on both sides. To the north of Taska Road, views are limited due to existing mature vegetation. Farther north from the improved paved roadway, pastureland

and mature vegetation, as well as the existing Nesbitt–Miller–Slayden Transmission Line, are visible into the middleground.

Continuing eastward, approaching the intersection of Taska Road and Wildcat Bottom Road, Taska Road turns sharply to the north toward US 72. The proposed project at this point would utilize the existing ROW for approximately 1.1 miles replacing the existing transmission line structures with 161-kV transmission line structures underbuilt with a 13-kV transmission line (Figure 2-1[b]). Several residences are visible in the vicinity along the roads, as well as pasturelands interspersed with mature vegetation. Topography in the area is gently rolling, falling to the east toward a branched stream that feeds Little Coldwater Creek. From several positions in the area, SR 311 is visible through thin bandings of vegetation that line the existing pasturelands and roadside.

SR 311 is a primary north/south route that connects Mt. Pleasant and Holly Springs, Mississippi. In the vicinity of the proposed transmission line, there are businesses, farmsteads, single-family homes, and small residential developments visible from within the foreground viewing distance. To the north, approximately 2 miles away, lies the town of Mt. Pleasant, Mississippi. Along the proposed route in its entirety, the landscape character may be described as rural/pastoral. The existing scenic attractiveness is common, and the scenic integrity is moderate.

3.11. Recreation, Parks, and Managed Areas

The TVA Natural Heritage Database indicated that the proposed action is not within, adjacent to, or within 3 miles of any managed area and/or ecologically significant site and no Nationwide Rivers Inventory (NRI) stream or Wild and Scenic River.

There are no developed recreational facilities in the proposed project corridor. Recreation activities are informal and dispersed and include hunting, nature viewing, and off-road vehicle activities.

3.12. Cultural Resources

Northern Mississippi has been the location of human occupation for over 12,000 years. The prehistory and history of the area is generally divided into six broad periods: Paleo-Indian (10,000-8000 B.C.); Archaic (8000-1000 B.C.); Gulf Formational (1100-300 B.C.); Woodland (300 B.C.-A.D. 900); Mississippian (A.D. 1000-1700); and Historic (A.D. 1700 to present). Prehistoric land use and settlement varies during each period, but generally, short- and long-term habitation sites are located on floodplains and alluvial terraces along rivers and tributaries. Specialized campsites tend to be located on older alluvial terraces and in the uplands. The Historic Period is represented by settlement in the region by Europeans, European Americans, and African Americans and the subsequent removal of Native American tribes.

North Mississippi, including all of what is now Marshall County, remained the territory of the Chickasaw until 1832, when the tribe finally was forced to cede all of it territory east of the Mississippi in the *Treaty of Pontotoc*. Most of the Chickasaw were moved between 1835 and 1839 (Fowler 1960), and Marshall County was created in 1836. Fertile cotton lands attracted settlers to the area. The census of 1850 reported that Marshall County was the number one producer of cotton in the third-largest cotton-producing state in the nation

(DeBow 1990). The prosperous agricultural economy of the county provided many of the residents with significant fortunes, and the county seat of Holly Springs was well known as a center of wealth, culture, and civic involvement (Clayton 1880). A building boom was under way once the railroad connected to Holly Springs, and the town became a strategic location during the Civil War. Although there were no major battles fought in the vicinity of the project corridor, there were a number of skirmishes as troops from both sides moved through the area (Official Records of the Union and Confederate Armies 1892). After the Civil War, much of Marshall County had to be rebuilt.

TVA identified the archaeological area of potential effect (APE) to be all areas in which land-disturbing activities would occur. The APE for historic architectural resources included the transmission line corridor plus an approximately 0.5-mile radius in which the proposed construction may lie within view of historic resources. Prior to any survey, a literature review was conducted at the Mississippi Department of Archives and History/SHPO.

The archaeological survey, conducted in January and February 2007, identified one new archaeological site (22MR665), a Civil War-era fortification situated on the slope of a low finger ridge that overlooks Little Coldwater Creek and its floodplain. The southern portion of the earthwork has been previously cleared and disturbed by dam construction and a man-made lake. This site is recommended eligible for listing on the NRHP and would have been affected by a section of the proposed Route Segment 7. This section of the proposed transmission line was rerouted to the south end of the site so that the transmission line centerline would pass through an eroded area. This area has also been previously disturbed by dumping and construction activity related to the dam. The eroded opening can be used for construction and maintenance access without doing further damage to the site.

The historic architecture survey identified seven previously unrecorded historic structures (HS-1 through HS-7) within the APE. HS-1 is a one story, four-bay dwelling with a vernacular side-gabled design located north of the project corridor. Because of the common type of architecture and alterations, HS-1 is not a good example of its type and is therefore recommended ineligible for listing on the NRHP. HS-2 is a one-and-one-half-story, three-gabled vernacular dwelling located south of the project corridor. HS-3 is a one-story, three-bay dwelling with vernacular gabled design located south of the project corridor. HS-2 and HS-3 structures are not good examples of their type and are therefore considered ineligible for listing on the NRHP. HS-4 is a one-story, three-bay dwelling with a vernacular side-gabled design located southeast of the project corridor and is considered ineligible for listing on the NRHP. HS-5 is a one-story, three-bay dwelling with a vernacular side-gabled design located southeast of the project corridor. Due to alterations, this structure is not a good example of its type and is therefore considered ineligible for listing on the NRHP. HS-6 is a one-story, four-bay dwelling with a vernacular design located southeast of the project corridor. This structure has six secondary outbuildings associated with it. HS-6 has architectural features unique to the area and is recommended eligible for listing on the NRHP. HS-7 is a one-and-one-half-story, four-bay, twin-bungalow dwelling designed in the Craftsman style located north of the project corridor. The Craftsman style twin house has architectural features unique to the area and is therefore recommended eligible for listing on the NRHP.

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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 2.2 Description of Alternatives.

Section 2.2 contains by alternative the predicted attainment and nonattainment of the purpose and need defined in Chapter 1. Chapter 4 presents the detailed predicted effects of implementing Alternative 1 - Do Not Build the Holly Springs-Miller 161-kV Transmission Line Tap to the Coldwater Substation (No Action) and Alternative 2 - Construct and Operate the Holly Springs-Miller 161-kV Transmission Line Tap to the Coldwater Substation (Action).

4.1.1. Alternative 1 - Do Not Build the Holly Springs-Miller 161-kV Transmission Line Tap to the Coldwater Substation (No Action)

Under this alternative, TVA would not construct and operate the proposed transmission line, or take other actions to serve HSUD's planned substation and help improve the power supply situation in the HSUD project area. None of the impacts resulting from the construction and operation of the proposed facilities described below would occur as a result of TVA's actions. In general, however, factors outside of TVA's control would continue to influence natural and cultural resources in the project area.

Adoption of the No Action Alternative could potentially affect the introduction and spread of invasive terrestrial plant species in the approximately 4,750-foot unvegetated section of ROW. If this area is not actively revegetated, it may be more susceptible to exotic species invasion than if reclaimed using TVA-approved methods for controlling erosion and establishing noninvasive plant cover (Muncy 1999). However, impacts are expected to be insignificant if this alternative is chosen because the affected ROW (approximately 11 acres) comprises only a small portion of the erosion-prone land found across the region or state.

Because much of the proposed project would occur on existing ROW currently owned by the distributors, vegetative maintenance would continue to occur periodically along this area regardless of whether the proposed TVA transmission line were constructed. This maintenance would include the use of herbicides that could possibly impact groundwater resources. Additionally, because SMZs have not been established or maintained along several sections of the existing distributor transmission line, stream crossings on this section of ROW would continue to be impacted negatively. Impacts to these streams could include increased siltation due to the lack of a riparian buffer zone and alteration of stream morphology. In areas that are not currently maintained as transmission line ROWs by HSUD, no access roads or ROW would be cleared and no transmission line built. Therefore, no additional impacts to aquatic habitat in the Little Coldwater Creek system would occur.

The implementation of Alternative 1, as discussed in Section 2.2.1, would not address the reliability or capacity concerns in the HSUD service area. As a result, the potential for impacts resulting from the actions that HSUD could take to address these concerns such as connecting its planned substation to the TVA system, is considered equal or greater to Alternative 2. Therefore, the effects of implementing Alternative 1 likely would be similar to if not greater than the effects of Alternative 2 - Construct and Operate the Holly Springs-Miller 161-kV Transmission Line Tap to the Coldwater Substation (Action).

4.1.2. Alternative 2 - Construct and Operate the Holly Springs-Miller 161-kV Transmission Line Tap to the Coldwater Substation (Action)

Under this alternative, TVA would implement the proposed project. The predicted effects of the construction, operation, and maintenance of the proposed 5.6-mile transmission line are described in this chapter.

4.2. Groundwater

None of the project area is located within or near a State Designated Source Water Protection Area; therefore, impacts to public drinking water supplies would be unlikely. Best management practices (BMPs) as described in Muncy (1999) would be used to avoid impacts on groundwater on the proposed ROW. Because the project area is underlain by the Sparta Sand, an unconfined, shallow aquifer, contamination of this shallow aquifer could easily occur and affect private wells. Therefore, during revegetation and maintenance activities, the use of fertilizers and herbicides would be considered with caution before application and would be applied according to the manufacturers' labels. Herbicides with groundwater contamination warnings would not be used. With the use of BMPs, impacts from the proposed project would be insignificant.

4.3. Surface Water

Soil disturbances associated with access roads or other construction activities can potentially result in adverse water quality impacts. Stream bank erosion and sedimentation can clog small streams, increase nutrient inflows, and threaten aquatic life. Removal of the tree canopy along stream crossings can increase water temperatures, algal growth, dissolved oxygen depletion, and adverse impacts to aquatic biota. Improper use of herbicides to control vegetation 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. ROW maintenance would employ manual and low-impact methods wherever possible. In areas requiring chemical treatment, only USEPA-registered herbicides would be used in accordance with label directions, designed in part to restrict applications in the vicinity of receiving waters and to prevent unacceptable aquatic impacts. Proper implementation of these controls is expected to result in only minor temporary impacts to surface waters. No cumulative impacts are anticipated.

4.4. Aquatic Ecology

Aquatic life could be affected by the proposed action either directly by the alteration of habitat conditions within streams or indirectly due to modification of the riparian zone and storm water runoff resulting from construction and maintenance activities along the transmission line corridor or on the substation site. Potential impacts due to removal of streamside vegetation within the riparian zone include increased erosion and siltation, loss of instream habitat, and increased stream temperatures. Other potential construction and maintenance impacts include alteration of stream banks and stream bottoms by heavy equipment and runoff of herbicides into streams.

All watercourses identified during the field surveys along the proposed transmission line routes were assigned a category of protection level 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 (Appendices IV and VII). The width of the SMZs is determined by the type of watercourse, primary use of the water resource, topography, or other physical barriers (Muncy 1999). SMZ width is measured along the slope in linear feet on each side from the edge of the water body to the toe of the road or other surface disturbance. Regardless of width, the SMZ must provide effective sediment protection for the watercourse (Muncy 1999).

Watercourses that convey only surface water during storm events (i.e., wet-weather conveyances) 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 in part to minimize disturbance of riparian areas and subsequent erosion and sedimentation in streams.

Part of the proposed transmission line would be built within an existing transmission line ROW. Because of the existing poor condition along streams within this section, implementation of TVA's standard practices, including SMZs and BMPs, would most likely improve current conditions for aquatic life by reestablishing streamside vegetation in areas of the ROW where they are currently lacking and decreasing runoff and the resulting sedimentation into the stream channels. For all watercourses along the proposed transmission line, with proper implementation of the appropriate stream protection requirements and the use of standard BMPs as outlined in Muncy (1999), all potential direct, indirect, or cumulative impacts to aquatic communities or habitat as a result of the construction, operation, and maintenance of the proposed transmission line would be insignificant.

4.5. Vegetation

Adoption of the proposed transmission line would require the reclearing of overgrown ROW and clearing of sections of approximately 21 acres of deciduous and mixed evergreen-deciduous forest. These communities are common and well represented in the region; therefore, no significant impacts to these communities are expected.

Approximately 800 feet (60 percent) of the proposed transmission line ROW is heavily disturbed by prior mechanical scraping and has existing populations of invasive terrestrial plant species. The proposed project would not contribute to the spread of exotic species in these areas because invasive species currently occupy the site. Implementation of the proposed project would fragment closed-canopy forest along other parts of the proposed

ROW. Forest fragmentation has been closely associated with increased susceptibility to exotic invasion (Rejmanek 1989). To avoid impacts to these communities, noninvasive species would be planted to prevent introduction and spread of invasive species at the project site (Muncy 1999). Overall impacts related to invasive species associated with the proposed project are expected to be insignificant.

4.6. Wildlife

Clearing of about 21 acres of forested habitat along the proposed route would increase early successional habitats and forest edge. Although some species, including several neotropical migrant songbirds, are dependent on large forested areas and can be impacted by forest conversion, current forested habitat along the proposed route is already heavily fragmented and forest-dependent species would be minimally impacted. Conversely, several species require early successional habitats maintained by disturbance. Although construction of the transmission line would temporarily disturb these species, they would ultimately benefit from the increase of habitat. Most species that would be affected by these changes are locally and regionally common, and existing habitats along the proposed transmission line route are already largely fragmented by agricultural practices. Further fragmentation of these habitats would be insignificant.

No caves or heronries are known to occur within 3 miles of the proposed project area, and these resources are not expected to be impacted under this alternative.

4.7. Threatened and Endangered Species

Two state-listed plant species (longstyle sweetroot and white trout-lily), previously undocumented from Marshall County, were observed in the project area during field surveys. Neither of these plant populations was observed along the proposed transmission line route and neither of them, nor other federally or state-listed plants, would be affected. No other rare plant species were observed, and no project-related impacts would result from the implementation of the proposed project. No federally or state-listed aquatic or terrestrial animals or their habitat would be affected.

4.8. Wetlands

Activities in wetlands are regulated under Sections 401 and 404 of the Clean Water Act and EO 11990. Section 401 requires water quality certification by the state for projects permitted by the federal government (Strand 1997). In Mississippi, the MDEQ issues Section 401 certifications. Section 404 implementation requires activities in wetlands be authorized through a Nationwide General Permit or Individual Permit issued by the USACE. The proposed Coldwater Substation project is located within the USACE Vicksburg Regulatory District. EO 11990 requires federal agencies to minimize wetland destruction, loss, or degradation, and preserve and enhance natural and beneficial wetland values, while carrying out agency responsibilities. TVARAM can aid in guiding wetland mitigation decisions consistent with TVA's independent responsibilities under the National Environmental Policy Act (NEPA) and EO 11990. Using TVARAM, lower standards for avoidance, minimization, and mitigation can be applied to Category 1 wetlands. Avoidance and minimization should be the first lines of mitigation for Category 2 wetlands. Disturbance of any kind to Category 3 wetlands and their buffer zone should be avoided if at all possible.

Two wetlands (W001 and W003) with a combined total of 0.48 acre of wetlands would be located within the proposed ROW. Both are relatively low-quality wetlands dominated by emergent wetland vegetation with minor amounts of scrub-shrub habitat that would require very little clearing. Both W001 and W003 extend beyond the proposed ROW. The construction of the proposed transmission line would likely require some structures to be placed within an identified wetland boundary, especially in W003. Appropriate BMPs would be implemented in each of the wetland boundaries to minimize wetland impacts (Muncy 1999). Because these are emergent/scrub-shrub wetlands, no vegetation clearing within any transmission line spans would be necessary. Only minimal, insignificant vegetation clearing and wetland fill resulting from potential structure placement within these wetlands would be incurred. Therefore, cumulative wetland impacts along the preferred route would be insignificant.

4.9. Floodplains

The proposed transmission line crosses several floodplain areas in Marshall County, Mississippi. Consistent with EO 11988, an overhead transmission line and related support structures are considered repetitive actions in the 100-year floodplain. The construction of the support structures for the transmission line would not be expected to result in any increase in flood hazard, either as a result of increased flood elevations or changes in flow-carrying capacity of the streams being crossed. To minimize adverse impacts on natural and beneficial floodplain values, the ROW 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 planned Coldwater Substation would not be located within the 100-year floodplain, which would be consistent with EO 11988. Some of the access roads would involve construction in the 100-year floodplain. Any road construction would be done in such a manner that upstream flood elevations would not be increased.

4.10. Visual Resources

Under the proposed Action Alternative, TVA would tap the existing Holly Springs–Miller Transmission Line and provide 161-kV service to the planned HSUD substation via a 5.6-mile tap line. Approximately 3.8 miles of the proposed 161-kV transmission line would be built primarily using single steel-pole structures utilizing existing transmission line ROW (Figure 2-1). Of this, 2.7 miles would replace a 46-kV transmission line and 1.1 miles would replace 13-kV transmission line that would remain on the new structures as an underbuilt circuit belonging to HSUD (Figure 2-1[b]). Structure type and height would vary according to terrain and would range between 60 and 120 feet. The new metal structures would be generally more prominent parts of the landscape than the shorter wood structures they would replace. Potential viewer groups of the proposed transmission line and substation would include residents who live within the foreground viewing distance and motorists who travel roadways that cross or come within 0.5 mile of the proposed transmission line.

At the tap point location along the existing Holly Springs–Miller Transmission Line, views would be restricted to areas surrounding the few residences located along the southern portion of Marshview Road where available foreground views would exist intermittently through mature vegetation. These views of single steel-pole structures would remain in context with the larger lace-frame structures, which are presently visible from similar

positions. The frequency and duration of available views would vary, based upon viewer position relative to the proposed transmission line, ROW, and associated structures.

Toward Mount Zion Road, views of the proposed transmission structures would be visible from areas near residences located along Mount Zion Road to the west and to motorists traveling the east/west roadway. From these positions, available views would exist perpendicular to the proposed transmission line and would be limited to the area surrounding the roadway crossing. Views north of the roadway would be limited, due to changes in topography and vegetation patterns. Frequency and duration of available views would vary based on viewer group and location. Motorists would have brief views of the transmission line from between structures and in context with existing transmission and distribution lines. Residents would have views of greater duration with existing structures in context.

Eastward along the proposed route, few views would be available as the transmission line would traverse forest and bottomland pasture over the segment between Mount Zion Road and the intersection with the HSUD ROW, approximately a mile away. Existing land ownership patterns, vegetation, and topography would limit views to fewer than five areas surrounding existing residences. From these positions within the foreground viewing distance, the proposed transmission line and structures would be visible against mature background vegetation, causing the foreground features to recede from view against the larger pattern of vegetation visible in the background. The number of available views would increase nearer North Red Banks Road, where annual average daily traffic (AADT), has been estimated at 820 vehicles per day along the north/south roadway (Mississippi Department of Transportation 2005). From positions along North Red Banks Road, views available to motorists would be similar to those existing views of single wooden-pole transmission structures on the existing HSUD ROW and distribution line structures. Views available to motorists and residents along Loftin Road to the east would remain similar and in context with those of the existing Nesbitt–Miller–Slayden Transmission Line. Frequency and duration of available views within this segment would vary between viewer groups. Motorists would have infrequent views of the proposed transmission line for a very brief duration, and residents who may have views of the proposed transmission line would have views of a greater frequency and duration.

Upon reaching the intersection of Taska Road and Loftin Road, the number of residences that are located in close proximity to the proposed transmission line route increase substantially. However, views from areas surrounding the residences along Taska Road would generally be precluded, due to the mature vegetation that lines much of the northern ROW along Taska Road. Views of the proposed transmission line would potentially be available to those residents living immediately to the south of Taska Road during winter months because changes in foliage patterns would offer intermittent views of the proposed transmission line, as has been the case with the existing transmission line in this area. Motorists traveling Taska Road south toward Wildcat Bottom Road would have brief views of the transmission line from between structures.

Approaching SR 311, residents north of the proposed transmission line would have intermittent views through mature vegetation from within the foreground viewing distance. These views of single steel-pole structures would be similar in context to the existing single wooden-pole distribution line structures that are presently visible along the roadway. Land use patterns and vegetation to the south of the proposed transmission line would generally preclude views from those positions. Motorists traveling SR 311 would have views of the

proposed transmission line only briefly near the roadway crossing point, from between structures. AADT for SR 311 has been estimated at 1,800 vehicles per day (Mississippi Department of Transportation 2005). East of SR 311, as land use patterns open, views would be available from several positions surrounding residences in the immediate vicinity. To the north, and nearing the distributor substation location, the number of available viewing positions would increase from positions within the Eagle Hill residential development. These available views would include areas of the planned distributor substation. Views from these positions would vary in frequency and duration, but would generally be greater in frequency and duration than from positions previously discussed. Views of the single steel-pole structures would remain similar in context with existing single wooden-pole distribution structures presently visible along the roadway and throughout the development.

The proposed transmission line would span lowland areas, pasturelands, and sparsely developed rural residential areas in Marshall County, Mississippi. It would cross secondary, rural, and unimproved roadways in approximately four locations. In many locations, the proposed transmission line would be obscured from view or viewed in context with existing transmission/distribution lines. Temporary visual discord associated with the construction of this proposed transmission line project would be probable as residents and motorists would have views of increases in personnel and equipment, as well as the creation and use of access roadways and material and equipment staging areas. These impacts to the existing landscape character associated with the construction phases of the project would be temporary in nature and would not result in a prolonged adverse impact. The Action Alternative, as proposed, would also result in the incremental addition of the number of contrasting vertical elements in the landscape and approximately 5.6 miles of transmission tap line. However, the changes that would be discernable from the viewing positions described in 3.10 at the conclusion of the construction phases of the project would not contribute to a substantial change in the existing landscape character and scenic value. Impacts to visual resources associated with the proposed project would be insignificant.

4.11. Recreation, Parks, and Managed Areas

There would be no significant impacts to public recreation activities, facilities, and resources with the implementation of the proposed project. Additionally, no natural areas, NRI streams or Wild and Scenic Rivers would be affected.

4.12. Cultural Resources

One newly identified archaeological resource, 22MR665, and seven historic structures (HS-1 through HS-7) were identified during surveys of the APE (D'Angelo 2007). Site 22MR665A, a Civil War fortification located along the proposed new ROW, is considered eligible for listing on the NRHP. However, since no poles would be placed directly on the site and maintenance activities would occur in an already cleared and disturbed section of the site that has eroded, the transmission line would have no adverse effect to the earthwork. Structures HS-1 through HS-5 do not meet criteria for eligibility for listing on the NRHP. Structures HS-6 and HS-7 are recommended eligible for listing on the NRHP. HS-6 would not be adversely affected because the only project activity visible from the structure would be an access road used during construction and then on infrequent occasions during subsequent maintenance activities. Similarly, HS-7 would not be adversely affected because the only project activity visible from the structure would be an access road. The

landscape in this area has also been altered with the construction of modern farm buildings nearby. The Mississippi SHPO concurs with TVA's determination that the proposed undertaking would not adversely impact any historic properties that are listed on, or eligible for listing on, the NRHP (Appendix I).

4.13. Post-Construction Impacts

4.13.1. 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 examining 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 ROW 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.

4.13.2. Other Impacts

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

4.14. 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 ROWs 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 ROW could continue.

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

4.15. Unavoidable Adverse Effects

As previously stated, clearing for the transmission line would result in the removal of approximately 21 acres of forest. After completion of the transmission line:

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

4.16. 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 Mt. Pleasant area of Marshall County, Mississippi. 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 ROW could be returned to its previous use or used for other purposes.

The principal change in short-term use of the ROW would be the exclusion of trees and permanent structures. The amount of forest being lost is approximately 21 acres within the ROW area, and areas removed from production are dispersed along the length of the transmission line. The ROW cannot support building construction for the life of the project, but the social and economic benefits of the project should outweigh this small loss.

4.17. 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

- All intermittent and perennial watercourse crossings would be designated as Category A, Standard Stream Protection as outlined in Muncy (1999). Protection levels for each watercourse crossing are identified in Appendix VII.

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

General Best Management Practices for Clearing, Construction, and Maintenance

- TVA practices detailed in Appendices II, III, IV, V, and VI 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 Preparers

Hugh S. Barger

Position:	Environmental Engineering Specialist, TVA Power System Operations, Chattanooga, Tennessee
Education/Experience:	B.S., Engineering; 34 years in Transmission Line Planning and Preparation of Environmental Review Documents
Involvement:	Purpose of and Need for Action; Alternatives Including Proposed Action

W. Nannette Brodie

Position:	Senior Environmental Scientist, TVA Research & Technology Applications, Chattanooga, Tennessee
Education/Experience:	B.S., Geology, B.S., Environmental Science; 12 years in Environmental Analyses, Surface Water Quality and Groundwater Assessments; Registered Professional Geologist
Involvement:	Groundwater

Adam Dattilo

Position:	Botanist, TVA Environmental Stewardship and Policy, Knoxville, Tennessee
Education/Experience:	M.S., Forestry; B.S., Natural Resource Conservation Management; 7 years in Ecological Restoration and Plant Ecology; 3 years in Botany
Involvement:	Vegetation, Threatened and Endangered Species

Britta Dimick

Position:	Wetlands Biologist, TVA Environmental Stewardship and Policy, Knoxville, Tennessee
Education/Experience:	M.S., Botany-Wetlands Ecology Emphasis; B.A., Biology; 9 years in Wetlands Assessments and Botanical Surveys; 3 years in Wetlands Regulations and NEPA Compliance
Involvement:	Wetlands

Jenny K. Fiedler

Position:	Terrestrial Zoologist, TVA Environmental Stewardship and Policy, Knoxville, Tennessee
Education/Experience:	M.S., Wildlife Science; B.S., Biology-Environmental Emphasis; 8 years in Field Biology; 3 years in NEPA Compliance
Involvement:	Wildlife, Threatened and Endangered Species

Heather M. Hart

Position:	Natural Areas Contractor, TVA Environmental Stewardship and Policy, Knoxville, Tennessee
Education/Experience:	M.S., Environmental and Soil Science, B.S., Plant and Soil Science (Water Quality); 4 years in Soil Assessment and Surface Water Quality Monitoring/Analysis, 3 years in Environmental Review
Involvement:	Natural Areas

John M. Higgins

Position:	Water Quality Specialist, TVA River Operations, Chattanooga, Tennessee
Education/Experience:	Ph.D., Environmental Engineering, B.S. and M.S., Civil Engineering; 31 years in Water Resource Management; Registered Professional Engineer
Involvement:	Surface Water

Clint E. Jones

Position:	Biologist-Aquatic Ecologist, TVA Environmental Stewardship and Policy, Knoxville, Tennessee
Education/Education:	B.S., Wildlife and Fisheries Science; 15 years in Environmental Consultation and Fisheries Management
Involvement:	Aquatic Ecology

Anita E. Masters

Position:	Senior NEPA Specialist, TVA Environmental Stewardship and Policy, Chattanooga, Tennessee
Education/Experience:	M.S., Biology/Fisheries, B.S., Wildlife Management; 20 years in Fisheries Biology/Aquatic Community and Watershed Assessments, Protected Aquatic Species and Habitat Monitoring, and NEPA Compliance
Involvement:	NEPA Compliance and Document Preparation

Roger A. Milstead

Position:	Manager, TVA Flood Risk and Data Management, Knoxville, Tennessee
Education/Experience:	B.S., Civil Engineering; 30 years in Floodplain and Environmental Evaluations; Registered Professional Engineer
Involvement:	Floodplains

Richard Pflueger

Position:	Land Use and Recreation Specialist, TVA, Environmental Stewardship and Policy, Muscle Shoals, Alabama
Education/Experience:	M.B.A.; B.S., Accounting; 29 years in Recreation Resources and Economic Development
Involvement:	Recreation

Jon C. Riley

Position:	Landscape Architect, TVA Environmental Stewardship and Policy, Muscle Shoals, Alabama
Education/Experience:	Bachelor of Landscape Architecture, Associate Member American Society of Landscape Architects; 8 years in Site Planning, Design, and Visual Resource Management
Involvement:	Land Use and Visual Resources

Marianne M. Shuler

Position:	Archaeologist Technician, TVA Environmental Stewardship and Policy, Knoxville, Tennessee
Education/Experience:	B.A., Religion/Middle Eastern Archaeology; 6 years in Archaeology
Involvement:	Cultural Resources

5.2. Literature Cited

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Appendix I – Correspondence

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H. T. Holmes, Director

March 19, 2007

Mr. Thomas O. Maher
Manager, Cultural Resources
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, Tennessee 37902-1401

RE: Cultural Resources Survey for the proposed Holly Springs-Miller 161 KV tap to Coldwater, MDAH Project Log #03-040-07, Marshall County

Dear Mr. Maher:

We have reviewed the February 2007 cultural resources survey report by Dr. James J. D'Angelo, Principal Investigator, received on March 6, for the above referenced undertaking, pursuant to our responsibilities under Section 106 of the National Historic Preservation Act and 36 CFR Part 800. After reviewing the information provided, we concur that site 22 Mr665, an apparent Civil War fortification, is eligible for listing in the National Register of Historic Places. We also concur that the proposed reroute will not adversely affect the resource. We further concur that no other sites or resources eligible for listing in the of the National Register of Historic Places will be affected by the project. Therefore, we have no reservations with the project.

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

Please provide a copy of this letter to Dr. D'Angelo. If you need further information, please let us know.

Sincerely,

Jim Woodrick
Review and Compliance Officer

FOR: H.T. Holmes
State Historic Preservation Officer

c: Clearinghouse for Federal Programs

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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 TVA's Transmission, Operations, and Maintenance (TOM) organization after initial clearing and construction. Cutting of trees within SMZs must be accomplished by using either hand-held equipment or other appropriate clearing equipment, such as a feller-buncher. The method will be selected based on site-specific conditions and topography to minimize soil disturbance and impacts to the SMZ and surrounding area. Disturbed soils in SMZs must be stabilized by appropriate methods immediately after the right-of-way is cleared. Stabilization must occur within the time frame specified in applicable storm water permits or regulations. Stumps within SMZs may be cut close to the ground but must not be removed or uprooted. Trees, limbs, and debris shall be immediately removed from streams, ditches, and wet areas using methods that will minimize dragging or scarring the banks or stream bottom. No debris will be left in the water or watercourse. Equipment will cross streams, ditches, or wet areas only at locations designated by TVA after the application of appropriate erosion control BMPs consistent with permit conditions or regulatory requirements.

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

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

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

Open burning debris will be kept away from streams and ditches and shall be incorporated into the soil.

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

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

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

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

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

11. Burning - The contractor shall obtain applicable permits and approvals to conduct controlled burning. The contractor will comply with all provisions of the permit, notification, or authorization including burning site locations, controlled draft, burning hours, and such other conditions as stipulated. If weather conditions such as wind speed or wind direction change rapidly, the contractor's burning operation may be temporarily stopped by TVA's field engineer. The debris to be burned shall be kept as clean and dry as possible and stacked and burned in a manner that produces the minimum amount of smoke. Residue

from burning will be disposed of according to permit stipulations. No fuel starters or enhancements other than kerosene will be allowed.

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

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

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

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

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

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

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

19. Brush and Timber Disposal (Reclearing) - The reclearing contractor shall place felled tree boles in neat stacks at the edge of the right-of-way, with crossing breaks at least every 100 feet. Property owner requests shall be reviewed with the project manager or right-of-way specialist before accepting them. Lop and drop activities must be specified in the contract

and on plan and profile drawings with verification with the right-of-way specialist before conducting such work. When tree trimming and chipping is necessary, disposal of the chips on the easement or other locations on the property must be with the consent of the property owner and the approval of the right-of-way specialist. No trees, branches, or chips shall remain in a surface water body or be placed at a location where washing into a surface water or groundwater source might occur.

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

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

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

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

    C. All disturbed areas will initially be seeded with a temporary ground cover such as winter wheat, rye, or millet, depending on the season. Perennials may also be planted during initial seeding if proper growing conditions exist. Final restoration and final seeding will be performed as line construction is completed. Final seeding will consist of permanent perennial grasses such as those outlined in TVA's *A Guide for Environmental Protection and 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 Environmental Stewardship and Policy staff will have studied each possible stream impact site and will have identified it as falling into one of three categories: (A) standard stream protection, (B) protection of important permanent streams, or (C) protection of unique habitats. These category designations are based on the variety of species and habitats that exist in the stream as well as state and federal requirements to avoid harming certain species. The category designation for each site will be marked on the plan and profile sheets. Construction crews are required to protect streams and other identified water habitats using the following pertinent set(s) of guidelines:

(A) Standard Stream Protection

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

Guidelines:

1. All construction work around streams will be done using pertinent best management practices (BMPs) such as those described in *A Guide for Environmental Protection and Best Management Practices for 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 Environmental Stewardship and Policy staff and may require an on-site planning session before any work begins. The purpose of these discussions will be to minimize the number of crossings and their impact on the important resources in the streams.

3. Cutting of trees within SMZs must be accomplished by using either hand-held equipment or other appropriate clearing equipment (e.g., a feller-buncher) that would result in minimal soil disturbance and damage to low-lying vegetation. The method will be selected based on site-specific conditions and topography to minimize soil disturbance and impacts to the SMZ and surrounding area. Cutting of trees near permanent streams must be limited to those required to meet National 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 Environmental Stewardship and Policy staff, preferably as a result of an on-site planning session. The purpose of this review and approval will be to minimize impacts on the unique habitat. All crossings of streams also must comply with appropriate state (and, at times, federal) permitting requirements.

3. Cutting of trees within 30 meters (100 feet) of the unique habitat must be discussed in advance with Environmental Stewardship and Policy staff, preferably during the on-site planning session. Cutting of trees near the unique habitat must be kept to an absolute minimum. Stumps must not be removed, uprooted, or cut shorter than 0.30 meter (1 foot) above the ground line.

4. Other vegetation near the unique habitat must be disturbed as little as possible during construction. The soil must not be disturbed by plowing, disking, blading, or grading. Areas that have to be disturbed must be stabilized as soon as possible and revegetated as soon as feasible, in some cases with specific kinds of native plants. These and other vegetative requirements will be coordinated with Environmental Stewardship and Policy staff.

Additional Help

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

Revision April 2007

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

Guidelines	A: Standard	B: Important Permanent Streams	C: Unique Water Habitats
1. Reference	• 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."	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."	• 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."
2. Equipment Crossings	• 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.	• 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 Environmental Stewardship and Policy staff and may require an on-site planning session before any work begins. The purpose of these discussions will be to minimize the number of crossings and their impact on the important resources in the streams.	• 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 Environmental Stewardship and Policy staff, preferably as a result of an on-site planning session. The purpose of this review and approval will be to minimize impacts on the unique habitat.

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

Guidelines	A: Standard	B: Important Permanent Streams	C: Unique Water Habitats
3. Cutting Trees	• 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.	• 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.	• Cutting of trees within 30 meters (100 feet) of the unique habitat must be discussed in advance with Environmental Stewardship and Policy staff, preferably during the on-site planning session. Cutting of trees near the unique habitat must be kept to an absolute minimum. • Stumps must not be removed, uprooted, or cut shorter than 1 foot above the ground line.
4. Other Vegetation	• 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.	• 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.	• Other vegetation near the unique habitat must be disturbed as little as possible during construction. • The soil must not be disturbed by plowing, disking, blading, or grading. • Areas that have to be disturbed must be stabilized as soon as possible and revegetated as soon as feasible, in some cases with specific kinds of native plants. These and other vegetative requirements will be coordinated with Environmental Stewardship and Policy staff.

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Appendix V – Site Clearing and Grading Specifications

1. General - The project manager with the clearing and/or grading contractor(s) shall review the environmental evaluation documents for the project or proposed activity (checklist, EDR, EA or EIS) along with all clearing and construction appendices, conditions in applicable general and/or site specific permits, the storm water pollution prevention plan, open burning or demolition notification requirements and any TVA commitments to property owners. The contractor shall then plan and carry out operations using techniques consistent with good engineering and storm water management practices as outlined in TVA's BMP manual (Revised 2000 version). 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. The BMPs shall be installed before general site clearing, before grading the site, and progressively stabilization BMPs shall be applied from the perimeter toward the interior work areas as grading is completed. Any stabilized area that must be disturbed in subsequent steps shall be protected by temporary BMPs again until work is completed and the area is re-stabilized.

   If the contractor fails to use best management practices or to follow environmental expectations discussed in the pre-bid, pre-work 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 anti-pollution laws, regulations, and ordinances, including, without limitation, all air, water, solid and hazardous waste, noise, and nuisance laws, regulations, and ordinances. He or she shall secure, or ensure that TVA has **secured, all necessary permits and authorizations and made all appropriate notifications** to conduct work on the acres shown on the drawings and plan and profile for the contract. The contractor's designated project manager will actively seek to prevent, control, monitor and safely abate all commonly recognized forms of workplace and environmental pollution. Permits or authorizations and **any necessary certifications of trained employees knowledgeable of environmental requirements shall be documented** with copies submitted to TVA's project manager or environmental specialist before work begins. The **contractor and subcontractors will be responsible for meeting all** conditions **specified in permits.** Permit conditions shall be reviewed in pre-work discussions.

3. Land and Landscape Preservation - The contractor shall exercise care to preserve the condition of cleared soils by avoiding as much compacting and deep scarring as possible in areas not to be developed for buildings, structures, or foundations. As soon as possible after initial disturbance of the soil and in accordance with any permit(s) or other state or local environmental regulatory requirements, cover material shall be placed to prevent erosion and sedimentation of water bodies or conveyances to surface or ground water. The placement of erosion/sediment controls shall begin at the perimeter and work progressively to the interior of the site. Repeated work in an area will require establishment of a ground cover immediately after each disturbance is completed. In areas outside the clearing, borrow, fill, or use, and access areas, the natural vegetation shall be protected from damage. The contractor and his or her employees and subcontractors must not deviate from delineated access routes or use areas, and must enter the

site(s) at designated areas that will be marked. Clearing operations shall be conducted to prevent any unnecessary destruction, scarring, or defacing of the remaining natural vegetation and adjacent surroundings in the vicinity of the work. In sensitive public or environmental areas, appropriate buffer zones shall be observed and the methods of clearing or re-clearing, grading, borrow or fill modified to protect the buffer and sensitive area. Some areas may require planting native low growing plants or grasses to meet the criteria of regulatory agencies, Executive Orders or commitments to special program interests.

4. Stream side Management Zones - The clearing and/or grading contractor(s) must leave as many rooted ground cover plants as possible in buffer zones along streams and other bodies of water or wet weather conveyances thereto. . In such stream side 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 re-sprouting. Low growing trees identified by TVA as marginal electrical clearance problems may be cut, 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 TOM organization after initial clearing and construction. Cutting of trees within SMZs must be accomplished by using either hand-held equipment or other appropriate clearing equipment, such as a feller-buncher. The method will be selected based on site specific conditions and topography to minimize soil disturbance and impacts to the SMZ and surrounding area. Disturbed soils in SMZs must be stabilized by appropriate methods immediately after the access or site is cleared. Stabilization must occur within the time frame specified in applicable storm water permits or regulations. Stumps within SMZs may be cut close to the ground but must not be removed or uprooted. Trees, limbs, and debris shall be prevented from falling into water bodies or immediately removed from streams, ditches, ponds, and wet areas using methods which will minimize dragging or scarring the banks or stream bottom. No debris will be left in the water or watercourse. Equipment will cross streams, ditches, or wet areas only at locations designated by TVA after the application of appropriate erosion control BMPs, and consistent with permit conditions or regulatory requirements.

5. Wetlands - In forested wetlands, tall trees will be cut near the ground, leaving stumps and roots in place. The cambium may be treated with herbicides applied by certified applicators from the TOM organization to prevent regrowth. Under story 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 re-clearing cycle. The decision will be situationally made based on existing ground cover, wetland type, and tree species since tall tree removal may "release" under story species and allow them to quickly grow to "electrical clearance problem" heights. In many circumstances herbicides labeled for water and wetland use may be used in re-clearing.

   At substation, switching stations, and communications sites wetlands **must be avoided.**

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

7. Water Quality Control - The contractor's clearing, grading, borrow and fill and/or disposal activities shall be performed using best management practices that will prevent erosion and entrance of spillage, contaminants, debris, and other pollutants or objectionable materials into

drainage ways, surface waters or ground water. Special care shall be exercised in refueling equipment to prevent spills. Fueling areas shall be remote from any sinkhole, crevice, stream or other water body. Open burning debris shall be kept away from streams and ditches and shall be incorporated into the soil. Only materials allowed to be burned under an open burning permit may be incorporated into the soil.

The clearing and grading contractor(s) and subcontractors will erect and (when TVA or contract construction personnel are unable) maintain BMPs such as silt fences on steep slopes and adjacent to any steam, wetland or other water body. BMPs will be inspected, by the TVA field engineer or other designated TVA or contractor personnel, routinely and at least as frequently as required by the permit or good management practices, and during periods of high runoff; any necessary repairs will be made as soon as practicable. BMP runoff sampling will be conducted in accordance with permit requirements. Records of all inspections and sampling will be maintained onsite, and copies of inspection forms and sampling results will be forwarded to the TVA environmental specialist.

8. Turbidity and Blocking of Streams - If temporary clearing, grading, borrow or fill activities must interrupt natural drainage, appropriate drainage facilities and erosion/sediment controls shall be provided to avoid erosion and siltation of streams and other water bodies or water conveyances. In Tennessee conditions of an Aquatic Resource Alteration Permit shall be met. Turbidity levels in receiving waters or at storm water discharge points shall be monitored, documented and reported if required by the applicable permit. Erosion and sediment control measures such as silt fences, water bars, and sediment traps shall be installed as soon as practicable after initial access, site, borrow, fill, or right-of-way disturbance; and after sequential disturbance of stabilized areas due to stepwise construction requirement in accordance with applicable permit or regulatory requirements.

   On rights-of-way mechanized equipment shall not be operated in flowing water except when approved; and then only to construct necessary stream crossings under direct guidance of TVA.

   Construction of stream fords or other crossings will only be permitted at approved locations and to current TVA design or construction access road standards. At any construction site material shall not be deposited in watercourses or within stream bank areas where it could be washed away by high stream flows. Any clearing debris which enters streams or other water bodies shall be removed immediately. Appropriate Corps of Engineers and state permits shall be obtained for stream or wetland crossings.

9. Air Quality Control - The clearing or grading contractor shall take appropriate actions to limit the amount of air emissions created by clearing and disposal operations to be well within the limits of clearing or burning permits and/or Forestry or local fire department requirements. All operations must be conducted in a manner which prevents nuisance conditions or damage to adjacent land, crops, dwellings, highways or people. If building renovation or demolition is involved the required air quality organization shall be notified the minimum 10 days in advance, and if the start date is delayed, re-notified to start the clock again.

10. Dust and Mud Control - Clearing, grading, borrow, fill, or transport activities shall be conducted in a manner which 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 on to 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 which 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 which 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 which limits vehicle exhaust emissions. Equipment and vehicles will be kept within the manufacturer's recommended limits and tolerances. Excessive exhaust gases will be eliminated and inefficient operating procedures will be revised or halted until corrective repairs or adjustments are made.

14. Vehicle Servicing - Routine maintenance of personnel vehicles will not be performed on the site, right-of-way, or access route. However, if emergency or “have to” situations arise, minimal/temporary maintenance to personnel vehicles will occur in order to mobilize the vehicle to an off-site maintenance shop. Heavy equipment may have to be serviced on the right-of-way, site, or access route, except in designated sensitive areas. The clearing, grading, borrow, or fill contractor will properly maintain these vehicles with approved spill protection controls and countermeasures. If emergency maintenance in a sensitive or questionable area arises, the Area Environmental Program Administration or project manager will be consulted. All wastes and used oils will be properly recovered, handled, and disposed/recycled. Equipment shall not be temporarily stored in stream floodplains, whether overnight or on weekends or holidays.

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

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

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

18. Refuse Disposal - The clearing, grading, borrow, fill, or construction contractor and subcontractor(s) shall be responsible for daily cleanup and proper labeling , storage and disposal of all refuse and debris on the site produced by his or her operations and employees. Facilities which meet applicable regulations and guidelines for refuse collection will be required. Only approved transport, storage, and disposal areas shall be used. Records of waste generation shall be maintained for a site and shall be provided to the project manager and environmental specialist assigned to the project.

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

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

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

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

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

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

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

    E. Vegetation designated by the Federal Invasive Species Council must be eliminated at the work site and equipment being transported from location to location must be inspected to ensure removal and destruction of live material.

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Appendix VI – Tennessee Valley Authority Environmental Protection Procedures Right-of-Way Vegetation Management Guidelines

1.0 Overview

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

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

C. TVA ROW Specialists develop a vegetation re-clearing plan that is specific to each line segment and is based on terrain conditions, species mix, growth, and density.

2.0 ROW Management Options

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

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

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

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

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

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

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

3.0 Herbicide Program

A. TVA has worked with universities (such as Mississippi State University, University of Tennessee, Purdue University and others), chemical manufacturers, other utilities, U.S. Department of Transportation, U.S. Fish and Wildlife, and U.S. Forest Service personnel to explore options for vegetation control. The results have been strong recommendations to use species specific, low volume, herbicide applications in more situations. Research, demonstrations, and other ROW programs show a definite improvement of ROWs treated with selective low volume applications of new herbicides using a variety of application techniques and timing.

B. Low volume herbicide applications are recommended since research demonstrates much wider plant diversity after such applications. There is better ground erosion protection and more wildlife food plants and cover plants develop. In most situations there is increased development of wild flowering plants and shrubs. In

conjunction with herbicides, the diversity and density of low growing plants provide control of tall growing species through competition.

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

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

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

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

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

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

G. Table 1 - Herbicides Currently Used on TVA ROWs

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

H. Table 2 - Pre-Emergent Herbicides Currently Used for Bare Ground Areas on TVA ROWs and Substations

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

I. Table 3 - Tree Growth Regulators (TGRs) Currently Used on TVA ROWs - TGRs may be used on tall trees that have special circumstances where they must be trimmed on a regular cycle.

TGR	Flurprimidol	Caution
Profile 2SC	TGR-paclobutrazol	Caution

J. TVA currently utilizes Activate Plus, manufactured by Terra, as an adjuvant to herbicides to improve the performance of the spray mixture. Application rates are consistent with the EPA-approved label. U. S. Fish and Wildlife has expressed some concern on toxicity effects of surfactants on aquatic species. TVA is working in coordination with Mississippi State University and chemical companies to evaluate efficacy of additional low-toxicity surfactants, including LI700 as manufactured by Loveland Industries, through side-by-side test plots in the streamside management zones of area transmission lines.

K. The herbicides and TGRs listed above have been evaluated in extensive studies in support of registration applications and label requirements. Many have been reviewed in the U.S. Forest Service Vegetation Management Environmental Impact Statements 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 when applied by trained applicators following the label and registration procedures, including prescribed measures, such as buffer zones, to protect threatened and endangered species.

L. The rates of application utilized are those listed on the EPA approved label and consistent with utility standard practice throughout the Southeast. TVA currently uses primarily low volume applications of foliar and basal applications of Accord (Glyphosate) and Accord (Glyphosate)-Arsenal (Imazapyr) tank mixes. Glyposate 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 it's potential impacts on humans, animals and the environment.

4.0 Accord

A. Accord is labeled for vegetation management in forestry and utility ROW applications. It has a full aquatics label, and can be applied to emergent weeds in all bodies of fresh and brackish water. There is limited 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 which are building blocks of plant proteins. The plant, unable to make proteins, stops growing and dies.

B. 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.

C. 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.

D. Glyphosate is non-toxic 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.

5. Arsenal

A. 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.

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

C. 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 VII – Watercourse Crossings Within the Little Coldwater Creek Drainage Along the Proposed Holly Springs-Miller 161-kV Transmission Line Tap to Coldwater Substation

Stream Identification	Stream Type	SMZ[1] Category	Notes
ash1	Pond	Category A	Pond and downstream drainage located at the planned Coldwater Substation site; adjacent to Wetland W001
ash02	Perennial	Category A	20-foot x12-foot, deeply incised channel surrounded by row crop/pasture; scoured to hard pack clay; heavy deposits of sand and silt
ash03	Intermittent	Category A	13-foot x 12-foot, deeply incised channel; sand with some gravel substrate; bare soil on left-descending bank
ash4	Perennial	Category A	13-foot x 12-foot, deeply incised channel; sand with some gravel substrate; bare soil on left-descending bank
ash05	WWC[2]	BMPs[3]	4-foot x 1-foot channel; possibly bulldozed or old roadbed
ash06	WWC	BMPs	4-foot x 1-foot channel; continuation of ash05; feeds ash07
ash07	Perennial	Category A	15-foot x 5-foot eroded channel; follows ROW[4] for considerable distance; bulldozer tracks through stream; ROW is scraped to bare soil for majority of ash07 ROW
ash10r	Perennial	Category A	15-foot x 14-foot, deeply incised channel with heavy silt deposits.
asb12	Perennial	Category A	2.5-foot x 1.5-foot channel; mostly ponded area directly in ROW; numerous caddisfly, scuds, waterboatmen, and snails found
asb13	Perennial	Category A	15-foot x 2-foot, deeply incised channel; some gravel, mostly sand; trees in ROW stream bank intact
asb17	WWC	BMPs	Incised drainage/artificial channel
asb18	Intermittent	Category A	17-foot x 6-foot, deeply incised channel; mostly sand substrate; fed by asb19
asb19	Intermittent	Category A	17-foot x 6-foot, deeply incised channel; mostly sand substrate; feeds asb18
asb20	WWC	BMPs	3-foot x 6-foot incised channel; feeds small pond south of ROW
asb21	WWC	BMPs	3 foot 5 foot; feeds asb20
asb22	WWC	BMPs	Broad, undefined channel
ash-rr-01	WWC	BMPs	3-foot x 2-foot deep channel coming out of small wooded area into W2
ash-rr-02	Perennial	Category A	Runs through W2; broad, undefined; appears that surrounding hydrology has been altered by upstream pond
asb28	Pond	Category A	Farm pond located southeast of ROW

[1] **SMZ** = Streamside management zone
[2] **WWC** = Wet-weather conveyance
[3] **BMP** = Best management practices according to Muncy (1999)
[4] **ROW** = Right-of-way