

Appendix A – Correspondence

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
446 Neal Street
Cookeville, TN 38501



September 16, 2010

Ms. Peggy Shute
Biological Permitting and Compliance
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, Tennessee 37902-1499

Re: FWS #2010-CPA-0677

Dear Ms. Shute:

Fish and Wildlife Service personnel have reviewed the August 13, 2010, biological assessment regarding the Indiana bat and gray bat for the improvement of the power supply system in middle Tennessee in Sumner County, Tennessee.

The biological assessment is adequate and supports the conclusion of not likely to adversely affect, with which we concur. In view of this, we believe that the requirements of section 7 of the Endangered Species Act (Act) have been fulfilled. However, obligations under section 7 of the Act must be reconsidered if: (1) new information reveals that the proposed action may affect listed species in a manner or to an extent not previously considered, (2) the proposed action is subsequently modified to include activities which were not considered in this biological assessment, or (3) new species are listed or critical habitat designated that might be affected by the proposed action.

Your interest and initiative to protect endangered and threatened species is greatly appreciated. If you have questions or if we can be of further assistance, please contact Jim Widlak of my staff at 931/528-6481, ext. 202.

Sincerely,

Mary E. Jennings
Field Supervisor



Tennessee Valley Authority, 400 West Summit Hill Drive, Knoxville, Tennessee 37902-1499

August 13, 2010

Mr. Jim Widlak
Tennessee Field Office
U.S. Fish and Wildlife Service
446 Neal Street
Cookeville, Tennessee 38501

Dear Mr. Widlak:

ENDANGERED SPECIES ACT - SECTION 7 – INFORMAL CONSULTATION -
GALLATIN FOSSIL PLANT (GAF) – ANGELTOWN, TENNESSEE, TRANSMISSION
LINE (TL)

The Tennessee Valley Authority (TVA) is proposing to improve the existing power supply system in the middle Tennessee area by constructing and operating approximately 19.6 miles of new 161-kilovolt (kV) TL and a new switching station. TVA would complete construction and begin operation of the proposed TL and switching station in Sumner County, Tennessee, by June 2012.

The proposed project would add approximately 3.7 miles of 161-kV TL to the vacant side of the existing double-circuit GAF - Hoeganaes 161-kV TL and rebuild about 2.5 miles of the existing Gallatin-Hartsville 69-kV TL with a new double-circuit 161-kV TL. This 6.2-mile section of transmission line would be constructed on approximately 75 acres of existing, 100-foot-wide right-of-way (ROW). In addition, TVA would construct about 13.4 miles of single-circuit TL on new 100-foot-wide ROW occupying about 163 acres.

The TL would utilize mostly single- and double-pole steel structures, as well as a few three-pole structures. The transmission line would connect the GAF to a new TVA Angeltown 161-kV switching station. The switching station would occupy 10 acres and be located adjacent to TVA's existing Portland-Westmoreland 161-kV TL. TVA would also construct a new 750-foot-long section of TL to connect the switching station to the Portland-Westmoreland 161-kV TL.

According to TVA's Natural Regional Heritage database and data posted on the USFWS Cookeville Ecological Services website, five federally listed species (Appalachian monkeyface – *Quadrula sparsa* - Endangered; pink mucket - *Lampsilis abrupta* - Endangered; leafy prairie-clover - *Dalea foliosa* – Endangered; Spring Creek bladderpod - *Lesquerella perforata* - Endangered; and gray bat - *Myotis grisescens* - Endangered) are presently or historically known from Sumner County. Additionally, the recently

Mr. Jim Widlak
Page 2
August 13, 2010

delisted bald eagle - *Haliaeetus leucocephalus* - is known from Sumner County. The Indiana bat - *Myotis sodalis* - Endangered is reported from adjacent counties in Kentucky, but has not been reported from Sumner County, Tennessee. No designated critical habitat for any of these species has been designated in Sumner County.

TVA has determined that the proposed project would have no effect on the federally listed aquatic species (Appalachian monkeyface and pink mucket) known from Sumner County because the proposed power system improvements would not impact the riverine habitats where these species occur.

Field surveys of the project area occurred in November 2009 when leafy prairie-clover and spring bladderpod would not likely be visible above ground. However, each of these species has distinct habitat requirements that can be observed during any season, and these requirements are well known by our botanists. No habitat appropriate for either of these plant species was observed in the project area. It is TVA's determination that the proposed project would have no effect on these species due to the lack of habitat to support these species within the project area.

No federally or state-listed terrestrial animal species were observed during field surveys conducted in November 2009 or March 2010; however, habitat suitable for summer roosting of the Indiana bat was found within the proposed ROW. Approximately 0.25 mile of the proposed ROW was identified as having habitat potentially suitable for summer roosting by Indiana bats. Indiana bat is not known to occur within a 10-mile radius of the proposed project area. However, given the proximity of the proposed project area to locations in several counties in Kentucky where the Indiana bat has been reported, the potential for summer roosting at this location is possible. TVA, as a precautionary measure would implement the following commitment:

- During construction, the removal of trees located within or adjacent to this identified 0.25-mile area of the proposed ROW would be seasonally restricted to prevent directly impacting the Indiana bat. The removal of trees within this section of proposed ROW would occur during a time period between November 15 and March 31. However, should it become necessary to remove a tree outside of this time frame, TVA would conduct a bat mist-net survey and acoustic survey between June 1 through August 15 and prior to the removal of any trees within this 0.25-mile area. Documentation of Indiana bat use of this area following this survey would require additional consultation with your office.

Streams crossing the proposed route do provide marginal foraging habitat for gray bat. Impacts to foraging habitat could occur as a result of disturbance associated with heavy-equipment crossing streams, or soil disturbance adjacent to watercourses within the project area. Streamside Management Zones (SMZs) would be established and Best Management Practices (BMPs) would be properly implemented during construction and

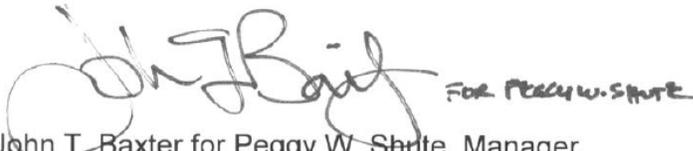
Mr. Jim Widlak
Page 3
August 13, 2010

maintenance activities. These measures are designed to minimize and avoid disturbance in or around watercourses within the project area. TVA has determined that the proposed project (including the commitment stated above) may affect, but is not likely to adversely affect the Indiana bat or gray bat. No impacts to bald eagle were identified. We discussed this project and appropriate species determinations during phone calls on July 29, 2010, with Jim Widlak and Dave Pelren on August 6, 2010.

We respectfully request your concurrence with our finding that this project is not likely to adversely affect the Indiana bat or gray bat.

If you have any questions, please contact Holly Le Grand at (865) 632-4010.

Sincerely,

A handwritten signature in black ink, appearing to read "John T. Baxter" with a large flourish at the end. To the right of the signature, the text "FOR PEGGY W. SHUTE" is written in a smaller, less stylized font.

John T. Baxter for Peggy W. Shute, Manager
Biological Permitting and Compliance
Endangered Species Act Compliance Officer
Environmental Permits and Compliance



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

April 21, 2010

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

RE: TVA, ARCHAEOLOGICAL ASSESSMENT, GALLATIN-ANGELTOWN 161-KV
LN & STN, UNINCORPORATED, SUMNER COUNTY

Dear Mr. Howard:

At your request, our office has reviewed the above-referenced archaeological survey final report in accordance with regulations codified at 36 CFR 800 (Federal Register, December 12, 2000, 77698-77739). We find that the report meets the Tennessee SHPO Standards and Guidelines For Archaeological Resource Management Studies.

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

Your continued cooperation is appreciated.

Sincerely,

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

EPM/jmb



the
Chickasaw
Nation HEADQUARTERS

Arlington at Mississippi / Box 1548 / Ada, OK 74821-1548 / (580) 436-2603

Bill Anoatubby
Governor

Jefferson Keel
Lieutenant
Governor

March 1, 2010

Date Rec'd.: _____
Saved: _____
Sent to: _____
File: _____

Ms. Patricia B. Ezzell
Native American Liaison and Historian
Environmental Permitting & Compliance
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, TN 37902-1499

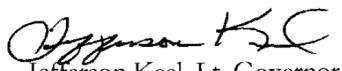
Dear Ms. Ezzell:

Thank you for the notification of projects delineated on the enclosed projects list for Grainger and Sumner Counties, Tennessee.

We accept your recommendation of no adverse effect. However, we ask that in the event of inadvertent discoveries, all construction activities cease, and we be notified according to all applicable federal and state laws.

If you have any questions, please contact Ms. Giny Nail, historic preservation officer at (580) 559-0817, giny.nail@chickasaw.net or Ms. Julie Ray, historic preservation and repatriation manager at (580) 559-0825, julie.ray@chickasaw.net.

Sincerely,


Jefferson Keel, Lt. Governor
The Chickasaw Nation

jar

enclosure



God Bless America!

Tennessee Valley Authority
Projects List

<i>Description</i>	<i>Location</i>
<i>Call of no adverse effect to historic properties for the easement expansion, modification and bridge replacement on Black Fox Road over Norris Reservoir</i>	Grainger County, Tennessee
<i>Call of no adverse effect of cultural resources for the upgrade and construction of a 161-kV transmission line that will extend from the Gallatin Fossil Plant to a proposed switching station located in the community of Angeltown</i>	Sumner County, Tennessee

Stringfield, I Kathleen

From: Ezzell, Patricia Bernard
Sent: Thursday, February 18, 2010 1:44 PM
To: Stringfield, I Kathleen; Harle, Michaelyn S; Yarnell, W Richard
Subject: FW: TVA, GALLATIN-ANGELTOWN 161-KV TRANSMISSION LINE AND SWITCHING STATION, SUMNER COUNTY, TENNESSEE

Fyi-from Shawnee Tribe

From: Kim Jumper [mailto:kimjumper@shawnee-tribe.com]
Sent: Thursday, February 18, 2010 12:16 PM
To: Ezzell, Patricia Bernard
Subject: Re: TVA, GALLATIN-ANGELTOWN 161-KV TRANSMISSION LINE AND SWITCHING STATION, SUMNER COUNTY, TENNESSEE

The Shawnee Tribe's Tribal Historic Preservation Department concurs that no known historic properties will be negatively impacted by this project. We have no issues or concerns at this time, but in the event that archaeological materials are encountered during construction, use, or maintenance of this location, please re-notify us at that time as we would like to resume consultation under such a circumstance.

Kim Jumper, THPO
Shawnee Tribe
PO Box 189
Miami, OK 74355

----- Original Message -----

From: Ezzell, Patricia Bernard
To: rallen@cherokee.org ; Tyler B. Howe ; Lisa Stopp ; Augustine Asbury ; Kirk Perry ; Julie Ray ; aberryhill@muscogeenation-nsn.gov ; hiharjo@yahoo.com ; charles coleman ; Karen Kaniatobe ; Robin Dushane ; kimjumper@shawnee-tribe.com
Cc: russtown@nc-chokeee.com ; Gingy Nail ; preservation@muscogeenation-nsn.gov
Sent: Wednesday, February 03, 2010 1:13 PM
Subject: TVA, GALLATIN-ANGELTOWN 161-KV TRANSMISSION LINE AND SWITCHING STATION, SUMNER COUNTY, TENNESSEE

Good Afternoon, Everyone,
I hope this e-mail finds you well. Attached is a letter regarding TVA's proposal to upgrade and construct a 161-kV transmission line that will extend from the Gallatin Fossil Plant to a proposed switching station located in the community of Angeltown in Sumner County, Tennessee. Instructions on accessing the referenced report are on the last page of the attached pdf file.

As always, should you have any questions or if you have trouble accessing the report, please contact me. I look forward to receiving any comments.

Sincerely,

Pat

Pat Bernard Ezzell
Native American Liaison and Historian
Tennessee Valley Authority
(865) 632-6461

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No virus found in this incoming message.

Checked by AVG - www.avg.com

Version: 8.5.435 / Virus Database: 271.1.1/2667 - Release Date: 02/04/10 07:35:00



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

February 16, 2010

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

RE: TVA, GALLATIN-ANGELTOWN 161-KV LINE/STN, UNINCORPORATED,
SUMNER COUNTY

Dear Mr. Howard:

Pursuant to your request, this office has reviewed documentation concerning the above-referenced undertaking received Monday, February 1, 2010. This is a requirement of Section 106 of the National Historic Preservation Act for compliance by the participating federal agency or applicant for federal assistance. Procedures for implementing Section 106 of the Act are codified at 36 CFR 800 (Federal Register, December 12, 2000, 77698-77739).

Considering available information, we find that the project as currently proposed will not adversely affect any property that is eligible for listing in the National Register of Historic Places. Therefore, this office has no objection to the implementation of this project. Please direct questions and comments to Jennifer M. Barnett (615) 741-1588, ext. 105. We appreciate your cooperation.

Sincerely,

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

EPM/jmb



Tennessee Valley Authority, 400 West Summit Hill Drive, Knoxville, Tennessee 37902-1499

February 3, 2010

To Those Listed:

TVA GALLATIN-ANGELTOWN 161-KV TRANSMISSION LINE AND SWITCHING STATION,
SUMNER COUNTY, TENNESSEE

The Tennessee Valley Authority (TVA) proposes to upgrade and construct a 161-kV transmission line (TL) that will extend from the Gallatin Fossil Plant to a proposed switching station located in the community of Angeltown in Sumner County, Tennessee. TVA identified the area of potential effect (APE) as the existing 6.5-mile long by 100-foot wide TL right-of-way (ROW), the approximately 13.5-mile long by 100-foot wide new TL ROW, and the 10-acre footprint of the proposed switching station. The architectural APE was identified as a 0.5-mile wide area linearly centered along the proposed TL ROW.

TVA contracted with TRC, INC (TRC) to conduct the cultural resource survey of the APE. Prior to the field survey, TRC conducted archival research at the Tennessee Division of Archaeology and the Tennessee Historical Commission in Nashville to identify all documented historic properties within and near the APE. One previously recorded archaeological site (40SU192) was identified within the APE.

Following the archival search, TRC conducted the cultural resources survey. An online version of the draft report titled *Phase I Cultural Resources Survey of the TVA Gallatin-Angeltown 161-kV Transmission Line and Switching Station, Sumner County, Tennessee* can be viewed at trcsolutions.com.

The archaeological survey conducted on October 26–30, 2009, November 2–5, 11, and December 11, 2009, identified five newly recorded archaeological sites (40SU252, 40SU253, 40SU254, 40SU255, and 40SU256) and eight isolated finds (IF1-8). Based on the findings of TRC, TVA recommends sites 40SU252, 40SU253, 40SU254, and 40SU256 ineligible for listing in the National Register of Historic Places (NRHP) due to a lack of research potential and an absence of intact archaeological deposits. Despite the high density of artifacts recovered at site 40SU255, no intact deposits or diagnostic materials were identified and the area had been heavily disturbed by agricultural activity. In addition, a 1 meter X 1 meter test unit was excavated at the center point location of a proposed corner structure within 40SU255. No subsurface features were identified at this location. Based on TRC's findings, TVA recommends 40SU255 ineligible for the NRHP. During the survey, TRC also revisited previously recorded archaeological site 40SU192 (35-42). An existing TL ROW lies within a portion of the site. The site consists of a complex of stone wall features associated with nineteenth-century agricultural and possible light industrial activities. No subsurface artifacts were uncovered during shovel testing. TVA recommends the portion of 40SU192 which lies within the APE as ineligible for listing on the NRHP due to the lack of intact archaeological deposits, and research potential. TVA is aware of other opinions regarding stone landscapes and references the enclosed United South & Eastern Tribes, Inc.'s Resolution No. 2007:037 entitled *Sacred Ceremonial Stone Landscapes Found In The Ancestral Territories of United South and Eastern Tribes, Inc., Member Tribes*. Based on the results of TRC's cultural

Page 2
February 3, 2010

resources survey and report, it is TVA's recommendation that no cultural resources eligible for the NRHP would be adversely affected by the proposed undertaking.

TVA is consulting with the following federally recognized Indian tribes regarding properties within the proposed project's APE that may be of religious and cultural significance to them and eligible for the NRHP: Cherokee Nation, Eastern Band of Cherokee Indians, United Keetoowah Band of Cherokee Indians in Oklahoma, The Chickasaw Nation, Muscogee (Creek) Nation of Oklahoma, Alabama-Quassarte Tribal Town, Kialegee Tribal Town, Thlopthlocco Tribal Town, Absentee Shawnee Tribe of Oklahoma, Eastern Shawnee Tribe of Oklahoma, and the Shawnee Tribe.

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

Should you have any questions or would like a printed version of this report, please contact me via phone at 865/632-6461 or via e-mail at pbezzell@tva.gov. Please respond within 30 days of receipt of this letter, if you have any comments on the proposed undertaking.

Sincerely,



Pat Bernard Ezzell
Historian and Native American Liaison

MH:IKS
Enclosure
cc: Kimberly Hodges (EDMS), LP 2V-C

THOSE LISTED:

Dr. Richard Allen
Policy Analyst
Cherokee Nation
Post Office Box 948
Tahlequah, Oklahoma 74465

Governor Bill Anoatubby
The Chickasaw Nation
Post Office Box 1548
Ada, Oklahoma 72821-1548

Ms. Augustine Asbury
Cultural Preservation Coordinator
Alabama Quassarte Tribal Town
Post Office Box 187
Wetumka, Oklahoma 74883

Second Chief Alfred Berryhill
Muscogee (Creek) Nation
Office of the Principal Chief
Post Office Box 580
Okmulgee, Oklahoma 74447

cc: Ms. Joyce Bear
Historic Preservation Officer
Muscogee (Creek) Nation of Oklahoma
Post Office Box 580
Okmulgee, Oklahoma 74447

Mr. Charles Coleman
NAGPRA Representative
Thlopthlocco Tribal Town
Route 1, Box 190-A
Weleetka, Oklahoma 74880

Ms. Robin DuShane
Cultural Preservation Director
Eastern Shawnee Tribe of Oklahoma
127 West Oneida
Seneca, Missouri 64865

Mr. Henry Harjo
Environmental Director
Kialegee Tribal Town
Post Office Box 332
Wetumka, Oklahoma 74883

Mr. Tyler Howe
Historic Preservation Specialist
Eastern Band of the Cherokee Indians
Post Office Box 455
Cherokee, North Carolina 28719

cc: Mr. Russ Townsend
Tribal Historic Preservation Officer
Eastern Band of the Cherokee Indians
Post Office Box 455
Cherokee, North Carolina 28719

Ms. Karen Kaniatobe
Tribal Historic Preservation Officer
Absentee Shawnee Tribe of Oklahoma
2025 S. Gordon Cooper
Shawnee, Oklahoma 74801

Ms. Lisa C. LaRue
Director, Language, History and Culture &
Acting Tribal Historic Preservation Officer
United Keetoowah Band
of Cherokee Indians in Oklahoma
Post Office Box 746
Tahlequah, Oklahoma 74464

Mr. Kirk Perry
Administrator
Division of Policy and Standards
The Chickasaw Nation
Post Office Box 1548
Ada, Oklahoma 72821-1548

Ms. Julie Ray
Preservation & Repatriation Manager
The Chickasaw Nation
Post Office Box 1548
Ada, Oklahoma 72821-1548

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

Mr. Ron Sparkman
Chairman
Shawnee Tribe
Post Office Box 189
Miami, Oklahoma 74355

cc: Ms. Kim Jumper
Tribal Historic Preservation Officer
Shawnee Tribe
Post Office Box 189
Miami, Oklahoma 74355

Chief Glenna J. Wallace
Eastern Shawnee Tribe of Oklahoma
127 West Oneida
Seneca, Missouri 64865



Tennessee Valley Authority, 400 West Summit Hill Drive, Knoxville, Tennessee 37902-1499

January 28, 2010

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

Dear Mr. McIntyre:

TVA GALLATIN-ANGELTOWN 161-KV TRANSMISSION LINE AND SWITCHING STATION,
SUMNER COUNTY, TENNESSEE

The Tennessee Valley Authority (TVA) proposes to upgrade and construct a 161-kV transmission line (TL) that will extend from the Gallatin Fossil Plant to a proposed switching station located in the community of Angeltown in Sumner County, Tennessee. TVA identified the area of potential effect (APE) as the existing 6.5-mile long by 100-foot wide TL right-of-way (ROW), the approximately 13.5-mile long by 100-foot wide new TL ROW, and the 10-acre footprint of the proposed switching station. The architectural APE was identified as a 0.5-mile wide area linearly centered along the proposed TL ROW.

TVA contracted with TRC, INC (TRC) to conduct the cultural resource survey of the APE. Prior to the field survey, TRC conducted archival research at the Tennessee Division of Archaeology and the Tennessee Historical Commission in Nashville to identify all documented historic properties within and near the APE. One previously recorded archaeological site (40SU192) and 49 previously recorded architectural resources (SU-100, 119, 147, 234–237, 238–240, 400, 401, 407, 408, 479, 480, 655–657, 660–665, 668, 669, 797, 798, 855–863, 885, 1077, 1089, 1090, 1092, 1093, 1096, 1097, 1113–1115) were identified within the archaeological and architectural APE. In addition, one National Register of Historic Properties (NRHP) eligible property (Womack House) and one NRHP-listed property (Oakland) are located within the architectural APE.

Following the archival search, TRC conducted the cultural resources survey. Please find enclosed the draft report titled *Phase I Cultural Resources Survey of the TVA Gallatin-Angeltown 161-kv Transmission Line and Switching Station, Sumner County, Tennessee*.

The archaeological survey conducted on October 26–30, 2009, November 2–5, 11, and December 11, 2009, identified five newly recorded archaeological sites (40SU252, 40SU253, 40SU254, 40SU255, and 40SU256) and eight isolated finds (IF1-8). Based on the findings of TRC, TVA recommends sites 40SU252, 40SU253, 40SU254, and 40SU256 ineligible for NRHP due to a lack of research potential and an absence of intact archaeological deposits. Despite the high density of artifacts recovered at site 40SU255, no intact deposits or diagnostic materials were identified and the area had been heavily disturbed by agricultural activity.

Mr. E. Patrick McIntyre, Jr.
Page 2
January 28, 2010

In addition, a 1m X 1m test unit was excavated at the center point location of a proposed corner structure within 40SU255. No subsurface features were identified at this location. Based on TRC's findings, TVA recommends 40SU255 ineligible for the NRHP. During the survey, TRC also revisited previously recorded archaeological site 40SU192. The site consists of a complex of stone wall features associated with nineteenth-century agricultural and possible light industrial activities. No subsurface artifacts were uncovered during shovel testing. TVA recommends the portion of 40SU192 which lies within the APE as ineligible for listing on the NRHP due to the lack of intact archaeological deposits, and research potential.

The architectural survey resulted in the identification of ten previously unrecorded architectural resources (HS-1–HS-10). TVA recommends HS-1–HS-7 ineligible for the NRHP due to their lack of architectural distinction and/or loss of integrity caused by modern alterations and/or damage. Of the previously recorded properties, 20 (SU-100, 119, 147, 400, 408, 480, 669, 797, 798, 856, 859, 861, 862, 1077, 1089, 1090, 1092, 1093, 1096 and 1113) have been destroyed since their initial recordation and 16 (SU-235–237, 238, 239, 401, 655, 656, 657, 662–665, 863, 1097 and 1114) are located outside the visual line-of-sight to the project corridor. TVA recommends the remaining extant architectural resources ineligible for the NRHP due to their lack of architectural distinction and loss of integrity caused by modern alterations and/or damage. HS-8–HS-10 are cemeteries and do not meet the criteria for listing in the NRHP.

It is TRC's findings that the Oakland House retains sufficient integrity to remain listed on the NRHP. It is TVA's recommendation that although there will be a visual effect to the Oakland House, the effect will not be adverse. The proposed ROW is obstructed from view by mature tree growth located between the property and the project area. Furthermore, the visual setting of the Oakland house has been compromised by the introduction of residential development and a cellular tower east and south of the property.

It also is TRC's recommendation that the Womack House retains sufficient integrity to remain eligible for the NRHP. The Womack House is located less than 0.1 mile east of the project area on Highway 31E. TVA's original design plans called for the construction of the transmission line route to be located roughly 900 feet west of the current ROW. However, this preferred route was changed due to the number of residential units that have been constructed since the initial planning period. According to TVA design guidelines, transmission line structures must be positioned not less than 300 feet from an existing residence. As a result of the increased development near the originally planned corridor, TVA was required to shift the location of the proposed transmission line route along Highway 31E. Although this shift in ROW alignment would result in visual effect to the Womack House, it is TVA's recommendation that the effect would not be adverse, due to the historic setting of the property having been compromised by modern residential development and two existing utility lines that extend along either side of Highway 31E adjacent to the Womack property.

Based on the results of TRC's cultural resources survey and report, it is TVA's recommendation that no cultural resources eligible for the NRHP would be adversely affected by the proposed undertaking. TVA has reviewed the enclosed report and agrees with the recommendations of the authors. Pursuant to 36 CFR Part 800, we are seeking your concurrence with TVA's findings and recommendations.

Mr. E. Patrick McIntyre, Jr.
Page 3
January 28, 2010

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

Sincerely,



A. Eric Howard
Federal Preservation Officer

RY:IKS

Enclosure

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

Kimberly Hodges (EDMS), LP 2V-C

Appendix B – Tennessee Valley Authority Right-of-Way Clearing Specifications

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

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

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

zones shall be observed and the methods of clearing or reclearing modified to protect the buffer and sensitive area. Some areas may require planting native plants or grasses to meet the criteria of regulatory agencies or commitments to special program interests.

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

contaminants, debris, and other pollutants or objectionable materials into drainage ways, surface water, or groundwater. Special care shall be exercised in refueling equipment to prevent spills. Fueling areas shall be remote from any sinkhole, crevice, stream, or other water body. Open burning debris will be kept away from streams and ditches and shall be incorporated into the soil.

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

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

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

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

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

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

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

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

Revision April 2007

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

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

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

Unless ponding previously occurred (i.e., existing low-lying areas), water should not be allowed to pond on the structure sites except around foundation holes; the water must

be directed away from the site in as dispersed a manner as possible. At tower or structure sites, some means of upslope interruption of potential overland flow and diversion around the footings should be provided as the first step in construction-site preparation. If leveling is necessary, it must be implemented by means that provide for continuous gentle, controlled, overland flow or percolation. A good grass cover, straw, gravel, or other protection of the surface must be maintained. Steps taken to prevent increases in the moisture content of the in-situ soils will be beneficial both during construction and over the service life of any structure.

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

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

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

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

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

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

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

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

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

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

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

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

Revision April 2007

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Appendix D – Tennessee Valley Authority Transmission Construction Guidelines Near Streams

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

Three Levels of Protection

During the preconstruction review of a proposed transmission line, TVA Environmental Stewardship and Policy staff will have studied each possible stream impact site and will have identified it as falling into one of three categories: (A) standard stream protection, (B) protection of important permanent streams, or (C) protection of unique habitats. These category designations are based on the variety of species and habitats that exist in the stream as well as state and federal requirements to avoid harming certain species. The category designation for each site will be marked on the plan and profile sheets. Construction crews are required to protect streams and other identified water habitats using the following pertinent set(s) of guidelines:

(A) Standard Stream Protection

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

Guidelines:

1. All construction work around streams will be done using pertinent best management practices (BMPs) such as those described in *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities*, especially Chapter 6, "Standards and Specifications."
2. All equipment crossings of streams must comply with appropriate state permitting requirements. Crossings of all drainage channels, intermittent streams, and permanent streams must be done in ways that avoid erosion problems and long-term changes in water flow. Crossings of any permanent streams must allow for natural movement of fish and other aquatic life.
3. Cutting of trees within SMZs must be accomplished by using either hand-held equipment or other appropriate clearing equipment (e.g., a feller-buncher) that would result in minimal soil disturbance and damage to low-lying vegetation. The

method will be selected based on site-specific conditions and topography to minimize soil disturbance and impacts to the SMZ and surrounding area. Stumps can be cut close to ground level but must not be removed or uprooted.

4. Other vegetation near streams must be disturbed as little as possible during construction. Soil displacement by the actions of plowing, disking, blading, or other tillage or grading equipment will not be allowed in SMZs; however, a minimal amount of soil disturbance may occur as a result of clearing operations. Shorelines that have to be disturbed must be stabilized as soon as feasible.

(B) Protection of Important Permanent Streams

This category will be used when there is one or more specific reason(s) why a permanent (always-flowing) stream requires protection beyond that provided by standard BMPs. Reasons for requiring this additional protection include the presence of important sports fish (trout, for example) and habitats for federal endangered species. The purpose of the following guidelines is to minimize the disturbance of the banks and water in the flowing stream(s) where this level of protection is required.

Guidelines:

1. Except as modified by guidelines 2-4 below, all construction work around streams will be done using pertinent BMPs such as those described in *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities*, especially Chapter 6, "Standards and Specifications."
2. All equipment crossings of streams must comply with appropriate state (and, at times, federal) permitting requirements. Crossings of drainage channels and intermittent streams must be done in ways that avoid erosion problems and long-term changes in water flow. Proposed crossings of permanent streams must be discussed in advance with Environmental Stewardship and Policy staff and may require an on-site planning session before any work begins. The purpose of these discussions will be to minimize the number of crossings and their impact on the important resources in the streams.
3. Cutting of trees within SMZs must be accomplished by using either hand-held equipment or other appropriate clearing equipment (e.g., a feller-buncher) that would result in minimal soil disturbance and damage to low-lying vegetation. The method will be selected based on site-specific conditions and topography to minimize soil disturbance and impacts to the SMZ and surrounding area. Cutting of trees near permanent streams must be limited to those required to meet National Electrical Safety Code and danger tree requirements. Stumps can be cut close to ground level but must not be removed or uprooted.
4. Other vegetation near streams must be disturbed as little as possible during construction. Soil displacement by the actions of plowing, disking, blading, or other tillage or grading equipment will not be allowed in SMZs; however, a minimal amount of soil disturbance may occur as a result of clearing operations. Shorelines that have to be disturbed must be stabilized as soon as possible and revegetated as soon as feasible.

(C) Protection of Unique Habitats

This category will be used when, for one or more specific reasons, a temporary or permanent aquatic habitat requires special protection. This relatively uncommon level of protection will be appropriate and required when a unique habitat (for example, a particular spring run) or protected species (for example, one that breeds in a wet-weather ditch) is known to occur on or adjacent to the construction corridor. The purpose of the following guidelines is to avoid or minimize any disturbance of the unique aquatic habitat.

Guidelines:

1. Except as modified by Guidelines 2-4 below, all construction work around the unique habitat will be done using pertinent BMPs such as those described in *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities*, especially Chapter 6, "Standards and Specifications."
2. All construction activity in and within 30 meters (100 feet) of the unique habitat must be approved in advance by Environmental Stewardship and Policy staff, preferably as a result of an on-site planning session. The purpose of this review and approval will be to minimize impacts on the unique habitat. All crossings of streams also must comply with appropriate state (and, at times, federal) permitting requirements.
3. Cutting of trees within 30 meters (100 feet) of the unique habitat must be discussed in advance with Environmental Stewardship and Policy staff, preferably during the on-site planning session. Cutting of trees near the unique habitat must be kept to an absolute minimum. Stumps must not be removed, uprooted, or cut shorter than 0.30 meter (1 foot) above the ground line.
4. Other vegetation near the unique habitat must be disturbed as little as possible during construction. The soil must not be disturbed by plowing, disking, blading, or grading. Areas that have to be disturbed must be stabilized as soon as possible and revegetated as soon as feasible, in some cases with specific kinds of native plants. These and other vegetative requirements will be coordinated with Environmental Stewardship and Policy staff.

Additional Help

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

Revision April 2007

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

Guidelines	A: Standard	B: Important Permanent Streams	C: Unique Water Habitats
<p>1. Reference</p>	<ul style="list-style-type: none"> All TVA construction work around streams will be done using pertinent BMPs such as those described in <i>A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities</i>, especially Chapter 6, BMP “Standards and Specifications.” 	<p>Except as modified by guidelines 2-4 below, all construction work around streams will be done using pertinent BMPs such as those described in <i>A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities</i>, especially Chapter 6, BMP “Standards and Specifications.”</p>	<ul style="list-style-type: none"> Except as modified by guidelines 2-4 below, all construction work around the unique habitat will be done using pertinent BMPs such as those described in <i>A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities</i>, especially Chapter 6, BMP “Standards and Specifications.”
<p>2. Equipment Crossings</p>	<ul style="list-style-type: none"> All crossings of streams must comply with appropriate state and federal permitting requirements. Crossings of all drainage channels, intermittent streams, and permanent streams must be done in ways that avoid erosion problems and long-term changes in water flow. Crossings of any permanent streams must allow for natural movement of fish and other aquatic life. 	<ul style="list-style-type: none"> All crossings of streams must comply with appropriate state and federal permitting requirements. Crossings of drainage channels and intermittent streams must be done in ways that avoid erosion problems and long-term changes in water flow. Proposed crossings of permanent streams must be discussed in advance with 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. 	<ul style="list-style-type: none"> All crossings of streams also must comply with appropriate state and federal permitting requirements. All construction activity in and within 30 meters (100 feet) of the unique habitat must be approved in advance by 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
<p align="center">3.</p> <p align="center">Cutting Trees</p>	<ul style="list-style-type: none"> • Cutting of trees within SMZs must be accomplished by using either hand-held equipment or other appropriate clearing equipment (e.g., a feller-buncher) that would result in minimal soil disturbance and damage to low-lying vegetation. The method will be selected based on site-specific conditions and topography to minimize soil disturbance and impacts to the SMZ and surrounding area. • Stumps can be cut close to ground level but must not be removed or uprooted. 	<ul style="list-style-type: none"> • Cutting of trees with SMZs must be accomplished by using either hand-held equipment or other appropriate clearing equipment (e.g., a feller-buncher) that would result in minimal soil disturbance and damage to low-lying vegetation. The method will be selected based on site-specific conditions and topography to minimize soil disturbance and impacts to the SMZ and surrounding area. • Cutting of trees near permanent streams must be limited to those meeting National Electrical Safety Code and danger tree requirements. • Stumps can be cut close to ground level but must not be removed or uprooted. 	<ul style="list-style-type: none"> • Cutting of trees within 30 meters (100 feet) of the unique habitat must be discussed in advance with 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.
<p align="center">4.</p> <p align="center">Other Vegetation</p>	<ul style="list-style-type: none"> • Other vegetation near streams must be disturbed as little as possible during construction. • Soil displacement by the actions of plowing, disking, blading, or other tillage or grading equipment will not be allowed in SMZs; however, a minimal amount of soil disturbance may occur as a result of clearing operations. • Shorelines that have to be disturbed must be stabilized as soon as feasible. 	<ul style="list-style-type: none"> • Other vegetation near streams must be disturbed as little as possible during construction. • Soil displacement by the actions of plowing, disking, blading, or other tillage or grading equipment will not be allowed in SMZs; however, a minimal amount of soil disturbance may occur as a result of clearing operations. • Shorelines that have to be disturbed must be stabilized as soon as possible and revegetated as soon as feasible. 	<ul style="list-style-type: none"> • Other vegetation near the unique habitat must be disturbed as little as possible during construction. • The soil must not be disturbed by plowing, disking, blading, or grading. • Areas that have to be disturbed must be stabilized as soon as possible and revegetated as soon as feasible, in some cases with specific kinds of native plants. These and other vegetative requirements will be coordinated with Environmental Stewardship and Policy staff.

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Appendix E – Tennessee Valley Authority Site Clearing and Grading Specifications

1. General - The project manager with the clearing and/or grading contractor(s) shall review the environmental evaluation documents for the project or proposed activity (categorical exclusion checklist, environmental assessment, or environmental impact statement) along with all clearing and construction appendices, conditions in applicable general and/or site-specific permits, the storm water pollution prevention plan, open burning or demolition notification requirements, and any Tennessee Valley Authority (TVA) commitments to property owners. The contractor shall then plan and carry out operations using techniques consistent with good engineering and storm water management practices as outlined in TVA's best management practices (BMPs) manual. The contractor will protect areas that are to be left unaffected by access or clearing work at and adjacent to all work sites. In sensitive areas and their buffers, the contractor will retain as much native ground cover and other vegetation as possible. BMPs shall be installed before general site clearing or grading, with progressive stabilization BMPs applied from the perimeter toward the interior work areas as grading is completed. Any stabilized area that must be disturbed in subsequent steps shall have temporary BMPs installed until work is completed and the area is restabilized.

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

2. Regulations - The clearing contractor shall comply with all applicable federal, state, and local environmental and antipollution laws, regulations, and ordinances, including without limitation, all air, water, solid and hazardous waste, noise, and nuisance laws, regulations, and ordinances. He or she shall secure, or ensure that TVA has **secured, all necessary permits and authorizations and made all appropriate notifications** to conduct work on the acres shown on the drawings and plan and profile for the contract. The contractor's designated project manager will actively seek to prevent, control, monitor, and safely abate all commonly recognized forms of workplace and environmental pollution. Permits or authorizations and **any necessary certifications of trained employees knowledgeable of environmental requirements shall be documented** with copies submitted to TVA's project manager or environmental specialist before work begins. The **contractor and subcontractors will be responsible for meeting all** conditions **specified in permits.** Permit conditions shall be reviewed in prework discussions.
3. Land and Landscape Preservation - The contractor shall exercise care to preserve the condition of cleared soils by avoiding as much compacting and deep scarring as possible in areas not to be developed for buildings, structures, or foundations. As soon as possible after initial disturbance of the soil and in accordance with any permit(s) or other state or local environmental regulatory requirements, cover material shall be placed to prevent erosion and sedimentation of water bodies or conveyances to

surface water or groundwater. The placement of erosion/sediment controls shall begin at the perimeter and work progressively to the interior of the site. Repeated work in an area will require establishment of a ground cover immediately after each disturbance is completed. In areas outside the clearing, borrow, fill, or use and access areas, the natural vegetation shall be protected from damage. The contractor and his or her employees and subcontractors must not deviate from delineated access routes or use areas and must enter the site(s) at designated areas that will be marked. Clearing operations shall be conducted to prevent any unnecessary destruction, scarring, or defacing of the remaining natural vegetation and adjacent surroundings in the vicinity of the work. In sensitive public or environmental areas, appropriate buffer zones shall be observed by modifying the methods of clearing or reclearing, grading, borrow, or fill so that the buffer and sensitive area are protected. Some areas may require planting native low-growing plants or grasses to meet the criteria of regulatory agencies, executive orders, or commitments to special program interests.

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

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

6. Sensitive Area Preservation - If prehistoric or historic artifacts or features that might be of archaeological or historical significance are discovered during clearing, grading, borrow, or fill operations, the activity shall immediately cease within a 100-foot radius, and a TVA project manager, an environmental specialist, and the TVA Cultural Resources program manager shall be notified. The site shall be protected and left as found until a determination about the resources, their significance, and site treatment is made by TVA's Cultural Resources Program. Work may continue beyond the finding zone and the 100-foot radius beyond its perimeter.
7. Water Quality Control - The contractor's clearing, grading, borrow and fill, and/or disposal activities shall be performed using BMPs that will prevent erosion and entrance of spillage, contaminants, debris, and other pollutants or objectionable materials into drainageways, surface waters, or groundwater. Special care shall be exercised in refueling equipment to prevent spills. Fueling areas shall be remote from any sinkhole, crevice, stream, or other water body. Open burning debris shall be kept away from streams and ditches and shall be incorporated into the soil. Only materials allowed to be burned under an open burning permit may be incorporated into the soil.

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

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

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

Construction of stream fords or other crossings will only be permitted at approved locations and to current TVA design or construction access road standards. At any construction site, material shall not be deposited in watercourses or within stream bank

areas where it could be washed away by high stream flows. Any clearing debris that enters streams or other water bodies shall be removed immediately. Appropriate U.S. Army Corps of Engineers and state permits shall be obtained for stream or wetland crossings.

9. Air Quality Control - The clearing or grading contractor shall take appropriate actions to limit the amount of air emissions created by clearing and disposal operations to be well within the limits of clearing or burning permits and/or forestry or local fire department requirements. All operations must be conducted in a manner that prevents nuisance conditions or damage to adjacent land, crops, dwellings, highways, or people. If building renovation or demolition is involved, the required air quality organization shall be notified the minimum 10 days in advance, and if the start date is delayed, renotified to start the clock again.
10. Dust and Mud Control - Clearing, grading, borrow, fill, or transport activities shall be conducted in a manner that minimizes the creation of fugitive dust. This may require limitations as to type of equipment, allowable speeds, and routes utilized. Control measures such as water, gravel, etc., or similar measures may be used subject to TVA approval. On new construction sites and easements, the last 100 feet before an access road approaches a county road or highway shall be graveled to prevent transfer of mud onto the public road.
11. Burning - The contractor shall obtain applicable permits and approvals to conduct controlled burning. The contractor will comply with all provisions of the permit, notification or authorization including burning site locations, controlled draft, burning hours, and such other conditions as stipulated. If weather conditions such as wind speed or wind direction change rapidly, the contractor's burning operation may be temporarily stopped by TVA's field engineer. The debris to be burned shall be kept as clean and dry as possible and stacked and burned in a manner that produces the minimum amount of smoke. Residue from burning will be disposed of according to permit stipulations. No fuel starters or enhancements other than kerosene will be allowed.
12. Smoke and Odors - The contractor will properly store and handle combustible and volatile materials that could create objectionable smoke, odor, or fumes. The contractor shall not burn oil or refuse that includes trash, rags, tires, plastics, or other manufactured debris.
13. Vehicle Exhaust Emissions - The contractor shall maintain and operate equipment in a manner that limits vehicle exhaust emissions. Equipment and vehicles will be kept within the manufacturer's recommended limits and tolerances. Excessive exhaust gases will be eliminated, and inefficient operating procedures will be revised or halted until corrective repairs or adjustments are made.
14. Vehicle Servicing - Routine maintenance of vehicles will not be performed on the site, right-of-way, or access route. However, if emergency or "have to" situations arise, minimal/temporary maintenance to vehicles will occur in order to mobilize the vehicle to an off-site maintenance shop. Some heavy equipment may have to be serviced on the right-of-way, site, or access route, except in designated sensitive areas. The clearing, grading, borrow, or fill contractor will properly maintain these vehicles with approved spill protection controls and countermeasures. If emergency maintenance in a

sensitive or questionable area arises, the Area Environmental Program Administration or project manager will be consulted. All wastes and used oils will be properly recovered, handled, and disposed/recycled. Equipment shall not be temporarily stored in stream floodplains, whether overnight or on weekends or holidays.

15. Noise Control - The contractor shall take steps to avoid the creation of excessive sound levels for employees, the public, or the site and adjacent property owners. Concentration of individual noisy pieces as well as the hours and locations of operation should be considered.
16. Noise Suppression - All internal combustion engines shall be properly equipped with mufflers. The equipment and mufflers shall be maintained at peak operating efficiency.
17. Sanitation - A designated representative of TVA or the clearing, grading, borrow, fill, or construction contractor shall contract a sanitary contractor who will provide sanitary chemical toilets convenient to all principal points of operation for every working party and at each construction step. The facilities shall comply with applicable federal, state, or local health laws and regulations. They shall not be located closer than 100 feet to any stream or tributary or to any wetland. The facilities shall be required to have proper servicing and maintenance, and the waste disposal contractor shall verify in writing that the waste disposal will be in state-approved facilities. Employees shall be notified of sanitation regulations and shall be required to use the toilet facilities.
18. Refuse Disposal - The clearing, grading, borrow, fill, or construction contractor and subcontractor(s) shall be responsible for daily cleanup and proper labeling, storage, and disposal of all refuse and debris on the site produced by his or her operations and employees. Facilities that meet applicable regulations and guidelines for refuse collection will be required. Only approved transport, storage, and disposal areas shall be used. Records of waste generation shall be maintained for a site and shall be provided to the project manager and environmental specialist assigned to the project.
19. Brush and Timber Disposal (Initial Clearing) - For initial clearing, trees are commonly part of the contractor's contract to remove as they wish. Trees may be removed from the site for lumber or pulpwood, or they may be chipped or stacked and burned. All such activities must be coordinated with the TVA field engineer and the open burning permits; notifications and regulatory requirements must be met. On rights-of-way, trees may be cut and left in place only in areas specified by TVA and approved by appropriate regulatory agencies. These areas may include sensitive wetlands or SMZs where tree removal would cause excessive ground disturbance or in very rugged terrain where windrowed trees are used as sediment barriers along the edge of the right-of-way, site, or access.

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

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

- A. The subsoil shall be loosened to a minimum depth of 6 inches if possible and worked to remove unnatural ridges and depressions.
- B. If needed, appropriate soil amendments will be added.
- C. All disturbed areas will initially be seeded with a temporary ground cover such as winter wheat, rye, or millet, depending on the season. Perennials may also be planted during initial seeding if proper growing conditions exist. Final restoration and final seeding will be performed as line, site, or communications facilities construction is completed. Final seeding will consist of permanent perennial grasses such as those outlined in TVA's *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities*. Exceptions would include those areas designated as native grass planting areas. Initial and final restoration will be performed by the clearing contractor with emphasis on using landscaping materials provided in guidelines for low maintenance native vegetation use.
- D. TVA holds the option, depending upon the time of year and weather condition, to delay or withdraw the requirement of seeding until more favorable planting conditions are certain. In the meantime, other stabilization techniques must be applied.
- E. Vegetation designated by the Federal Invasive Species Council must be eliminated at the work site, and equipment being transported from location to location must be inspected to ensure removal and destruction of live material.

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Appendix F – Tennessee Valley Authority Substation Lighting Guidelines

For Greenfield Sites

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

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

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

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

For Minor Modifications to Existing Facilities

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

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

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

General Design Issues and Design Principle Definitions

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

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

References

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

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

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

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

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

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Appendix G – Tennessee Valley Authority Environmental Quality Protection Specifications for Transmission Substation or Communications Construction

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

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

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

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

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

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

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

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

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

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

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

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

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

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

11. Floodplain Evaluation - During the planning and design phase of the substation or communications facility, floodplain information should be obtained to avoid locating flood-damageable facilities in the 100-year floodplain. If the preferred site is located within a floodplain area, alternative sites must be evaluated and documentation prepared to support a determination of "no practicable alternative" to siting in the floodplain. In addition, steps taken to minimize adverse floodplain impacts should also be documented.
12. Clearing - No construction, dismantling, or forensic activities may clear additional site or right-of-way vegetation or disturb remaining retained vegetation, stumps, or regrowth at locations other than the structure, substation, or communication site or access thereto. TVA and the construction, dismantling, or forensic contractor(s) must provide appropriate erosion or sediment controls for areas they have disturbed after each disturbance that have previously been restabilized after clearing operations. Control measures shall be implemented as soon as practicable after disturbance in accordance with applicable federal, state, and/or local storm water regulations.
13. Restoration of Site - All construction, dismantling, or forensic-related disturbed areas with the exception of farmland under cultivation and any other areas as may be designated by TVA's specifications shall be stabilized in the following manner unless the property owner and TVA's engineer specify a different method:
 - A. The subsoil shall be loosened to a minimum depth of 6 inches if possible and worked to remove unnatural ridges and depressions.
 - B. If needed, appropriate soil amendments will be added.
 - C. All disturbed areas will initially be seeded with a temporary ground cover such as winter wheat, rye, or millet, depending on the season. Perennials may also be planted during initial seeding if proper growing conditions exist. Final restoration and final seeding will be performed as line construction is completed. Final seeding will consist of permanent perennial grasses such as those outlined in TVA's *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities*. Exceptions would

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

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

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

Revision April 2007

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

1.0 Overview

- A. The Tennessee Valley Authority (TVA) must manage the vegetation on its rights-of-way and easements to ensure emergency maintenance access and routine access to structures, switches, conductors, and communications equipment. In addition, TVA must maintain adequate clearance, as specified by the National Electrical Safety Code, between conductors and tall-growing vegetation and other objects. This requirement applies to vegetation within the right-of-way as well as to trees located off the right-of-way.
- B. Each year TVA assesses the conditions of the vegetation on and along its rights-of-way. This is accomplished by aerial inspections, periodic field inspections, aerial photography, and information from TVA personnel, property owners, and the general public. Important information gathered during these assessments includes the coverage by various vegetation types, the mix of plant species, the observed growth, the seasonal growing conditions, and the density of the tall vegetation. TVA also evaluates the proximity, height, and growth rate of trees adjacent to the right-of-way that may be a danger to the line or structures.
- C. TVA right-of-way specialists develop a vegetation reclearing plan that is specific to each line segment and is based on terrain conditions, species mix, growth, and density.

2.0 Right-of-Way Management Options

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

- D. TVA does not encourage tree reclearing by individual property owners because of the high hazard potential of hand clearing, possible interruptions of the line, and electrical safety considerations for untrained personnel that might do the work. Private property owners may reclear the right-of-way with trained reclearing professionals.
- E. Mechanical mowers not only cut the tall saplings and seedlings on the right-of-way, they also shatter the stump and the supporting near-surface root crown. The tendency of resistant species is to resprout from the root crown, and shattered stumps can produce a multistem dense stand in the immediate area. Repeated use of mowers on short cycle reclearing with many original stumps regrowing in the above manner can create a single species thicket or monoculture. With the original large root system and multiple stems, the resistant species can produce regrowth at the rate of 5-10 feet in a year. In years with high rainfall, the growth can reach 12-15 feet in a single year. These dense, monoculture stands can become nearly impenetrable for even large tractors. Such stands have low diversity and little wildlife food or nesting potential and become a property owner's concern. Selective herbicide application may be used to control monoculture stands.
- F. TVA encourages property owners to sign an agreement to manage rights-of-way on their land for wildlife under the auspices of "Project Habitat," a joint project by TVA, BASF, and wildlife organizations, e.g., National Wild Turkey Federation, Quail Unlimited, and Buckmasters. The property owner maintains the right-of-way in wildlife food and cover with emphasis on quail, turkey, deer, or other wildlife. A variation used in or adjacent to developing suburban areas is to sign agreements with the developer and residents to plant and maintain wildflowers on the right-of-way.
- G. TVA places strong emphasis on managing rights-of-way in the above manner. When the property owners do not agree to these opportunities, TVA must maintain the right-of-way in the most environmentally acceptable, cost-effective, and efficient manner possible.

3.0 Herbicide Program

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

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

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

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

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

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

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

- B. The herbicides listed in Tables 1 and 2 and TGRs listed in Table 3 have been evaluated in extensive studies in support of registration applications and label requirements. Many have been reviewed in the USFS vegetation management environmental impact statements (EISs), and those evaluations are incorporated here by reference (USFS 1989a, 1989b, 2002a, and 2002b). Electronic copies can be accessed at <http://www.fs.fed.us/r8/planning/documents/vegmgmt/>. The result of these reviews has been a consistent finding of limited environmental impact beyond that of control of the target vegetation. All the listed herbicides have been found to be of low environmental toxicity when applied by trained applicators following the label and registration procedures, including prescribed measures, such as buffer zones, to protect threatened and endangered species.
- C. Low-volume herbicide applications are recommended since research demonstrates much wider plant diversity after such applications. There is better ground erosion protection, and more wildlife food plants and cover plants develop. In most situations, there is increased development of wild flowering plants and shrubs. In

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

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

5. Liquid application is not performed when the temperature reaches 95 degrees Fahrenheit or above.
 6. Application during unstable, unpredictable, or changing weather patterns is avoided.
 7. Equipment and techniques are used that are designed to ensure maximum control of the spray swath with minimum drift.
 8. Herbicides are not applied to surface water or wetlands unless specifically labeled for aquatic use. Filter and buffer strips will conform at least to federal and state regulations and any label requirements. The use of aerial or broadcast application of herbicides is not allowed within a streamside management zone (SMZs) (200 feet minimum width) adjacent to perennial streams, ponds, and other water sources. Hand application of certain herbicides labeled for use within SMZs is used only selectively.
 9. Buffers and filter strips (200 feet minimum width) are maintained next to agricultural crops, gardens, farm animals, orchards, apiaries, horticultural crops, and other valuable vegetation.
 10. Herbicides are not applied in the following areas or times: (a) in city, state, and national parks or forests or other special areas without written permission and/or required permits, (b) off the right-of-way, and (c) during rainy periods or during the 48-hour interval prior to rainfall predicted with a 20 percent or greater probability by local forecasters, when soil active herbicides are used.
- H TVA currently utilizes Activate Plus, manufactured by Terra, as an adjuvant to herbicides to improve the performance of the spray mixture. Application rates are consistent with the USEPA-approved label. The USFWS has expressed some concern on toxicity effects of surfactants on aquatic species. TVA is working in coordination with Mississippi State University and chemical companies to evaluate efficacy of additional low-toxicity surfactants, including LI700 as manufactured by Loveland Industries, through side-by-side test plots in the SMZs of area transmission lines.
- I. TVA currently uses primarily low-volume applications of foliar and basal applications of Accord (glyphosate) and Accord- (glyphosate) Arsenal (imazapyr) tank mixes. Glyphosate is one of the most widely used herbicidal active ingredients in the world and has been continuously the subject of numerous exhaustive studies and scrutiny to determine its potential impacts on humans, animals, and the environment.

4.0 References

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Revision April 2008

**Appendix I – Analysis of the Alternative Transmission Line
Routes and Switching Station Sites for the Gallatin Fossil Plant-
Angeltown 161-kV Transmission Line and Switching Station
Power System Improvement Project in Sumner County,
Tennessee**

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Appendix I – Location Descriptions of the Individual Proposed Transmission Line Segments Considered for the Proposed Gallatin Fossil Plant-Angeltown 161-kV Transmission Line in Sumner County, Tennessee

Introduction

The Tennessee Valley Authority (TVA) considered 51 alternative transmission line segments for the proposed Gallatin Fossil Plant (FP)-Angeltown 161-kV Transmission Line. Using various combinations of these constituent segments, 102 alternate transmission line routes were developed.

However, following the open house, TVA learned that Segment 9 was not practical due to existing commercial development and airport flight path restrictions. Consequently, Alternative Route Options 2, 4, 6, 8, 10, 12, 14, 16, 18, and 20 were eliminated from the formal analysis, and TVA considered only 92 potential transmission line route options for the analysis. Following are descriptions of these segments as well as indications of how each segment rated within the routes ranked as the top 20.

Segment Descriptions

Segment 1 begins at Bay 29 of the Gallatin Fossil Plant (GAF) switchyard, proceeds southwest on new right-of-way (ROW) contained on TVA property for approximately 0.17 mile before terminating into Segments 2 and 3. This segment is utilized in all of the routes identified as being in the top 20.

Segment 2 utilizes the vacant eastern side of the double-circuit structures on TVA's Gallatin FP-Hoeganaes 161-kV Transmission Line for approximately 3.68 miles. This segment begins at the end of Segment 1 and terminates where the existing Gallatin-Hartsville 69-kV Transmission Line crosses the Gallatin FP-Hoeganaes 161-kV Transmission Line, into Segments 6 and 7. Segment 2 begins on the eastern side of Steam Plant Road, then transitions to and remains on the western side of Steam Plant Road. Segment 2 starts to the northeast, proceeding to the east of the Gallatin combustion turbines, then turns and continues in northeast direction. This segment is used in all of the top 20 routes.

Segment 3 begins at the end of Segment 1, turning east to clear ROWs for other TVA transmission lines leaving GAF before turning southeast and paralleling the other TVA lines leaving the plant. The segment crosses the GAF intake channel and the Cumberland River, crossing into Wilson County. The segment then turns northeast, then east as it crosses Cairo Bend Road, finally turning northeast and terminating into Segments 4 and 5. This segment is on all new ROW, utilizing a combination of TVA and private property, and is approximately 2.12 miles long. This segment is not utilized in any of the top 20 routes.

Segment 4 begins in Wilson County east of Cairo Bend Road. The segment is generally to the north, with some proposed angles on the route taking advantage of terrain features and property lines. As the segment runs north, it approaches the end of the peninsula, turning northwest, and crossing over Cairo Bend Road before crossing the Cumberland River back into Sumner County. Once the segment is back in Sumner County, it crosses two minor roads as the segment terminates into Segment 10. This termination point is also the

termination point of Segments 5 and 6. Segment 4 is on all new ROW and is approximately 4.13 miles long. This segment is not used in any of the top 20 routes.

Segment 5 begins east of Cairo Bend Road in Wilson County and runs east, crossing over the Cumberland River and into Sumner County. The segment then parallels the TVA Gallatin FP-Lafayette 161-kV Transmission Line ROW, proceeding to the northeast and crossing East Robertson Road. Leaving the existing ROW, the segment turns north, then west crossing back over East Robertson Road. It then turns northwest crossing over a Cumberland River embayment before crossing over Lakeview Road and then Ziegler's Fort Road finally terminating into Segment 10. Segment 5 utilizes all new ROW and is approximately 6.12 miles long. This segment is not utilized in any of the top 20 routes.

Segment 6, which is located entirely on TVA's existing Gallatin-Hartsville 69-kV Transmission Line ROW, begins just north of Newton Lane and west of Steam Plant Road on the ROW for the Gallatin FP-Hoeganaes 161-kV Transmission Line. The segment then crosses over Steam Plant Road, Newton Lane, Lakewood Drive, Lake Marie Road, and Cairo Road before terminating into Segment 10. This segment, which is approximately 2.45 miles long, would require a portion of the existing 69-kV line to be rebuilt as a double-circuit transmission line. This segment is used in 100 percent of the top 20 routes.

Segment 7 utilizes the vacant eastern side of the double-circuit structures on TVA existing Gallatin FP-Hoeganaes 161-kV Transmission Line. Segment 7 begins at the end of Segment 2 and terminates just north of Airport Road into Segments 8 and 9. This segment is on the western side of Steam Plant Road and is approximately 1.13 miles long. This segment is not utilized in any of the top 20 routes.

Segment 8 begins just to the north of the intersection of Steam Plant Road and Airport Road. This segment runs on the eastern side of Steam Plant Road, heading northwest, then north, turning east, before turning north and then following existing railroad tracks and terminating into Segment 11. Segment 8 utilizes all new ROW and is approximately 1.44 miles in length. This segment is not used in any of the top 20 routes.

Segment 9 utilized all new ROW and is approximately 1.21 miles long. This segment was determined to be unusable due to airport glide path restrictions as well as existing commercial development and facilities. Therefore, all routes that utilize Segment 9 were removed from the analysis following the public open house for the project.

Segment 10 begins at the end of Segments 4, 5, and 6 on the existing Gallatin-Hartsville 69-kV Transmission Line ROW. This segment proceeds northwest, turns north, and then northwest again before finally turning northeast, terminating into Segments 12 and 13. This segment is entirely on farmland with no road crossings. Segment 10 utilizes all new ROW and is approximately 1.46 miles long. This segment is used in all of the top 20 routes.

Segment 11 utilizes all new ROW and begins at the termination points of Segments 8 and 9. This segment proceeds northeast, paralleling an existing railroad ROW, before crossing over the intersection of Airport Road and SR 25 (known locally as Hartsville Pike). Segment 11 continues parallel to an abandoned railroad ROW, terminating east of Gateway

Drive at the beginning of Segments 18 and 19. This segment is approximately 1.39 miles long. This segment is not utilized in any of the top 20 routes.

Segment 12 uses all new ROW and begins at the termination of Segment 10, south of SR 25, west of Zieglers Fort Road. This segment crosses SR 25 in a northwest direction turns north and terminates just north of Roundtree Drive into Segments 16 and 17. Segment 12 is approximately 1.82 miles long. This segment is used in 85 percent of the top 20 routes.

Beginning at the termination point of Segment 10, Segment 13 proceeds to the east/northeast, crossing Zieglers Fort Road, then turning north, crossing over SR 25, before terminating into Segments 14 and 15. Segment 13 is approximately 1.35 miles long and utilizes all new ROW. This segment is utilized in 15 percent of the top 20 routes.

Segment 14 begins at the termination point of Segment 13, north of SR 25 and east of Brights Lane. This segment heads northeast, crossing a stream before turning north and crossing another stream, Branham Mill Road, the vacant Montgomery-Wilson Loop to Hartsville 500-kV Transmission Line ROW, and Shiloh Road. Segment 14 then turns slightly northeast, crosses another small stream and Rogana Road, then turns to the northwest. The segment then turns west crossing over US 31E before turning north and terminating into Segment 26. Segment 14 uses all new ROW and is approximately 5.21 miles long. This segment is not used in any of the top 20 routes.

Segment 15 stays to the east of Brights Lane, proceeding to the northwest, crossing one small stream and terminating into Segment 22. This segment is approximately 1.71 miles long and utilizes all new ROW. This segment is utilized in 15 percent of the top 20 routes.

Segment 16 begins at the termination of Segment 12, turns east along Roundtree Drive, before turning north, crossing a small stream, and terminating into Segment 22. Segment 16 is approximately 1.16 miles long and uses all new ROW. This segment is used in 40 percent of the top 20 routes.

Segment 17 begins at the termination of Segment 12 and turns northwest, terminating into Segments 20 and 21. This segment uses all new ROW and is approximately 0.40 mile long. This segment is utilized in 45 percent of the top 20 routes.

Segment 18 begins at the termination of Segment 11, then turns northeast, making two small stream crossings before crossing Roundtree Drive and terminating into Segments 20 and 21. This segment is approximately 1.45 miles long and utilizes all new ROW. This segment is not used in any of the top 20 routes.

Segment 19 is the longest of the proposed route segments and begins at the termination of Segment 11, just east of Gateway Drive. The segment runs north, paralleling Commerce Way, turns northwest crossing north of the end of Commerce Way, before turning north to cross US 31E. The segment then parallels Martin Lane for approximately 2,000 feet, crossing a minor stream. The segment then turns west, crossing Martin Lane and a stream, then northwest to cross Gibbs Lane and another stream. The segment then turns north, crossing a minor stream and the vacant Montgomery-Wilson Loop to Hartsville 500-kV Transmission Line ROW before turning northeast and crossing Deshea Creek Road and

Deshea Creek, and finally turning to the north again. Segment 19 then crosses Hickory Ridge Road, just west of the Hickory Ridge Road and Wrights Lane intersection. The segment then proceeds north, crossing over Dry Fork Creek Road and Campbell Hollow Road before terminating into Segments 36 and 37. Segment 19 is approximately 7.69 miles long and utilizes all new ROW. This segment is not utilized in any of the top 20 routes.

Segment 20 uses all new ROW and begins at the termination of Segments 17 and 18. The segment runs northwest, crossing US 31E, turns north crossing the vacant Montgomery-Wilson Loop to Hartsville 500-kV Transmission Line ROW and Kansas Lane before turning northeast for a small distance and terminating into Segment 27. Segment 20 is approximately 2.99 miles long and is used in 25 percent of the top 20 routes.

Segment 21 begins at the termination of Segments 17 and 18, and runs north crossing Brights Lane, Deshea Creek, and then Branham Mill Road before turning northeast and then east making another minor stream crossing, before terminating into Segment 23. Segment 21 is approximately 1.63 miles long and uses all new ROW. This segment is utilized in 20 percent of the top 20 routes.

Segment 22 is a very short segment that begins at the termination of Segments 15 and 16, running northwest and crossing over Branham Mill Road before terminating into Segment 23. This segment uses all new ROW and is approximately 0.37 mile long. This segment is used in 55 percent of the top 20 routes.

Segment 23 begins at the termination of Segments 21 and 22, running north crossing over the vacant Montgomery-Wilson Loop to Hartsville 500-kV Transmission Line ROW, then turning north, crossing over Old US 31E and US 31E before turning north and northwest and terminating into Segments 24 and 25. This segment is approximately 1.74 miles long and utilizes all new ROW. This segment is utilized in 75 percent of the top 20 routes.

Segment 24 is a short route that begins at the termination of Segment 23 and heads to the northwest, terminating into Segment 27. This segment utilizes all new ROW and is approximately 0.60 mile long. This segment is used in 50 percent of the top 20 routes.

Segment 25 begins at the termination of Segment 23 and heads northeast, crosses over Rock Bridge Road and South Dry Fork Road, then crosses a minor stream before terminating into Segment 26. This segment utilizes all new ROW and is approximately 1.25 miles long. Segment 25 is utilized in 25 percent of the top 20 routes.

Segment 26 begins at the termination of Segments 14 and 25, runs north at the beginning, then turns slightly northwest and then northeast as it begins to cross hilly terrain. This segment terminates into Segments 30 and 31. Segment 26 uses all new ROW and is approximately 2.56 miles long. This segment is used in 20 percent of the top 20 routes.

Segment 27 begins at the termination of Segments 20 and 24, initially running north along the side of a slope, roughly paralleling Rock Bridge Road. The route then jogs northwest to cross Dry Fork Creek and Dry Fork Creek Road, before turning north paralleling existing property lines. The segment then crosses a small stream before crossing Campbell Hollow

Road and a newly constructed natural gas pipeline and finally turning northwest at the base of a rock cliff to terminate into Segments 28 and 29. Using all new ROW, Segment 27 is approximately 2.22 miles long and is utilized in 75 percent of the top 20 routes.

Segment 28 begins at the termination of Segment 27 and runs northwest crossing over very hilly terrain, crossing one small stream before terminating into Segment 35. Segment 28 is approximately 1.21 miles long and uses all new ROW. This segment is used in 20 percent of the top 20 routes.

Segment 29 begins at the termination of Segment 27 and heads northeast, crossing over undulating terrain and crossing Rock Bridge Road, crossing two small streams before terminating into Segments 34 and 50. This segment is approximately 1.81 miles long and uses all new ROW. This segment is utilized in 55 percent of the top 20 routes.

Segment 30 begins at the termination of Segment 26 and heads northwest over hilly terrain, crossing one small stream and terminating into Segments 33 and 51. Segment 30 utilizes all new ROW and is approximately 0.79 mile long. This segment is used in 20 percent of the top 20 routes.

Segment 31 begins at the termination of Segment 26 and heads northeast, north, and then northwest before ending. The segment crosses over hilly terrain that flattens out near the end of the segment. There are two minor stream crossings on the northeast section, then the segment crosses Mount Vernon Road before turning to the northwest and crossing back over Mount Vernon Road north of James Whitefield Road and terminating into Segments 40 and 41. Segment 31 is approximately 2.04 miles long and uses all new ROW. This segment is utilized in 5 percent of the top 20 routes.

Segment 32 begins at the termination of Segments 50 and 51, heads north then northeast over undulating terrain, crossing over James Whitefield Road and terminating just before a small stream into Segments 39 and 42. This segment utilizes all new ROW and is approximately 0.89 mile long. This segment is used in 25 percent of the top 20 routes.

Segment 33 is routed northwest over sloping terrain that begins at the termination of Segment 30 and terminates into Segments 34 and 50. This segment is approximately 0.40 mile long, uses all new ROW, and is utilized in 15 percent of the top 20 routes.

Segment 34 begins at the termination of Segments 29 and 33 and heads northwest over hilly terrain, crossing over Whippoorwill Lane and Whitson Road before terminating into Segment 38. Segment 34 utilizes all new ROW and is approximately 0.88 mile long. This segment is used in 45 percent of the top 20 routes.

Segment 35 is over undulating terrain beginning at the termination of Segments 28 and 36, heads northeast, then northwest before turning northeast again and terminating into Segment 38. This segment uses all new ROW and is approximately 1.79 miles long. This segment is utilized in 20 percent of the top 20 routes.

Segment 36 begins at the termination of Segment 19, heading in a northeast direction over hilly terrain and terminating into Segment 35. This segment is approximately 0.48 mile long and uses all new ROW. This segment is not used in any of the top 20 routes.

Segment 37 begins at the termination of Segment 19, heading northwest as it crosses Less Lane and Buttermilk Hollow Road in slowly rolling terrain, then turning northeast over slightly flatter terrain, crossing a small stream. This northeast portion crosses over Womack Road before turning northwest. The segment then proceeds north-northwest crossing another small stream just before crossing over Rock Bridge Road just south of Hickory Corner Road and proceeding to cross another stream and then Smith Thompson Road before turning northeast, making one more minor stream crossing finally turning east to terminate into Segment 48. The terrain is still rolling at the end of the segment, but with less severity than at the beginning. Segment 37 uses all new ROW and is approximately 3.37 miles long. This segment is not utilized in any of the top 20 routes.

Segment 38 begins at the termination of Segments 34 and 35 heading northwest over slowly rolling terrain, crossing over Smith Thompson Road and finally terminating into Segments 46 and 47. This segment is approximately 0.49 mile long and utilizes all new ROW. This segment is used in 70 percent of the top 20 routes.

Segment 39 begins at the termination of Segments 32 and 40 and heads west-northwest, terminating into Segments 44 and 45. This segment uses all new ROW and is approximately 0.31 mile long. This segment is utilized in 5 percent of the top 20 routes.

Segment 40 begins at the termination of Segment 31 heads west-northwest, crosses Bob Perry Road, and terminates into Segments 39 and 42. This segment is approximately 0.41 mile long and uses all new ROW. This segment is used in 5 percent of the top 20 routes.

Segment 41 begins at the termination of Segment 31 and heads north, paralleling Bob Perry Road over slowly rolling terrain before turning west, then northwest crossing over Bob Perry Road and terminating into Segment 43. This segment is approximately 0.72 mile long and utilizes all new ROW. This segment is not utilized in any of the top 20 routes.

Segment 42 begins at the termination of Segments 32 and 40, heads northeast crossing over Bob Perry Road south of Cal Durham Drive and turns north crossing Bob Perry Road again before terminating into Segment 43. This segment uses all new ROW and is approximately 0.55 mile long. This segment is used in 25 percent of the top 20 routes.

Segment 43 begins at the termination of Segments 41 and 42 and heads north then northeast before turning north again, crossing over slowly rolling terrain and across Buck Perry Road, then parallels to the west of Mount Vernon Road before terminating into Segment 49. This segment uses all new ROW and is approximately 0.99 mile long. This segment is utilized in 25 percent of the top 20 routes.

Segment 44 begins at the termination of Segment 39 and heads north over slowly rolling terrain, crossing the southern portion of Cal Durham Road and then paralleling the western leg of this road. The segment continues north, crossing a small stream and West Mount Vernon Road before continuing north and intersecting TVA's Portland-Westmoreland 161-

kV Transmission Line to the east of Structure 146. The segment then parallels the existing ROW, terminating into Segment 49. This segment is approximately 1.85 miles long and utilizes all new ROW. This segment is not used in any of the top 20 routes.

Segment 45 begins at the termination of Segment 39 heading northwest to begin over hilly terrain. This segment then turns north, crossing two small streams and roughly paralleling Fence Row Lane before crossing Buck Perry Road and turning northwest into proposed alternative switching station Site 2. This segment uses all new ROW and is approximately 1.21 miles long. This segment is utilized in 5 percent of the top 20 routes.

Segment 46 begins at the termination of Segment 38 and heads north-northeast through hilly terrain. The segment proceeds up existing property lines and over hilly terrain before coming to a point north of Buck Perry Road. Segment 46 then turns east and terminates into proposed alternative switching station Site 2. A barn is located within the proposed ROW just south of Buck Perry Road where the line turns east into the switching station site. This segment uses all new ROW and is approximately 1.19 miles long. This segment is used in 45 percent of the top 20 routes.

Segment 47 begins at the termination of Segment 38 and heads northwest over moderately rolling terrain, crossing a small stream before terminating into Segment 48. This segment uses all new ROW and is approximately 0.47 mile long. This segment is utilized in 20 percent of the top 20 routes.

Segment 48 begins at the termination of Segments 37 and 47 and heads north, crossing over Buck Perry Road and turning east as it terminates into proposed alternative switching station Site 1. This segment is approximately 0.55 mile long and utilizes all new ROW. This segment is used in 25 percent of the top 20 routes.

Segment 49 begins at the termination of Segments 43 and 44 and heads east across pasture south of TVA's Portland-Westmoreland 161-kV Transmission Line terminating into the proposed alternative switching station Site 3. This segment is approximately 0.05 mile long and uses all new ROW. This segment is utilized in 25 percent of the top 20 routes.

Segment 50 begins at the termination of Segments 29 and 33 and heads northeast over rolling terrain before terminating into Segment 32. This segment was developed following the open house as a connector to Segment 32. It is approximately 0.29 mile long and uses all new ROW. This segment is used in 20 percent of the top 20 routes.

Segment 51 begins at the termination of Segment 30, heads northwest over rolling terrain terminating into Segment 32. This segment, added after the open house because of the addition of Segment 50, connects Segments 30 and 32. Segment 51 uses all new ROW and is approximately 0.49 mile long. This segment is utilized in 5 percent of the top 20 routes.

Segment Adjustments Following the Open House

Several minor adjustments to route segments were made along the transmission line route before and during field surveys. The changes are summarized in the table below.

Table I-1. Individual Segment Adjustments Along the Proposed Route for the Gallatin-Angeltown 161-kV Transmission Line Project in Sumner County, Tennessee

Segment	Adjustment	Reason
10	Adjusted PI* to the northeast where the transmission line would transition from existing ROW to new ROW	Environmental and Engineering - Spring in area of original PI; also, topography as PI was in a valley
10	Moved PI west on property corner	Owner request to save tree
10	Created new PI and moved route west between PIs 29 and 30	Environmental - To avoid spring
12	Cut corner out of the segment to avoid spring and also to save walnut trees	Environmental - To avoid spring and owner request on trees
12	Moved route east off of one owner onto another at property owners' request (both owners agreed to change)	Owner request
12	Moved PI south off of one owner onto another (both owners agreed to change)	Owner request
17	Moved route north off of one owner and onto another at owners' request (both owners agreed to change)	Owner request
20	Moved PI onto owner	Owner request
20	Revised route at owner's request to avoid one property and keep ROW on two other owners (all owners agreed)	Owner request
20	Revised the route to parallel US 31 at owner's request to facilitate parcel development	Owner request
20	Modified route at owner's request	Owner request
20	Modified route to avoid certain parcel	TVA Realty request because owner could not be located
20	Moved PI east	Environmental - To avoid spring and creek
27	Adjusted transmission line route to east	Environmental - To avoid stream
27	Moved PI east	Environmental - To avoid stream
27	Moved route west at owner's request	Owner request
27	Moved route east to avoid rock cliff	Engineering
29	Moved route west at owner's request	Owner request
29	Moved route west at owner's request	Owner request
34	Moved PI north to top of hill	Engineering
38 & 46	Moved route east at owner's request to parallel property line	Owner request
46	Altered route in order to avoid spring	Environmental
46	Altered route to avoid wetland	Environmental
46	Altered route to provide route into switching station	Engineering

* PI = Point of intersection, or the point at which a survey turns an angle

Table I-2. Analysis of Criteria Scores of the Proposed Routes for the Gallatin Fossil Plant-Angeltown 161-kV Transmission Line in Sumner County, Tennessee

Alternative Transmission Line Route Option	SCORES OF INDIVIDUAL CRITERIA				Criteria Total Score
	Engineering	Environmental	Land Use	Cultural	
Route 1	19.20	10.64	13.13	4.01	46.99
Route 3	17.70	9.73	14.42	1.63	43.48
Route 5	17.14	8.43	14.27	1.59	41.42
Route 7	18.09	10.84	14.65	1.82	45.39
Route 9	17.82	9.53	14.49	1.78	43.63
Route 11	19.84	9.87	13.58	1.75	45.04
Route 13	19.08	9.30	15.28	1.75	45.40
Route 15	21.39	10.46	14.04	1.75	47.64
Route 17	21.78	10.95	22.04	1.75	56.52
Route 19	20.64	9.61	15.48	1.75	47.48
Route 21	9.54	10.89	4.78	2.27	27.47
Route 22	9.27	9.70	4.62	2.23	25.82
Route 23	9.92	12.60	4.97	2.46	29.94
Route 24	9.66	11.12	4.81	2.42	28.00
Route 25	9.88	11.51	4.81	4.81	31.01
Route 26	9.62	10.21	4.66	4.77	29.25
Route 27	11.63	10.55	3.74	4.74	30.66
Route 28	10.87	9.97	5.44	4.74	31.02
Route 29	13.18	11.13	4.20	4.74	33.26
Route 30	13.57	11.63	12.20	4.74	42.14
Route 31	12.55	11.61	5.65	4.74	34.55
Route 32	9.81	12.70	4.81	7.42	34.74
Route 33	9.54	11.45	4.66	7.38	33.04
Route 34	11.55	11.79	3.74	7.35	34.44
Route 35	10.80	11.22	5.44	7.35	34.81
Route 36	13.11	12.38	4.20	7.35	37.05
Route 37	13.50	12.87	12.20	7.35	45.93
Route 38	12.37	11.53	5.65	7.35	36.89
Route 39	11.68	13.34	4.05	8.35	37.42
Route 40	10.91	12.78	5.75	8.35	37.79
Route 41	13.22	13.95	4.51	8.35	40.03
Route 42	13.62	14.45	12.51	8.35	48.93
Route 43	12.48	13.11	5.95	8.35	39.89
Route 44	15.74	26.04	2.82	6.45	51.04
Route 45	15.48	24.79	2.66	6.41	49.35
Route 46	16.13	27.14	3.01	6.64	52.91
Route 47	15.87	25.90	2.85	6.60	51.22

Gallatin FP-Angeltown 161-kV Transmission Line and Switching Station

Alternative Transmission Line Route Option	SCORES OF INDIVIDUAL CRITERIA				Criteria Total Score
	Engineering	Environmental	Land Use	Cultural	
Route 48	16.08	27.56	2.86	6.49	52.99
Route 49	15.82	26.32	2.70	6.45	51.29
Route 50	15.91	27.47	2.86	11.60	57.83
Route 51	15.64	26.23	2.70	11.56	56.13
Route 52	17.66	26.58	1.78	11.53	57.55
Route 53	16.90	26.00	3.48	11.53	57.91
Route 54	19.20	27.16	2.24	11.53	60.14
Route 55	19.60	27.66	10.24	11.53	69.03
Route 56	18.46	26.31	3.69	11.53	59.99
Route 57	17.77	28.13	2.09	12.53	60.52
Route 58	17.00	27.55	3.79	12.53	60.88
Route 59	19.32	28.73	2.55	12.53	63.13
Route 60	19.71	29.22	10.55	12.53	72.02
Route 61	18.46	27.49	3.27	13.78	63.01
Route 62	16.16	21.33	3.16	3.31	43.97
Route 63	15.90	21.43	3.00	3.27	43.61
Route 64	16.55	22.42	3.35	3.50	45.82
Route 65	16.29	22.51	3.19	3.46	45.46
Route 66	18.31	22.85	2.28	3.43	46.87
Route 67	17.54	22.28	3.98	3.43	47.23
Route 68	19.85	23.43	2.74	3.43	49.46
Route 69	20.25	23.92	10.74	3.43	58.34
Route 70	19.11	21.25	4.18	3.43	47.97
Route 71	16.51	23.27	3.20	5.85	48.82
Route 72	16.25	23.36	3.04	5.81	48.46
Route 73	18.26	23.70	2.13	5.78	49.87
Route 74	17.50	23.12	3.82	5.78	50.23
Route 75	19.81	24.29	2.59	5.78	52.47
Route 76	20.20	24.78	10.59	5.78	61.35
Route 77	19.07	23.43	4.03	5.78	52.31
Route 78	16.33	21.84	3.20	8.46	49.83
Route 79	16.07	21.93	3.04	8.42	49.46
Route 80	18.09	22.23	2.13	8.40	50.84
Route 81	17.32	21.66	3.82	8.40	51.20
Route 82	19.63	22.81	2.59	8.40	53.43
Route 83	20.03	23.31	10.59	8.40	62.32
Route 84	18.89	21.97	4.03	8.40	53.28
Route 85	18.19	25.12	2.43	10.65	56.39
Route 86	17.43	24.54	4.13	10.65	56.75

Alternative Transmission Line Route Option	SCORES OF INDIVIDUAL CRITERIA				Criteria Total Score
	Engineering	Environmental	Land Use	Cultural	
Route 87	19.74	25.70	2.89	10.65	58.98
Route 88	20.14	26.20	10.89	10.65	67.87
Route 89	19.00	24.85	4.34	10.65	58.84
Route 90	17.47	7.70	14.71	1.59	41.47
Route 91	17.86	8.80	14.94	1.78	43.38
Route 92	9.30	10.62	5.21	3.23	28.36
Route 93	9.69	11.72	5.40	3.42	30.23
Route 94	9.65	10.81	5.25	5.77	31.47
Route 95	9.47	10.72	5.25	3.38	28.82
Route 96	8.95	11.30	5.84	2.73	28.82
Route 97	9.50	12.40	6.13	2.92	30.95
Route 98	9.46	12.82	5.97	5.27	33.53
Route 99	9.16	12.54	6.09	2.77	30.56
Route 100	11.37	12.16	5.06	4.74	33.33
Route 101	18.93	11.94	14.47	4.01	49.36
Route 102	18.42	12.27	15.54	4.01	50.26

Table I-3. Analysis of Criteria Ranking of the Proposed Routes for the Gallatin Fossil Plant-Angeltown 161-kV Transmission Line in Sumner County, Tennessee

Proposed Transmission Line Route	RANKS OF INDIVIDUAL CRITERIA				Comparative Ranking
	Engineering	Environmental	Land Use	Cultural	
Route 1	76	15	79	31	45
Route 3	58	8	83	3	34
Route 5	51	2	82	1	30
Route 7	63	18	86	11	39
Route 9	60	5	85	9	36
Route 11	84	9	80	4	38
Route 13	74	4	89	4	40
Route 15	91	12	81	4	48
Route 17	92	20	92	4	74
Route 19	90	6	90	4	47
Route 21	8	19	50	13	2
Route 22	3	7	47	12	1
Route 23	16	38	54	15	8
Route 24	12	21	51	14	3
Route 25	15	26	52	41	13
Route 26	10	11	48	40	7
Route 27	22	13	32	34	11
Route 28	18	10	60	34	14
Route 29	28	22	43	34	17
Route 30	31	29	76	34	32
Route 31	26	28	62	34	21
Route 32	14	39	52	63	22
Route 33	9	25	48	62	16
Route 34	21	31	32	57	20
Route 35	17	23	60	57	23
Route 36	27	35	43	57	25
Route 37	30	42	76	57	43
Route 38	24	27	62	57	24
Route 39	23	44	40	64	26
Route 40	19	40	64	64	27
Route 41	29	45	46	64	29
Route 42	32	46	78	64	52
Route 43	25	43	66	64	28
Route 44	35	77	15	52	62
Route 45	33	71	11	51	53
Route 46	42	83	21	56	68
Route 47	37	75	16	55	64
Route 48	41	88	17	54	69

Proposed Transmission Line Route	RANKS OF INDIVIDUAL CRITERIA				Comparative Ranking
	Engineering	Environmental	Land Use	Cultural	
Route 49	36	81	12	52	65
Route 50	39	85	17	87	77
Route 51	34	79	12	86	72
Route 52	57	82	1	81	76
Route 53	49	76	30	81	78
Route 54	77	84	5	81	83
Route 55	79	89	70	81	91
Route 56	68	80	31	81	82
Route 57	59	90	2	88	84
Route 58	50	87	34	88	85
Route 59	78	91	8	88	89
Route 60	81	92	71	88	92
Route 61	69	86	28	92	88
Route 62	43	48	24	21	37
Route 63	38	49	20	20	35
Route 64	48	56	29	30	42
Route 65	45	57	25	29	41
Route 66	66	59	6	24	44
Route 67	56	55	37	24	46
Route 68	85	64	14	24	55
Route 69	89	67	74	24	79
Route 70	75	47	42	24	49
Route 71	47	61	26	50	51
Route 72	44	63	22	49	50
Route 73	65	66	3	44	58
Route 74	55	60	35	44	59
Route 75	83	68	9	44	67
Route 76	88	70	72	44	86
Route 77	73	65	38	44	66
Route 78	46	51	26	75	57
Route 79	40	52	22	74	56
Route 80	62	54	3	69	61
Route 81	52	50	35	69	63
Route 82	80	58	9	69	71
Route 83	86	62	72	69	87
Route 84	70	53	38	69	70
Route 85	64	73	7	76	73
Route 86	53	69	41	76	75
Route 87	82	74	19	76	81
Route 88	87	78	75	76	90

Gallatin FP-Angeltown 161-kV Transmission Line and Switching Station

Proposed Transmission Line Route	RANKS OF INDIVIDUAL CRITERIA				Comparative Ranking
	Engineering	Environmental	Land Use	Cultural	
Route 89	72	72	45	76	80
Route 90	54	1	87	1	31
Route 91	61	3	88	9	33
Route 92	4	14	56	19	4
Route 93	13	30	59	23	9
Route 94	11	17	57	43	15
Route 95	6	16	57	22	6
Route 96	1	24	65	16	5
Route 97	7	36	69	18	12
Route 98	5	41	67	42	19
Route 99	2	37	68	17	10
Route 100	20	33	55	34	18
Route 101	71	32	84	31	54
Route 102	67	34	91	31	60

Table I-4. Alternative Route Rankings With Constituent Segments Used for the Proposed Gallatin-Angeltown 161-kV Transmission Line in Sumner County, Tennessee

Route Ranking	Alternative Transmission Line Route Option	Alternative Switching Station Site	Constituent Segments
1	22	2	1, 2, 6, 10, 12, 17, 20, 27, 29, 34, 38, 46
2	21	2	1, 2, 6, 10, 12, 17, 20, 27, 28, 35, 38, 46
3	24	2	1, 2, 6, 10, 12, 17, 21, 23, 24, 27, 29, 34, 38, 46
4	92	3	1, 2, 6, 10, 12, 17, 20, 27, 29, 50, 32, 42, 43, 49
5	96	1	1, 2, 6, 10, 12, 17, 20, 27, 29, 34, 38, 47, 48
6	95	3	1, 2, 6, 10, 13, 15, 22, 23, 24, 27, 29, 50, 32, 42, 43, 49
7	26	2	1, 2, 6, 10, 12, 16, 22, 23, 24, 27, 29, 34, 38, 46
8	23	2	1, 2, 6, 10, 12, 17, 21, 23, 24, 27, 28, 35, 38, 46
9	93	3	1, 2, 6, 10, 12, 17, 21, 23, 24, 27, 29, 50, 32, 42, 43, 49
10	99	1	1, 2, 6, 10, 12, 17, 20, 27, 28, 35, 38, 47, 48
11	27	2	1, 2, 6, 10, 12, 16, 22, 23, 25, 26, 30, 33, 34, 38, 46
12	97	1	1, 2, 6, 10, 12, 17, 21, 23, 24, 27, 29, 34, 38, 47, 48
13	25	2	1, 2, 6, 10, 12, 16, 22, 23, 24, 27, 28, 35, 38, 46
14	28	3	1, 2, 6, 10, 12, 16, 22, 23, 25, 26, 30, 51, 32, 42, 43, 49
15	94	3	1, 2, 6, 10, 12, 16, 22, 23, 24, 27, 29, 50, 32, 42, 43, 49
16	33	2	1, 2, 6, 10, 13, 15, 22, 23, 24, 27, 29, 34, 38, 46
17	29	2	1, 2, 6, 10, 12, 16, 22, 23, 25, 26, 31, 40, 39, 45
18	100	1	1, 2, 6, 10, 12, 16, 22, 23, 25, 26, 30, 33, 34, 38, 47, 48
19	98	1	1, 2, 6, 10, 12, 16, 22, 23, 24, 27, 29, 34, 38, 47, 48
20	34	2	1, 2, 6, 10, 13, 15, 22, 23, 25, 26, 30, 33, 34, 38, 46
21	31	3	1, 2, 6, 10, 12, 16, 22, 23, 25, 26, 31, 41, 43, 49
22	32	2	1, 2, 6, 10, 13, 15, 22, 23, 24, 27, 28, 35, 38, 46
23	35	3	1, 2, 6, 10, 12, 16, 22, 23, 25, 26, 30, 32, 42, 43, 49
24	38	3	1, 2, 6, 10, 13, 15, 22, 23, 25, 26, 31, 41, 43, 49
25	36	2	1, 2, 6, 10, 13, 15, 22, 23, 25, 26, 31, 40, 39, 45
26	39	2	1, 2, 6, 10, 13, 14, 26, 30, 33, 34, 38, 46
27	40	3	1, 2, 6, 10, 13, 14, 26, 30, 32, 42, 43, 49
28	43	3	1, 2, 6, 10, 13, 14, 26, 31, 41, 43, 49
29	41	2	1, 2, 6, 10, 13, 14, 26, 31, 40, 39, 45
30	5	2	1, 2, 7, 8, 11, 18, 20, 27, 29, 34, 38, 46
31	90	3	1, 2, 7, 8, 11, 18, 20, 27, 29, 50, 32, 42, 43, 49
32	30	3	1, 2, 6, 10, 12, 16, 22, 23, 25, 26, 31, 40, 39, 44, 49
33	91	3	1, 2, 7, 8, 11, 18, 21, 23, 24, 27, 29, 50, 32, 42,
34	3	2	1, 2, 7, 8, 11, 18, 20, 27, 28, 35, 38, 46
35	63	2	1, 3, 5, 10, 12, 17, 20, 27, 29, 34, 38, 46
36	9	2	1, 2, 7, 8, 11, 18, 21, 23, 24, 27, 29, 34, 38, 46
37	62	2	1, 3, 5, 10, 12, 17, 20, 27, 28, 35, 38, 46
38	11	2	1, 2, 7, 8, 11, 18, 21, 23, 25, 26, 30, 33, 34, 38, 46
39	7	2	1, 2, 7, 8, 11, 18, 21, 23, 24, 27, 28, 35, 38, 46

Gallatin FP-Angeltown 161-kV Transmission Line and Switching Station

Route Ranking	Alternative Transmission Line Route Option	Alternative Switching Station Site	Constituent Segments
40	13	2	1, 2, 6, 10, 13, 15, 22, 23, 25, 26, 31, 40, 39, 45
41	65	2	1, 3, 5, 10, 12, 17, 21, 23, 24, 27, 29, 34, 38, 46
42	64	2	1, 3, 5, 10, 12, 17, 21, 23, 24, 27, 29, 35, 38, 46
43	37	3	1, 2, 6, 10, 13, 15, 22, 23, 25, 26, 31, 40, 39, 44, 49
44	66	2	1, 3, 5, 10, 12, 17, 21, 23, 25, 26, 30, 33, 34, 38, 46
45	1	2	1, 2, 7, 8, 11, 19, 36, 35, 38, 46
46	67	3	1, 3, 5, 10, 12, 17, 21, 23, 25, 26, 30, 51, 32, 42, 43, 49
47	19	3	1, 2, 7, 8, 11, 18, 21, 23, 25, 26, 31, 41, 43, 49
48	15	2	1, 2, 7, 8, 11, 18, 21, 23, 25, 26, 31, 40, 39, 45
49	70	3	1, 3, 5, 10, 12, 17, 21, 23, 25, 26, 31, 41, 43, 49
50	72	2	1, 3, 5, 10, 12, 16, 22, 23, 24, 27, 29, 34, 38, 46
51	71	2	1, 3, 5, 10, 12, 16, 22, 23, 24, 27, 28, 35, 38, 46
52	42	3	1, 2, 6, 10, 13, 14, 26, 31, 40, 39, 44, 49
53	45	2	1, 3, 4, 10, 12, 17, 20, 27, 29, 34, 38, 46
54	101	1	1, 2, 7, 8, 11, 19, 36, 35, 38, 47, 48
55	68	2	1, 3, 5, 10, 12, 17, 21, 23, 25, 26, 31, 40, 39, 45
56	79	2	1, 3, 5, 10, 13, 15, 22, 23, 24, 27, 29, 34, 38, 46
57	78	2	1, 3, 5, 10, 13, 15, 22, 23, 24, 27, 28, 35, 38, 46
58	73	2	1, 3, 5, 10, 12, 16, 22, 23, 25, 26, 30, 33, 34, 38, 46
59	74	3	1, 3, 5, 10, 12, 16, 22, 23, 25, 26, 30, 51, 32, 42, 43, 49
60	102	1	1, 2, 7, 8, 11, 19, 36, 35, 38, 47, 48
61	80	2	1, 3, 5, 10, 13, 15, 22, 23, 25, 26, 30, 33, 34, 38, 46
62	44	2	1, 3, 4, 10, 12, 17, 20, 27, 28, 35, 38, 46
63	81	3	1, 3, 5, 10, 13, 15, 22, 23, 25, 26, 30, 51, 32, 42, 43, 49
64	47	1	1, 3, 4, 10, 12, 17, 21, 23, 24, 27, 29, 34, 38, 46
65	49	2	1, 3, 4, 10, 12, 16, 22, 23, 24, 27, 29, 34, 38, 46
66	77	3	1, 3, 5, 10, 12, 16, 22, 23, 25, 26, 31, 41, 43, 49
67	75	2	1, 3, 5, 10, 12, 16, 22, 23, 25, 26, 31, 40, 39, 45
68	46	2	1, 3, 4, 10, 12, 17, 21, 23, 24, 27, 28, 35, 38, 46
69	48	2	1, 3, 4, 10, 12, 16, 22, 23, 24, 27, 28, 35, 38, 46
70	84	3	1, 3, 5, 10, 13, 15, 22, 23, 25, 26, 31, 41, 43, 49
71	82	2	1, 3, 5, 10, 13, 15, 22, 23, 25, 26, 31, 40, 39, 45
72	51	2	1, 3, 4, 10, 13, 15, 22, 23, 24, 27, 29, 34, 38, 46
73	85	2	1, 3, 5, 10, 13, 14, 26, 30, 33, 34, 38, 46
74	17	3	1, 2, 7, 8, 11, 18, 21, 23, 25, 26, 31, 40, 39, 44, 49
75	86	3	1, 3, 5, 10, 13, 14, 26, 30, 51, 32, 42, 43, 49
76	52	2	1, 3, 4, 10, 13, 15, 22, 23, 25, 26, 30, 33, 34, 38, 46
77	50	2	1, 3, 4, 10, 13, 15, 22, 23, 24, 27, 28, 35, 38, 46
78	53	3	1, 3, 4, 10, 13, 15, 22, 23, 25, 26, 30, 51, 32, 42, 43, 49
79	69	3	1, 3, 5, 10, 12, 17, 21, 23, 25, 26, 31, 40, 39, 44, 49
80	89	3	1, 3, 5, 10, 13, 14, 26, 31, 41, 43, 49

Route Ranking	Alternative Transmission Line Route Option	Alternative Switching Station Site	Constituent Segments
81	87	2	1, 3, 5, 10, 13, 14, 26, 31, 40, 39, 45
82	56	3	1, 3, 4, 10, 13, 15, 22, 23, 25, 26, 31, 41, 43, 49
83	54	2	1, 3, 4, 10, 13, 15, 22, 23, 25, 26, 31, 40, 39, 45
84	57	2	1, 3, 4, 10, 13, 14, 26, 30, 33, 34, 38, 46
85	58	3	1, 3, 4, 10, 13, 14, 26, 30, 51, 32, 42, 43, 49
86	76	2	1, 3, 5, 10, 12, 16, 22, 23, 25, 26, 31, 40, 39, 45
87	83	3	1, 3, 5, 10, 13, 15, 22, 23, 25, 26, 31, 40, 39, 44, 49
88	61	3	1, 3, 4, 10, 13, 14, 26, 31, 41, 43, 49
89	59	2	1, 3, 4, 10, 13, 14, 26, 31, 40, 39, 45
90	88	3	1, 3, 5, 10, 13, 14, 26, 31, 40, 39, 44, 49
91	55	3	1, 3, 4, 10, 13, 15, 22, 23, 25, 26, 31, 40, 39, 44, 49
92	60	3	1, 3, 4, 10, 13, 14, 26, 31, 40, 39, 44, 49

Table I-5. Alternative Switching Station Site Selection Matrix for the Proposed Gallatin-Angeltown 161-kV Transmission Line Project in Sumner County, Tennessee

Site	Terrain	Environmental	Accessibility	Transmission Line Routing	Visibility	Land Use	Constructability	Housing Density	Clearing	Total	Ranking
1	3	1	3	1	1	5	1	3	3	21	3
2	1	1	1	1	3	1	1	1	1	11	1
3	1	1	1	3	3	3	1	5	1	19	2

Explanations:

Please note, each impact item scored 1 (minimal) to 5 (maximum) for each category

Category	Explanation
Terrain	Terrain refers to the topography of each site.
Environmental	Environmental includes botany, aquatics, archaeology, and wetlands.
Accessibility	Accessibility refers to available access points from surrounding roads.
Transmission Line Routing	Transmission line routing looks at the area in and around the switching station site for line routing into the station.
Visibility	Visibility refers to the switching station's visual impact to the surrounding area.
Land Use	Land use considered the current use of the land, any known plans for the land and owner's willingness to sell.
Constructability	Constructability judged the engineering issues associated with the sites (soil, rock, grading, drainage, etc.).
Housing Density	Housing density used a 1,000-foot radius around each site to determine number of private dwellings within the buffer. It should be noted for a 500-foot radius, no private dwellings are encompassed (500-foot vs. 1,000-foot radius does not change overall rankings).
Clearing	Clearing refers to the clearing work required for each site.

Appendix J – Stream Crossings Along the Proposed Gallatin-Angeltown 161-kV Transmission Line, Access Roads, and Switching Station Site in Sumner County, Tennessee

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Table J-1. Stream Crossings Along the Proposed Gallatin-Angeltown 161-kV Transmission Line Right-of-Way in Sumner County, Tennessee

Stream Identification	Stream Type	Streamside Management Zone Category	Stream Name	Field Notes
001	Intermittent	Category A (50 feet)	Unnamed Tributary to the Cumberland River	1-foot-wide x 1-foot-deep stream with sand/silt substrate. Some fish observed. Clear and runs the length of adjacent ROW.
002	Intermittent	Category A (50 feet)	Unnamed Tributary to the Cumberland River	1-foot-wide x 1-foot-deep channel. Herbaceous cover up to bank. Partially forested.
003	Intermittent	Category A (50 feet)	Unnamed Tributary to the Cumberland River	4-foot-wide x 2-foot-deep channel with bedrock/silt substrate. It flows under the road and through a culvert. Nonforested.
004	Perennial	Category A (50 feet)	Unnamed Tributary to the Cumberland River	5-foot-wide x 3-foot-deep channel with gravel/sand/cobble substrate. Partially forested.
005	Perennial	Category A (50 feet)	Unnamed Tributary to the Cumberland River	8-foot-wide x 3-foot-deep channel with bedrock substrate. Partially forested. Darters were observed.
006	Perennial	Category A (50 feet)	Unnamed Tributary to the Cumberland River	8-foot-wide x 4-foot-deep channel with bedrock substrate. Aquatic snails were observed.
007	Perennial	Category A (75 feet)	Unnamed Tributary to the Cumberland River	Unnamed tributary to the Cumberland River. Impounded by Old Hickory Reservoir. Right descending. Degraded boat ramp near ROW. Left-descending bank of SMZ 007.
008	Other	Category A (50 feet)	Pond	Pond in the middle of a field. Banks are heavily eroded.
009	Perennial	Category A (50 feet)	Unnamed Tributary to the Cumberland River	5-foot-wide x 2-foot-deep clear flowing stream of sand/silt substrate near a cow field. Fenced in section in ROW.
010	Perennial	Category B (100 feet)	Spring	Perennial spring originating in the ROW that could support aquatic life.
011	Perennial	Category A (50 feet)	Unnamed Tributary to the Cumberland River	Spring fed stream with a small channel that flows into a stream from a pond. Originates in the ROW.
012	Perennial	Category A (50 feet)	Unnamed Tributary to the Cumberland River	3-foot-wide x 1-foot-deep stream flowing from a pond.

Gallatin FP-Angeltown 161-kV Transmission Line and Switching Station

Stream Identification	Stream Type	Streamside Management Zone Category	Stream Name	Field Notes
013	Other	Category A (50 feet)	Pond	Small pond in a forested area.
014	Perennial	Category A (50 feet)	Unnamed Tributary to Bledsoe Creek	7-foot-wide x >1-foot-deep channel with exposed rock substrate. Shallow with wide banks.
015	Intermittent	Category A (50 feet)	Unnamed Tributary to Bledsoe Creek	May have some pond/spring influence. Exhibited stream characteristics; however, the upper portion is more of a transition to wet-weather conveyance (WWC). This stream flows into a perennial, spring fed stream
016	Other	Category A (50 feet)	Pond	Farm pond.
017	Perennial	Category A (50 feet)	Unnamed Tributary to Bledsoe Creek	7-foot-wide x 1-foot-deep channel with high flow at time of survey. May be spring/pond influenced.
018	Perennial	Category A (50 feet)	Unnamed Tributary to Bledsoe Creek	10-foot-wide x 2-foot-deep channel with bedrock substrate. Nonforested. Cattle have access.
019	Other	Category A (50 feet)	Pond	A small, shallow cattle pond.
020	Intermittent	Category A (50 feet)	Unnamed Tributary to Deshea Creek	7-foot-wide x 3-foot-deep channel with bedrock substrate. Nonforested. Farm road ford present.
021	Other	Category A (50 feet)	Pond	Large cattle pond.
022	Perennial	Category A (50 feet)	Deshea Creek	Approximately 20-foot-wide x 11-foot-deep channel with bedrock/cobble substrate. Partially forested.
023	Perennial	Category A (50 feet)	Unnamed Tributary to Deshea Creek	Could not access in a fenced field. Boundary drawn in based on ortho imagery.
024	Perennial	Category A (50 feet)	Unnamed Tributary to Deshea Creek	Could not access in a fenced field. Boundary drawn in based on ortho imagery.
025	Perennial	Category A (50 feet)	Unnamed Tributary to Deshea Creek	Small 3-foot-wide x 1-foot-deep channel that drains a farm pond. It appears to flow all year long. Nonforested.
026	Other	Category A (50 feet)	Pond	Farm pond outside of the ROW, but SMZ is adjacent to the ROW. Drawn in from ortho imagery.
027	Other	Category A (50 feet)	Pond	Pond in a field.
028	Intermittent	Category A (50 feet)	Unnamed Tributary to Deshea Creek	Small braided channel running through pasture field. Nonforested.

Stream Identification	Stream Type	Streamside Management Zone Category	Stream Name	Field Notes
029	Intermittent	Category A (50 feet)	Unnamed Tributary to Deshea Creek	Small side channel. Nonforested.
030	Intermittent	Category A (50 feet)	Unnamed Tributary to Deshea Creek	Small channel with mostly sand substrate.
031	Intermittent	Category A (50 feet)	Unnamed Tributary to Deshea Creek	4-foot-wide x 1-foot-deep channel with 3-foot-wide x 1-foot-deep wetted width/depth of sand/silt substrate and some large rock.
032	Intermittent	Category A (50 feet)	Unnamed Tributary to Dry Fork	Small stream with silt substrate in a forested area.
033	Intermittent	Category A (50 feet)	Unnamed Tributary to Dry Fork	Stream with deep undercut banks. Channelized in some places. Two WWCs connect to the stream channel.
034	Intermittent	Category A (50 feet)	Unnamed Tributary to Dry Fork	5-foot-wide x 3-foot-deep channel with 1-foot-wide x >1-foot-deep wetted width/depth. Gravel substrate present.
035	Intermittent	Category A (50 feet)	Unnamed Tributary to Dry Fork	5-foot-wide x 3-foot-deep channel with 2-foot-wide x >1-foot-deep wetted width/depth. Numerous WWCs flow into this channel.
036	Perennial	Category A (50 feet)	Unnamed Tributary to Dry Fork	May be spring fed, but some water comes from a pond west of the ROW.
037	Perennial	Category A (50 feet)	Dry Fork	25-foot-wide x 6-foot-deep channel with a wetted width/depth at 23-foot-wide x 2-foot-deep. Substrate was mostly bedrock. Little to no gravel was present, and silt formations were observed near the bank.
038	Perennial	Category A (50 feet)	Pryor Branch	8-foot-wide x 3-foot-deep stream with bedrock substrate. Partially forested.
039	Other	Category A (50 feet)	Pond	Small pond.
040	Intermittent	Category A (50 feet)	Seep	Intermittent seep.
041	Intermittent	Category A (50 feet)	Unnamed Tributary to Pryor Branch	Spring fed, but ends in field. Bedrock substrate. Forested.
042	Other	Category A (50 feet)	Pond	Farm pond.
043	Perennial	Category A (50 feet)	Unnamed Tributary to Pryor Branch	4-foot-wide x 2-foot-deep channel with gravel/cobble substrate that flows along a road before entering a culvert. Partially forested.

Gallatin FP-Angeltown 161-kV Transmission Line and Switching Station

Stream Identification	Stream Type	Streamside Management Zone Category	Stream Name	Field Notes
044	Intermittent	Category A (50 feet)	Dry Fork	4-foot-wide x 3-foot-deep channel. Upper reaches of Dry Fork.
045	Perennial	Category A (50 feet)	Brushy Fork Creek	6-foot-wide x 1-foot-deep channel near a jeep trail. Part of Brushy Fork.
046	Intermittent	Category A (50 feet)	Unnamed Tributary to Brushy Fork Creek	Small 1-foot-wide x 1-foot-deep stream flowing into Brushy Fork near a jeep trail.
047	Other	Category A (50 feet)	Pond	Pond at the bottom of a hill that is degraded and fenced off from livestock.
048	Intermittent	Category A (50 feet)	Unnamed Tributary to West Prong	3-foot-wide x 1-foot-deep channel flowing into Caney Fork Creek.
049	Perennial	Category B (100 feet)	Spring	Springhouse located at the spring with water present at the time of survey.
050	Intermittent	Category A (50 feet)	Unnamed Tributary to Caney Fork Creek	Spring fed 4-foot-wide x 5-foot-deep channel with gravel/cobble substrate. Springhouse located at the spring with water present at time of survey.
051	Intermittent	Category A (50 feet)	Unnamed Tributary to Caney Fork Creek	8-foot-wide x 2-foot-deep channel with gravel/cobble substrate. No water was present at the time of survey. Forested.
052	Intermittent	Category A (50 feet)	Unnamed Tributary to Caney Fork Creek	8-foot-wide x 2-foot-deep channel with gravel/cobble substrate. No water was present at the time of survey. Forested.
053	Perennial	Category A (50 feet)	Caney Fork Creek	20-foot-wide x 4-foot-deep channel with bedrock substrate. Forested.

Table J-2. Stream Crossings Along the Proposed Gallatin-Angeltown 161-kV Transmission Line Right-of-Way in Sumner County, Tennessee

Stream Identification	Stream Type	Streamside Management Zone Category	Stream Name	Field Notes
001AR	Perennial	Category A (50 feet)	Unnamed Tributary to the Cumberland River	8-foot-wide x 3-foot-deep channel with bedrock substrates.
002AR	Intermittent	Category A (50 feet)	Unnamed Tributary to Dry Fork Creek	6-foot-wide x 4-foot-deep channel that is in transition to WWC near ROW.
003AR	Intermittent	Category A (50 feet)	Unnamed Tributary to Dry Fork Creek	6-foot-wide x 4-foot-deep channel with silt/gravel substrate.
004AR	Intermittent	Category A (50 feet)	Unnamed Tributary to Dry Fork Creek	6-foot-wide x 4-foot-deep channel with silt/gravel substrate.
005AR	Intermittent	Category A (50 feet)	Unnamed Tributary to Dry Fork Creek	6-foot-wide x 4-foot-deep channel with silt/gravel substrate.
006AR	Intermittent	Category A (50 feet)	Unnamed Tributary to Dry Fork Creek	8-foot-wide x 4-foot-deep channel with bedrock substrate. Aquatic snails were observed.
007AR	Perennial	Category B (100 feet)	Spring	Spring adjacent to access road flowing into a small wetland.
008AR	Perennial	Category B (100 feet)	Spring	Spring with channel flowing into Dry Fork Creek.
009AR	Intermittent	Category A (50 feet)	Unnamed Tributary to West Prong	4-foot-wide x 4-foot-deep channel with bedrock/cobble substrate. Fish were observed.
010AR	Intermittent	Category A (50 feet)	Unnamed Tributary to West Prong	3-foot-wide x 1-foot-deep channel flowing into the unnamed tributary to West Prong identified as SMZ 009AR.

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Appendix K – Nonnative, Noninvasive Species Suitable For Public Use Areas, Erosion Control/Stabilization, and Wildlife Habitat Plantings

Compiled for the Implementation of the Executive Order on Invasive Species

KENTUCKY 31 AND OTHER FESCUES - for dam reservations, public use areas, and other facilities; transmission line construction stabilization where fescue is currently present as forage or lawn grasses or when landowners request it; not to be used in wildlife plantings or in agricultural license areas

ZOYSIA VARIETIES - for dam reservations, public use areas, and other facilities

BERMUDAGRASS - for dam reservations, public use areas, and other facilities

ANNUAL RYEGRASS - suitable for all sites

FOXTAIL, BROWNTOP AND JAPANESE MILLETS - suitable for all sites

BUCKWHEAT - suitable for wildlife plantings

WINTER WHEAT - suitable for wildlife plantings

OATS - suitable for wildlife plantings

ORCHARDGRASS - suitable for all sites

PERENNIAL RYEGRASS - suitable for all sites

REDTOP - suitable for all sites

RYE - suitable for all sites

TIMOTHY - suitable for all sites

WEeping LOVEGRASS - for erosion control use only

COMMON, KOBE, KOREAN LESPEDEZA - suitable for all sites

CRIMSON, RED AND LADINO CLOVERS - suitable for all sites

SOYBEANS - suitable for wildlife plantings

SORGHUM-MILO - suitable for wildlife plantings

Invasive Species of High Priority to TVA

Plants:

Common privet, *Ligustrum sinense*
Autumn olive, *Elaeagnus umbellata*
Japanese honeysuckle, *Lonicera japonica*
Kudzu, *Pueraria montana*
Multiflora rose, *Rosa multiflora*
Sericea lespedza, *Lespedeza cuneata*
Oriental bittersweet, *Celastrus orbiculatus*
Tree-of-heaven, *Ailanthus altissima*
Hairy jointgrass, *Arthraxon hispidus*
Amur bush honeysuckle, *Lonicera mackii* (and other closely related species)
Japanese/Nepal grass, *Microstegium vimineum*
Alligatorweed, *Alternanthera philoxeroides*
Japanese bromegrass, *Bromus japonicus*
Common cocklebur, *Xanthium strumarium*
Tall fescue, *Festuca elatior**
Johnson grass, *Sorghum halapense*
Japanese wisteria, *Wisteria floribunda*
Purple loosestrife, *Lythrum salicaria*
Common reed, *Phragmites australis*
Japanese knotweed, *Polygonum cuspidatum*
Eurasian watermilfoil, *Myriophyllum spicatum*
Spinyleaf naiad, *Najas minor*
Hydrilla, *Hydrilla verticillata*
Princess tree, *Paulownia tomentosa*

Watch List:

Giant salvinia, *Salvinia molesta*
Water hyacinth, *Eichhornia crassipes*

January 2002

Invasives Exotic Pest Plants of Tennessee

Rank 1 — Severe Threat: Exotic plant species that possess characteristics of invasive species and spread easily into native plant communities and displace native vegetation

Scientific Nomenclature	Common Name
<i>Ailanthus altissima</i> (Mill.) Swingle	Tree-of-heaven
<i>Albizia julibrissin</i> Durz.	Mimosa
<i>Alliaria petiolata</i> (Bieb.) Cavara & Grande	Garlic-mustard
<i>Celastrus orbiculata</i> Thunb.	Asian bittersweet
<i>Dioscorea oppositifolia</i> L.	Air-potato
<i>Elaeagnus umbellata</i> Thunb.	Autumn olive
<i>Elaeagnus pungens</i> Thunb.	Thorny-olive
<i>Euonymus fortunei</i> (Turcz.) Hand.-Mazz.	Winter creeper
<i>Hedera helix</i> L.	English ivy
<i>Lespedeza cuneata</i> (Dum.-Cours.) G. Don	Sericea lespedeza
<i>Ligustrum sinense</i> Lour.	Chinese privet
<i>Ligustrum vulgare</i> L.	Common privet
<i>Lonicera fragrantissima</i> Lindl. & Paxton	January jasmine
<i>Lonicera japonica</i> Thunb.	Japanese honeysuckle
<i>Lonicera maackii</i> (Rupr.) Maxim.	Amur bush honeysuckle
<i>Lonicera morrowii</i> A. Gray	Morrow's bush honeysuckle
<i>Lonicera tatarica</i> L.	Tartarian honeysuckle, twinsisters
<i>Lonicera x bella</i> Zabel	Bush honeysuckle
<i>Lythrum salicaria</i> L. [all varieties and cultivars]	Purple loosestrife
<i>Microstegium vimineum</i> (Trin.) A.	Camus Nepalgrass, Japanese grass
<i>Myriophyllum spicatum</i> L.	Eurasian water milfoil
<i>Paulownia tomentosa</i> (Thunb.) Sieb. & Zucc. ex Steud	Princess tree
<i>Phragmites australis</i> (Cav.) Trin. ex Steud.	Common reed
<i>Polygonum cuspidatum</i> Seib. & Zucc	Japanese knotweed, Japanese bamboo
<i>Pueraria montana</i> (Lour.) Merr.	Kudzu
<i>Rosa multiflora</i> Thunb.	Multiflora rose
<i>Solanum viarum</i> Dunal	Tropical soda apple
<i>Sorghum halepense</i> (L.) Pers.	Johnson grass
<i>Spiraea japonica</i> L.f.	Japanese spiraea

Rank 2 — Significant Threat: Exotic plant species that possess characteristics of invasive species but are not presently considered to spread as easily into native plant communities as those species listed as **Rank 1— Severe Threat**

Scientific Nomenclature	Common Name
<i>Alternanthera philoxeroides</i> (Mart.) Griseb.	Alligatorweed
<i>Artemisia vulgaris</i> L.	Mugwort, common wormwood
<i>Arthraxon hispidus</i> (Thunb.) Makino	Hairy jointgrass
<i>Berberis thunbergii</i> DC.	Japanese barberry
<i>Bromus commutatus</i> Schrad.	Meadow brome
<i>Bromus japonicus</i> Thunb. ex Murray	Japanese brome
<i>Bromus secalinus</i> L.	Rye brome
<i>Bromus tectorum</i> L.	Thatch brome, cheat grass
<i>Carduus nutans</i> L.	Musk thistle, nodding thistle
<i>Centaurea biebersteinii</i> DC.	Spotted knapweed
<i>Cirsium arvense</i> L. (Scop.)	Canada thistle
<i>Cirsium vulgare</i> (Savi) Ten.	Bull thistle
<i>Clematis ternifolia</i> DC.	Leatherleaf clematis
<i>Conium maculatum</i> L.	Poison hemlock
<i>Coronilla varia</i> L.	Crown vetch
<i>Daucus carota</i> L.	Wild carrot, Queen Anne's-lace
<i>Dipsacus fullonum</i> L.	Fuller's teasel
<i>Dipsacus laciniatus</i> L.	Cutleaf teasel
<i>Euonymus alata</i> (Thunb.) Sieb.	Burning bush
<i>Festuca arundinacea</i> Schreb.	Tall fescue
<i>Festuca pratensis</i> Huds.	Meadow fescue
<i>Hesperis matronalis</i> L.	Dame's rocket
<i>Hydrilla verticillata</i> (L.f.) Royle	Hydrilla, water thyme
<i>Lespedeza bicolor</i> Turcz.	Bicolor lespedeza, shrubby bushclover
<i>Ligustrum japonicum</i> Thunb.	Japanese privet
<i>Lysimachia nummularia</i> L.	Moneywort, creeping Jenny
<i>Mahonia bealei</i> (Fortune) Carriere	Oregon grape
<i>Melilotus alba</i> Medik.	White sweet clover
<i>Melilotus officinalis</i> (L.) Lam.	Yellow sweet clover
<i>Miscanthus sinensis</i> Andersson	Zebra grass, Chinese silver grass
<i>Murdannia keisak</i> (Hassk.) Hand.-Mazz.	Asian spiderwort
<i>Myriophyllum aquaticum</i> (Vell.) Verdc.	Parrot's feather, water milfoil
<i>Nandina domestica</i> Thunb.	Nandina, sacred-bamboo
<i>Rorippa nasturtium-aquaticum</i> (L.)	Hayek Watercress
<i>Polygonum caespitosum</i> Blume	Bunchy knotweed, oriental lady's-thumb
<i>Populus alba</i> L.	White poplar
<i>Potamogeton crispus</i> L.	Curly pondweed
<i>Setaria faberi</i> R.A.W. Herrm.	Nodding foxtail-grass, Japanese bristle-grass
<i>Setaria italica</i> (L.) P. Beauv.	Foxtail-millet
<i>Setaria pumila</i> (Poir.) Roem. & Schult.	Yellow foxtail, smooth millet
<i>Setaria viridis</i> (L.) P. Beauv.	Green millet
<i>Torilis arvensis</i> (Huds.) Link	Spreading hedge-parsley
<i>Tussilago farfara</i> L.	Coltsfoot
<i>Verbascum thapsus</i> L.	Common mullein
<i>Vicia sativa</i> L.	Garden vetch
<i>Vinca minor</i> L.	Common periwinkle
<i>Wisteria sinensis</i> (Sims) DC.	Chinese wisteria
<i>Wisteria floribunda</i> (Willd.) DC.	Wisteria
<i>Xanthium strumarium</i> L.	Common cocklebur, rough cocklebur

Rank 3 — Lesser Threat: Exotic plant species that spread in or near disturbed areas and are not presently considered a threat to native plant communities

Scientific Nomenclature	Common Name
<i>Allium vineale</i> L.	Field garlic
<i>Arundo donax</i> L.	Giant reed, elephant grass
<i>Bromus catharticus</i> Vahl	Bromegrass, rescue grass
<i>Bromus inermis</i> Leyss.	Smooth bromegrass
<i>Broussonetia papyrifera</i> (L.) L'Her. ex Vent.	Paper mulberry
<i>Lithospermum arvense</i> (L.) I. M. Johnston	Corn gromwell
<i>Cardiospermum halicacabum</i> L.	Balloonvine, love-in-a-puff
<i>Centaurea cyanus</i> L.	Bachelor's button, cornflower
<i>Chrysanthemum leucanthemum</i> L.	Ox-eye daisy
<i>Cichorium intybus</i> L.	Chicory
<i>Egeria densa</i> Planch.	Brazilian elodea, Brazilian water-weed
<i>Elaeagnus angustifolia</i> L.	Russian olive
<i>Eschscholzia californica</i> Cham.	California poppy
<i>Fatoua villosa</i> (Thunb.) Nakai	Hairy crabweed
<i>Glechoma hederacea</i> L.	Gill-over-the-ground, ground ivy
<i>Iris pseudacorus</i> L.	Pale-yellow iris
<i>Kummerowia stipulacea</i> (Maxim.) Makino	Korean clover
<i>Kummerowia striata</i> (Thunb.) Schindl.	Japanese clover
<i>Melia azedarach</i> L.	Chinaberry
<i>Ornithogalum umbellatum</i> L.	Star of Bethlehem
<i>Pastinaca sativa</i> L.	Wild parsnip
<i>Polygonum persicaria</i> L.	Lady's thumb
<i>Rubus phoenicolasius</i> Maxim.	Wineberry
<i>Senna obtusifolia</i> (L.) H. S. Irwin & Barneby	Sicklepod senna
<i>Tragopogon dubius</i> Scop.	Yellow goat's-beard
<i>Tribulus terrestris</i> L.	Puncturevine
<i>Urtica dioica</i> L.	Stinging nettle
<i>Xanthium spinosum</i> L.	Spiny cocklebur

Watch List A: Exotic plants that naturalize and may become a problem in the future; includes species that are or could become widespread in Tennessee; at this time, more information is needed, and there is no consensus about their status.

Scientific Nomenclature	Common Name
<i>Agrostis stolonifera</i> L.	Weeping love grass
<i>Alnus glutinosa</i> (L.) Gaertn.	Sticky alder
<i>Bromus hordeaceus</i> L.	Soft brome
<i>Bromus sterilis</i> L.	Poverty brome
<i>Buddleia davidii</i> Franch.	Butterfly bush
<i>Bupleurum rotundifolium</i> L.	Hound's-ear, hare's-ear
<i>Cosmos bipinnatus</i> Cav.	Garden cosmos
<i>Cosmos sulphureus</i> Cav.	Sulphur cosmos
<i>Echium vulgare</i> L.	Viper's bugloss
<i>Hibiscus syriacus</i> L.	Rose of Sharon
<i>Hypericum perforatum</i> L.	Goatweed, St. John's-wort
<i>Mentha spicata</i> L.	Spearmint
<i>Mentha x piperita</i> L.	Peppermint
<i>Muscari atlanticum</i> Boiss. & Reut.	Grape hyacinth
<i>Muscari botryoides</i> (L.) Mill.	Common grape hyacinth
<i>Najas minor</i> All.	Water nymph
<i>Phalaris canariensis</i> L.	Canary grass
<i>Pyrus calleryana</i> Decne.	Bradford pear
<i>Rhamnus frangula</i> L.	Alder buckthorn
<i>Rhodotypos scandens</i> (Thunb.) Makino	Jetbead
<i>Senecio vulgaris</i> L.	Ragwort
<i>Setaria verticillata</i> (L.) P. Beauv.	Bur-foxtail
<i>Solanum dulcamara</i> L.	Bittersweet
<i>Stachys floridana</i> Shuttlew. ex Benth.	Hedge nettle

Watch List B: Exotic plant species that are severe problems in surrounding states but have not been reported in Tennessee

Scientific Nomenclature	Common Name
<i>Ampelopsis brevipedunculata</i> (Maxim.) Trautv.	Amur peppervine
<i>Polygonum perfoliatum</i> L.	Mile-a-minute, Asiatic tear-thumb
<i>Rhamnus cathartica</i> L.	European buckthorn
<i>Rottboellia cochinchinensis</i> (Lour.) Clayton	Itchgrass
<i>Salvinia molesta</i> Mitchell	Aquarium water-moss
<i>Sapium sebiferum</i> (L.) Roxb.	Chinese tallowtree

**Appendix L – Prime Farmland Analysis – U.S. Department of
Agriculture Farmland Conversion Impact Assessment and
Farmland Classification of the Proposed Angeltown 161-kV
Switching Station Site in Sumner County, Tennessee**

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U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I (To be completed by Federal Agency)		Date Of Land Evaluation Request 2/22/10			
Name Of Project Angeltown Switching Station		Federal Agency Involved Tennessee Valley Authority			
Proposed Land Use Switching Station		County And State Sumner, TN			
PART II (To be completed by NRCS)		Date Request Received By NRCS			
Does the site contain prime, unique, statewide or local important farmland? (If no, the FPPA does not apply -- do not complete additional parts of this form).		Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Acres Irrigated	Average Farm Size 110 acres
Major Crop(s) Pasture	Farmable Land In Govt. Jurisdiction Acres: 238900 % 70	Amount Of Farmland As Defined in FPPA Acres: 96700 % 28			
Name Of Land Evaluation System Used LESA	Name Of Local Site Assessment System	Date Land Evaluation Returned By NRCS 5/24/10			
PART III (To be completed by Federal Agency)		Alternative Site Rating			
		Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly		10.0			
B. Total Acres To Be Converted Indirectly					
C. Total Acres In Site		10.0	0.0	0.0	0.0
PART IV (To be completed by NRCS) Land Evaluation Information					
A. Total Acres Prime And Unique Farmland		7.0			
B. Total Acres Statewide And Local Important Farmland					
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted		0.0			
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value		0.0			
PART V (To be completed by NRCS) Land Evaluation Criterion Relative Value Of Farmland To Be Converted (Scale of 0 to 100 Points)		5	0	0	0
PART VI (To be completed by Federal Agency) Site Assessment Criteria (These criteria are explained in 7 CFR 658.5(b))		Maximum Points			
1. Area In Nonurban Use		10			
2. Perimeter In Nonurban Use		10			
3. Percent Of Site Being Farmed		20			
4. Protection Provided By State And Local Government		0			
5. Distance From Urban Builtup Area		15			
6. Distance To Urban Support Services		0			
7. Size Of Present Farm Unit Compared To Average		0			
8. Creation Of Nonfarmable Farmland		0			
9. Availability Of Farm Support Services		5			
10. On-Farm Investments		4			
11. Effects Of Conversion On Farm Support Services		0			
12. Compatibility With Existing Agricultural Use		2			
TOTAL SITE ASSESSMENT POINTS		160	66	0	0
PART VII (To be completed by Federal Agency)					
Relative Value Of Farmland (From Part V)		100	5	0	0
Total Site Assessment (From Part VI above or a local site assessment)		160	66	0	0
TOTAL POINTS (Total of above 2 lines)		260	71	0	0
Site Selected:		Date Of Selection	Was A Local Site Assessment Used? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>		
Reason For Selection:					

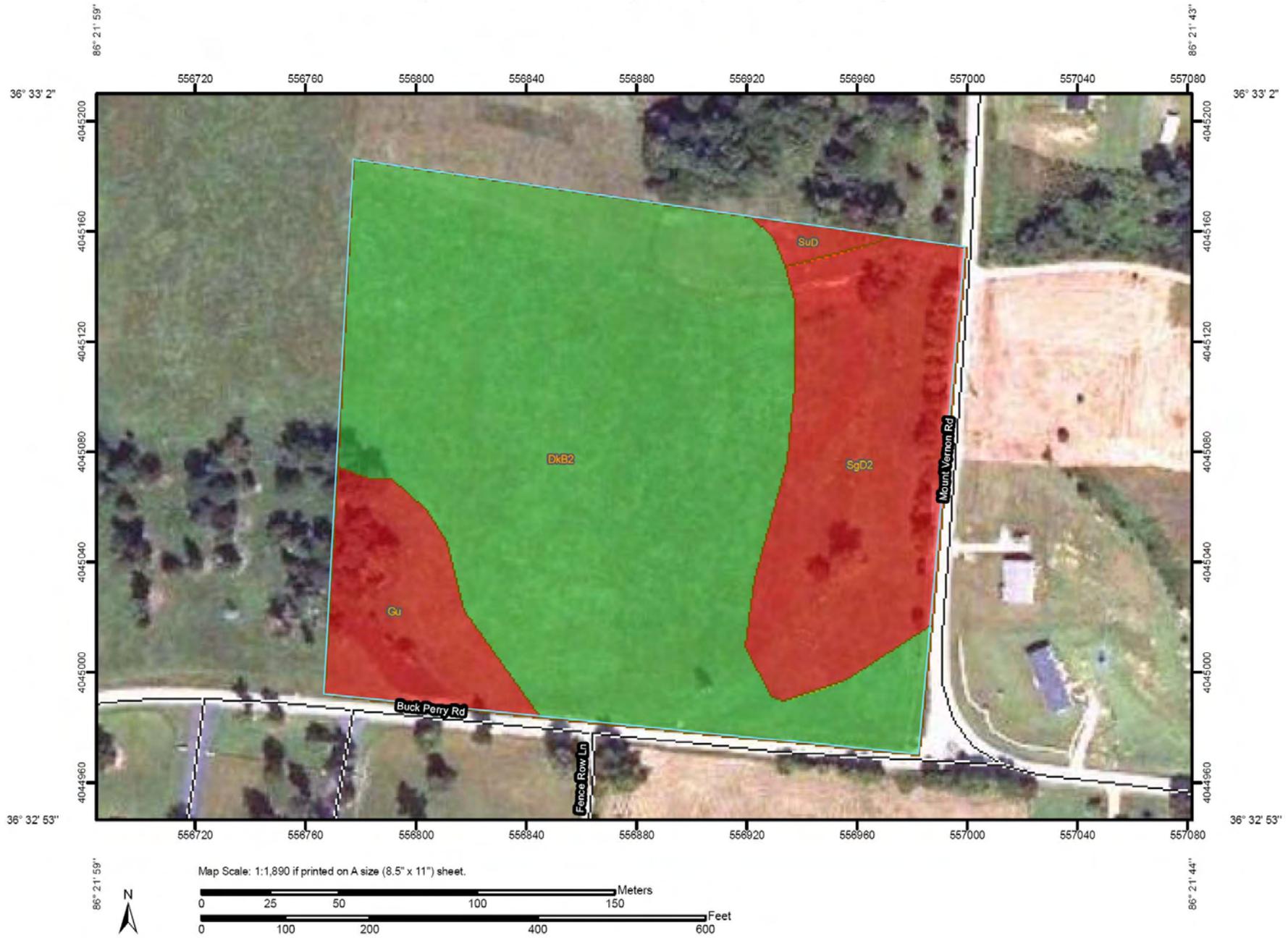
(See Instructions on reverse side)

This form was electronically produced by National Production Services Staff

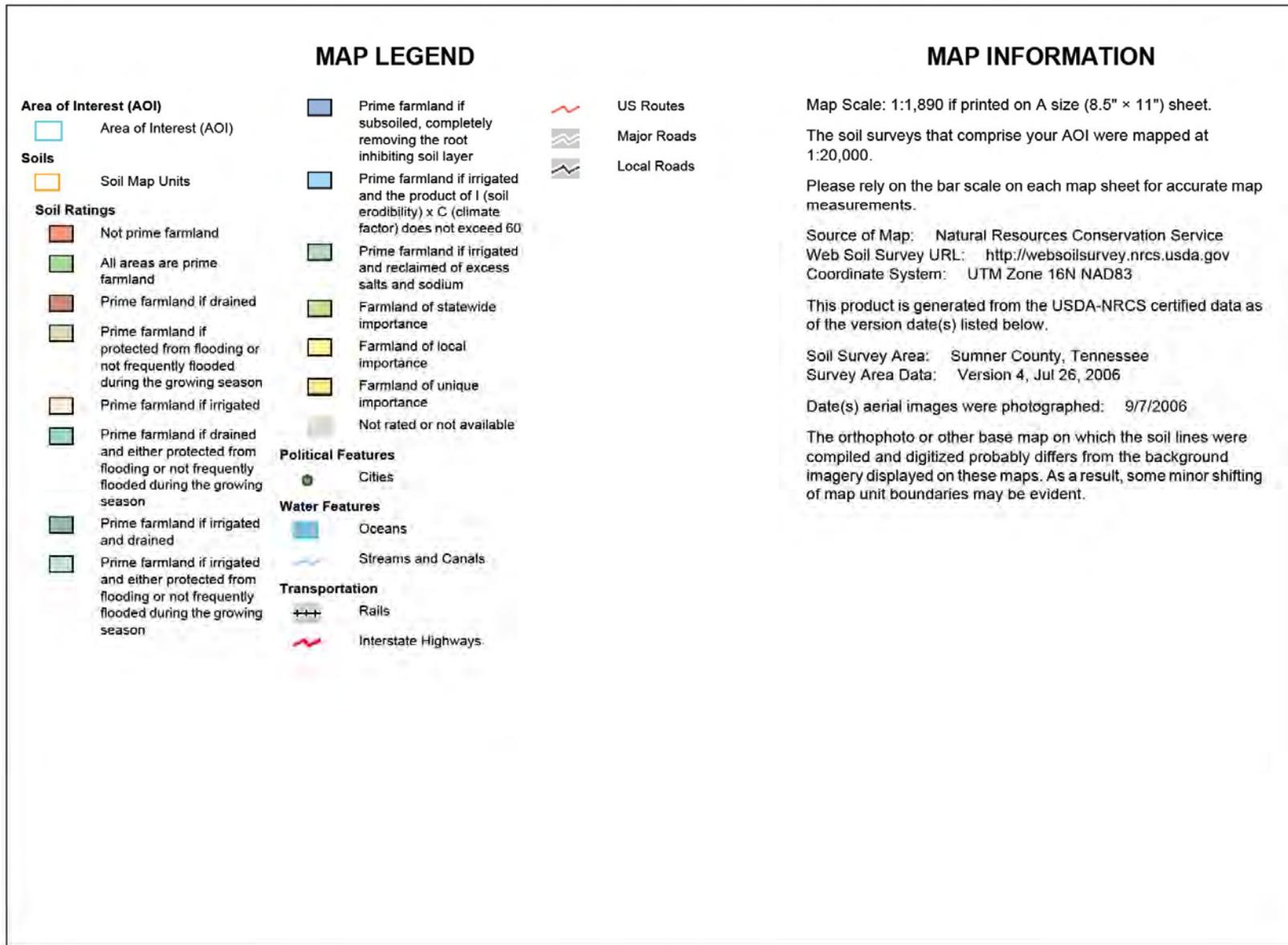
Clear Form

Form AD-1006 (10-83)

Farmland Classification—Sumner County, Tennessee
 (Farmland Classification Summary of the Proposed Switching Station Site)



Farmland Classification—Sumner County, Tennessee
(Farmland Classification Summary of the Proposed Switching Station Site)



Farmland Classification

Farmland Classification— Summary by Map Unit — Sumner County, Tennessee				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
DkB2	DICKSON SILT LOAM, 2 TO 5 PERCENT SLOPES, ERODED	All areas are prime farmland	6.9	66.7%
Gu	GUTHRIE SILT LOAM, PONDED	Not prime farmland	1.0	9.6%
SgD2	SUGARGROVE GRAVELLY SILT LOAM, 12 TO 20 PERCENT SLOPES, ERODED	Not prime farmland	2.3	22.7%
SuD	SULPHURA CHANNERY SILT LOAM, 10 TO 25 PERCENT SLOPES	Not prime farmland	0.1	1.0%
Totals for Area of Interest			10.3	100.0%

Description

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

Appendix M – Tennessee Valley Authority Visual Resources – Scenic Value Criteria for Scenery Inventory and Management

R3: 2/26/03

The criteria for classifying the quality and value of scenery has been adapted from a scenic management system developed by the U.S. Forest Service and integrated with current planning methods used by the Tennessee Valley Authority. The classification process is also based on fundamental methodology and descriptions adapted from Landscape Aesthetics, A Handbook for Scenery Management, Agriculture Handbook Number 701, U.S. Forest Service, U.S.D.A. 1995.

The process and criteria are used to compare the value of scenery to other resource values during inventory and land planning tasks. They are also used to evaluate the extent and magnitude of visual changes that could result from proposed projects, as part of the environmental review required under NEPA. In addition they can be useful to help establish management objectives for improving or maintaining the scenic quality of managed lands.

Scenic Attractiveness - 3 levels

Attractiveness is a measure of scenic quality based on human perceptions of intrinsic beauty as expressed in the forms, colors, textures, and visual composition of each landscape. The combination of rock outcrops, water bodies, landforms, vegetation patterns, and other natural features that shape landscape character also help define scenic importance. The presence or absence of these features, along with valued attributes such as variety, uniqueness, mystery, pattern, order, vividness, harmony, and balance are used to classify the scenic attractiveness of a landscape.

- Category 1:** Distinctive - Areas where the variety of land forms, rock, vegetation patterns, water, and other features have outstanding or unique visual quality. These areas have strong, positive attributes that are relatively uncommon in the characteristic landscape. This category also includes areas in visually strategic locations that have somewhat more common attributes.
- Category 2:** Common - Areas where the land forms, rock, vegetation patterns, water, and other features have ordinary or common visual quality. These areas have generally positive but typical attributes, with a basic variety of forms, colors, and textures that are normally seen throughout the characteristic landscape.
- Category 3:** Minimal - Areas where the natural features have little change in form, line, color or texture resulting in low visual quality. Rock forms and vegetation patterns of any consequence are often not present, and these areas generally have weak or missing attributes. All areas not classified as 1 or 2 are included in this category.

Scenic Integrity - 4 levels

Integrity is a measure of scenic importance based on the degree of visual unity and wholeness of the natural landscape character. Human alteration can sometimes raise integrity, such as an impounded water body that unifies the landscape while adding variety,

mystery, harmony, and balance. Most often scenic integrity is lowered by human alteration and the addition of visually disruptive elements. The presence and degree of discordant alteration is used to classify the scenic integrity of a landscape.

High: Areas where the valued landscape character appears to be intact and unaltered, with very minor deviation. Any deviation present must repeat the form, line, color, texture and pattern of the landscape so closely and at such a scale that they are not evident.

Moderate: Areas where the valued landscape character appears to be slightly altered. Noticeable deviations must be visually subordinate to the landscape being viewed, and borrow much of the natural form, line, color, texture and pattern.

Low: Areas where the valued landscape character appears to be modestly altered. Deviations begin to dominate the landscape being viewed, but the alterations should share natural color, shape, edge pattern, and vegetation characteristics in order to remain compatible or complimentary.

Very Low: Areas where the valued landscape character appears to be heavily altered. Deviations strongly dominate the landscape and may not share any of the visual attributes. The alterations may be visually disruptive and provide significant negative contrast to the natural landscape characteristics.

Scenic Visibility - 2 parts, 3 levels each

Landscape visibility is a measure of scenic importance based on several essential interrelated considerations which include viewer context and sensitivity, number of viewers, frequency and duration of view, level of detail seen, and seasonal variation. A large number of highly concerned viewers who view the landscape for a long time period may raise the scenic importance significantly. The importance may be much lower when only a few viewers with low concern see the landscape for a brief period. These considerations are combined in two parts which are used to classify the scenic visibility of a landscape.

Sensitivity: The level of scenic importance based on expressed human concern for the scenic quality of land areas viewed. Sensitivity may be derived/confirmed by resident and visitor surveys.

Level 1: High - Areas seen from the reservoir, lake shore residents, and lake view residents, where the number of viewers and concern for scenic quality are normally quite high.

Level 2: Moderate - Areas seen from principle roadways, use areas, and other public viewing areas. Concern for scenic quality is generally high while the number of viewers, view frequency and duration are moderate.

Level 3: Low - Areas seen from secondary travel routes, use areas, and any not included in the other levels. Concern may be high in some areas, but number of viewers is generally low.

View Distance: A principal indicator of scenic importance based on the distance an area can be seen by observers, and the degree of visible detail within that zone.

- Foreground:** From 0 feet to ½ mile. A distance zone where the individual details of specific objects are important and easily distinguished. Details are most significant within the immediate foreground, 0 - 300 feet.
- Middleground:** From ½ mile to 4 miles. The zone where most object characteristics are distinguishable, but their details are weak and they tend to merge into larger patterns. When landscapes are viewed in this zone they are seen in broader context. Human alteration may contrast strongly with the larger patterns and make some middleground landscapes more sensitive than the foreground.
- Background:** From 4 miles to the horizon. The distant landscape, where specific features are not normally discernible unless they are especially large, standing alone, or have a substantial color contrast. Details are generally not visible and colors are lighter.

Scenic Value Class - 4 levels

The value class of a landscape is determined by combining the levels of scenic attractiveness, scenic integrity and visibility. The selection matrix below shows the various combinations and the resulting scenic class. It is a guide that is intended to complement both a thorough field analysis and careful review of the visual absorption capacity.

- Excellent:** Areas with outstanding natural features that appear unaltered. Very minor deviations may be present but are generally unnoticeable even in the foreground. These areas are highly visible in the foreground and middleground from both land and water. Unaltered areas that may be less outstanding but are in a visually strategic location are also classified as excellent scenic value.
- Good:** Areas with attractive but common scenic quality and no distinctive natural features. Minor human alteration may be seen in the foreground but is barely noticeable in the middleground. These areas have relatively high visibility from both land and water.
- Fair:** Areas of common or minimal scenic quality with little or no interesting features. Moderate human alteration provides discordant contrast that is seen in the foreground but is less distinct in the middleground due to compatible form and color. These areas have relatively high visibility from both land and water.
- Poor:** Areas that have very little scenic importance and/or visually significant disturbances resulting from human activity. The alterations provide discordant contrast in the natural landscape due to incompatible size, shape, color, and material. The areas are clearly visible in the foreground and middleground, and have relatively high visibility from both land and water.

Severity of impact

The threshold of significance is the extent or magnitude of alteration to the existing landscape that is sufficient to change the Scenic Value Class by two levels or more.

SCENIC VALUE CLASS SELECTION MATRIX													
Visibility:	Sensitivity Level View Distance	1 foreground			1 middleground			2 foreground			2 middleground		
		1	2	3	1	2	3	1	2	3	1	2	3
Scenic Attractiveness Categories													
Scenic Integrity Levels	High	E	G	F	E	E	G	E	G	F	E	E	G
	Moderate	G	G	F	E	G	F	G	G	F	E	G	F
	Low	F	F	P	F	F	P	F	F	P	F	F	P
	Very low	P	P	P	F	P	P	P	P	P	F	P	P
		Scenic Value Class: E = Excellent; G = Good; F = Fair; P = Poor											

Visual Absorption Capacity

Absorption capacity indicates the relative ability of a landscape to accept human alteration with the least loss of landscape character and scenic value. These indicators are useful to help predict potential difficulty or success with proposed development and scenic management. They are based on characteristics of the physical factors found in a landscape. Each characteristic has a capacity range from less to more, and the primary ones are shown in the list below. Visual absorption is also affected by the variety of landscape patterns, and the amount of screening provided by landforms, rock, water bodies, and vegetation.

<u>Factor</u>	<u>Least Capacity to Absorb Change</u>	<u>Greatest Capacity to Absorb Change</u>
Slope	Steep Unstable geology	Level Stable geology
Vegetation	Sparse cover Low cover, grasses and shrubs Few species, little or no pattern	Dense cover Tall cover, trees Multiple species, diverse pattern
Landforms	Simple shape	Diverse shapes, heavily dissected
Soils	Easily eroded Poor; slow re-vegetation	Erosion resistant Rich; fast re-vegetation
Shoreline	Simple line, little or no interruption	multiple interruptions, diverse features
Color	Narrow range of indigenous colors	Broad range of indigenous colors

Desired Landscape Character

Scenic attractiveness and the existing level of scenic integrity serve as the foundation for selecting the preferred landscape character. Lake adjacency and ecosystem trends should be considered along with the historic visual character to help any changes be more complete, attractive, and sustainable. Several types of landscape character and the related long range objectives for scenic integrity are described below.

Natural Evolving landscape character expressing the natural change in ecological features and processes with very limited human intervention.

Natural Appearing landscape character that expresses predominantly natural qualities but includes minor human interaction along with cultural features and processes that are relatively unobtrusive.

Pastoral landscape character expressing dominant human developed pasture, range, and meadow, along with associated structures, reflecting historic land uses, values, and lifestyles.

Rural landscape character that expresses sparse but dominant human residential and recreational development, along with associated structures and roadways that reflect current lifestyles.

Urban landscape character expressing concentrations of human activity in the form of commercial, residential, cultural, and transportation, facilities, along with supporting infrastructure.

Visual Management Objectives

Based on the scenic value class, management objectives may be developed to accomplish or maintain the visual character desired for each area.

Preservation:

Areas classified Excellent, and managed for a natural evolving landscape character. Only very low impact recreational and scientific activities are allowed, and no facilities are permitted.

Retention:

Areas classified Good, and managed for a natural appearing landscape character. Permitted activity or minor development should repeat the natural form, line, color, and texture of the area and remain visually subordinate to the surrounding landscape. Changes in the size, intensity, direction and pattern of activity should be unobtrusive and not readily evident.

Modification:

Areas classified Good or Fair, and managed for pastoral or rural landscape character. Permitted activity and development may dominate the original character but should remain visually compatible with the remaining natural landscape. Vegetation and landform alterations should repeat the natural edges, forms, color, and texture of the surrounding area. The scale and character of structures, roads, and other features should borrow naturally established forms, lines, lines, colors and patterns to provide the greatest possible visual harmony.

Maximum Modification:

Areas classified Fair or Poor, and managed for urban landscape character. Permitted activity and development generally dominates the original visual character. Vegetation and landform alterations should remain visually harmonious with the adjacent landscape. When seen In the foreground and middleground, they may not fully borrow the surrounding natural forms, lines, colors and textures. Likewise, development features seen from the same distances may be out of scale and have significant details that are discordant with the natural landscape character. Overall development should be directed toward achieving the greatest possible visual harmony.

Enhancement:

Any area classified less than Excellent, with a relatively short term management objective intended to restore and/or improve the desired scenic quality. Rehabilitation activities may include alteration, concealment, or removal of obtrusive and discordant elements.

Enhancement activities may include addition or modification of natural elements and man-made features to increase the variety and attractiveness of spaces, edges, forms, colors, textures, and patterns.

United States Department of Agriculture (USDA). 1995. *Landscape Aesthetics, A Handbook for Scenery Management*. Handbook No. 701. USDA, U.S. Forest Service.