

Appendix A – Correspondence

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

December 1, 2009

To those Listed:

THE TVA PROPOSED STARKVILLE TO COLUMBUS TRANSMISSION LINE, OKTIBBEHA AND LOWNDES COUNTIES, MISSISSIPPI

The Tennessee Valley Authority (TVA) proposes to construct and operate approximately 14 miles of new 161-kV transmission line (TL) and associated 161 kV switching station near the community of Clayton Village. TVA Historic and Archaeological Permitting Compliance staff identified the area of potential effect (APE) to be the 14-mile long by 100-foot wide right-of-way (ROW) and the 19-acre tract of the proposed switching station.

TVA contracted with TRC, Inc. (TRC) to conduct the cultural resources survey of the APE. Prior to the field survey, TRC conducted archival research at the Mississippi Department of Archives and History in Jackson to identify all documented historic properties within and near the APE. Archival research identified four previously recorded archaeological resources within the APE (22OK924, 22OK958, 22OK960, and 22OK967).

An online draft report titled *Cultural Resource Survey for the Proposed Starkville and Columbus Power Improvement Project in Oktibbeha and Lowndes Counties, Mississippi* can be downloaded at trcsolutions.com.

During the archaeological survey conducted between October 2008 and October 2009, no archaeological sites were identified. In addition, sites 22OK924, 22OK958, 22OK960, and 22OK967 are no longer extant and likely have been destroyed by former ground disturbance activities within the area.

It is TVA's opinion that no cultural resources potentially eligible for the National Register of Historic Places (NRHP) would be affected by the proposed undertaking and no further investigations are recommended.

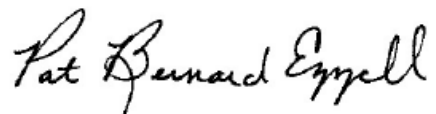
TVA is consulting with the following federally recognized Indian tribes regarding properties within the proposed project's APE that may be of religious and cultural significance to them and eligible for the NRHP: The Chickasaw Nation, Choctaw Nation of Oklahoma, Jena Band of Choctaw Indians, Mississippi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

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

Page 2
December 1, 2009

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,

A handwritten signature in black ink that reads "Pat Bernard Ezzell". The signature is written in a cursive style with a large initial "P".

Pat Bernard Ezzell
Historian and Native American Liaison

Enclosure

THOSE LISTED:

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. Kenneth Carleton
Tribal Historic Preservation Officer/Archaeologist
Mississippi Band of Choctaw Indians
Post Office Box 6257
Choctaw, Mississippi 39350

Mr. Bryant Celestine
Tribal Historic Preservation Officer
Alabama-Coushatta Tribe of Texas
571 State Park Rd. 56
Livingston, Texas 77351

Mr. Terry Cole
Cultural Resources Director
Choctaw Nation of Oklahoma
Post Office Drawer 1210
Durant, Oklahoma 74702

cc: Ms. Caren Johnson
Cultural Resources Office
Choctaw Nation of Oklahoma
Post Office Drawer 1210
Durant, Oklahoma 74702

cc: Chief Gregory E. Pyle
Choctaw Nation of Oklahoma
Post Office Drawer 1210
Durant, Oklahoma 74702

cc: Dr. Ian Andrew Thompson
Choctaw Nation of Oklahoma
Post Office Drawer 1210
Durant, Oklahoma 74702

Starkville and Columbus, Mississippi - Power System Improvement

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

Ms. Natalie Deere
Tribal Historic Preservation Officer
Seminole Nation of Oklahoma
Post Office Box 1498
Wewoka, Oklahoma 74884

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

Mrs. Jemmie Lillard
Tribal Town King
Kialegee tribal Town
Post Office Box 332
Wetumka, Oklahoma 74883

Ms. Virginia (Gingy) Nail
Tribal Historic Preservation Officer
The Chickasaw Nation
Cultural Resources Department
Post Office Box 1548
Ada, Oklahoma 74821

Mr. Kirk Perry
Administrator of Policy and Standards
Cultural Resources
The Chickasaw Nation
Cultural Resources Department
Post Office Box 1548
Ada, Oklahoma 74821

Ms. Julie Ray
Historic Preservation & Repatriation Manager
Cultural Resources
The Chickasaw Nation
Cultural Resources Department
Post Office Box 1548
Ada, Oklahoma 74821

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

Mr. Mike Tarpley
Jena Band of Choctaw Indians
Post Office Box 14
Jena, Louisiana 71342

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

Stringfield, I Kathleen

From: Ezzell, Patricia Bernard
Sent: Thursday, December 03, 2009 1:47 PM
To: Stringfield, I Kathleen; Harle, Michaelyn S; Yarnell, W Richard
Subject: FW: TVA, PROPOSED STARKVILLE TO COLUMBUS TRANSMISSION LINE, OKTIBBEHA & LOWNDES COUNTIES, MISSISSIPPI

For the files.--Pat

From: Caren Johnson [mailto:cjohnson@choctawnation.com]
Sent: Thursday, December 03, 2009 11:55 AM
To: Ezzell, Patricia Bernard
Subject: RE: TVA, PROPOSED STARKVILLE TO COLUMBUS TRANSMISSION LINE, OKTIBBEHA & LOWNDES COUNTIES, MISSISSIPPI

December 3, 2009

Ms. Patricia Barnard Ezzell:

The Choctaw Nation of Oklahoma has reviewed the PARPOSED STARKVILLE TO COLUBUS TRANSMISSION LINE, OKTIBBEHA AND LOWNDES COUNTIES MISSISSIPPI and based on the information provided to the best of our knowledge it will have no adverse effect on any historic properties in the project's area of potential effect. However, should construction expose buried archaeological or building materials such as chipped stone, tools, pottery, bone, historic crockery, glass or metal items, or should it uncover evidence of buried historic building materials such as rock foundations, brick, or hand poured concrete, this office should be contacted immediately @ 1-800-522-6170 ext. 2137.

Sincerely,

Caren A. Johnson,
Administrative Assistant
Choctaw Nation of Oklahoma
P. O. Box 1210, 16th & Locust
Durant, OK 74702-1210
1-580-924-8280 Ext. 2133
Fax 1-580-920-3181

From: Ezzell, Patricia Bernard [mailto:pbezzell@tva.gov]
Sent: Tuesday, December 01, 2009 3:42 PM
To: Giny Nail; Kirk Perry; Julie Ray; Terry Cole; jbcconstruct@aol.com; Carleton, Ken; Natalie Deere; aberryhill@muscogeenation-nsn.gov; Bryant J. Celestine; Augustine Asbury; kialegeetribal@yahoo.com; charles coleman; kkaniatobe@astribe.com; Robin Dushane; Kim Jumper
Cc: Caren Johnson; Joyce Bear
Subject: TVA, PROPOSED STARKVILLE TO COLUMBUS TRANSMISSION LINE, OKTIBBEHA & LOWNDES COUNTIES, MISSISSIPPI

Good Afternoon,

I hope this e-mail finds you well. Attached is a letter regarding TVA's proposal to construct and operate approximately 14 miles of new 161-kV transmission line (TL) and associated 161-kV switching station near the community of Clayton Village in Mississippi. The instructions for accessing the cited report are included as the last page of the attached pdf file.

As always, should you have any questions, please do not hesitate to contact me.

Sincerely,

Pat

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

This message is intended only for the use of the individual or entity to which it is addressed and may contain information that is privileged, confidential and exempt from disclosure. If you have received this message in error, you are hereby notified that we do not consent to any reading, dissemination, distribution or copying of this message. If you have received this communication in error, please notify the sender immediately and destroy the transmitted information. Please note that any view or opinions presented in this email are solely those of the author and do not necessarily represent those of the Choctaw Nation.



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

Ms. Patricia Bernard Ezzell
Historian and Native American Liaison
Cultural Resources
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, TN 37902-1499

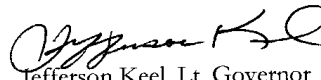
Dear Ms. Ezell:

Thank you for your recent letter regarding the proposal to construct and operate approximately 14 miles of new 161-kV transmission line and associated 161-kV switching station near the community of Clayton Village, in Oktibbeha and Lowndes Counties, Mississippi.

This area is very near the aboriginal lands of the Chickasaw Nation which were ceded in the Treaty of 1832 and is known to be a very sensitive area. 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



God Bless America!



Eastern Shawnee Tribe

Cultural Preservation Department

P.O. Box 350, Seneca, MO 64865

918 666 2435 ext 247

culturalpreservation@estoo.net

February 2, 2010

Tennessee Valley Authority
Att: Pat Bernard Ezzell
400 West Summit hill Drive
Knoxville, TN 37902-1499

RE: The TVA proposed Starkville to Columbus Transmission Line, Oktibbeha and Lowndes Counties, Mississippi.

Dear Pat Bernard Ezzell:

In reference to the above listed project, the Eastern Shawnee Tribe of Oklahoma (ESTO) would like to thank you for the opportunity to comment. This department has received the communication dated December 1, 2009 pertaining to the proposed construction and operation of the new transmission line and switch station near Clayton Village. At this time, we take no interest in Mississippi.

I prefer to make future replies via e-mail. My e-mail address is rdushane@estoo.net. Thank you for the opportunity to comment, if I can be of further assistance please feel free to call me at (918) 666-2435 Ext. 247.

Best Regards,

Robin Dushane
Cultural Preservation Director

Cc/jh



Choctaw Nation of Oklahoma

P.O. Box 1210 • Durant, OK 74702-1210 • (580) 924-8280

Gregory E. Pyle
Chief

Gary Batton
Assistant Chief

February 3, 2010

Pat Ezzell
TVA
400 West Summit Hill Drive
Knoxville, Tennessee 37902-1499

Dear Pat Ezzell:

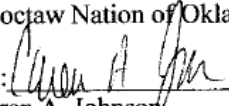
We have reviewed the following proposed project (s) as to its effect regarding religious and/or cultural significance to historic properties that may be affected by an undertaking of the projects area of potential effect.

Project Description: Starkville to Columbus Transmission Line, Oktibbeha and Lowndes Counties, Mississippi

Comments: After review of the above-mentioned project(s), to the best of our knowledge, it will have no adverse effect on any historic properties in the project's area of potential effect. However, should construction activities expose human remains, buried archaeological materials such as chipped stone, tools, pottery, bone, glass or metal items, or should it uncover evidence of buried historic building materials such as rock foundations, brick, or hand-poured concrete, this office should be contacted immediately at 1-800-522-6170 ext. 2137.

Sincerely,

Terry D. Cole
Tribal Historic Preservation Officer
Choctaw Nation of Oklahoma

By: 
Caren A. Johnson
Administrative Assistant

CAJ:vr



ALABAMA-COUSHATTA TRIBE OF TEXAS

571 State Park Rd 56 • Livingston, Texas 77351 • (936) 563-1100

February 10, 2010

Tennessee Valley Authority
Attn: Pat Bernard Ezzell
400 West Summit Hill Drive
Knoxville, TN 37902-1499

Dear Mrs. Ezzell:

On behalf of Chief Oscola Clayton Sylestine and the Alabama-Coushatta Tribe, our appreciation is expressed on your efforts to consult us regarding the Starkville-Columbus Power Improvement proposal in Oktibbeha and Lowndes Counties.

Our Tribe maintains ancestral associations within the state of Mississippi despite the absence of written records to completely identify Tribal activities, villages, trails, or grave sites. However, it is our objective to ensure significances of Native American ancestry including the Alabama-Coushatta Tribe are administered with the utmost regard.

Upon review of your documents submission, no known impacts to religious, cultural, or historical assets of the Alabama-Coushatta Tribe of Texas are anticipated in conjunction with this proposal. However, in the event of inadvertent discovery of human remains and/or archaeological artifacts, activity in proximity to the location must cease and appropriate authorities, including this office, notified without delay.

Should you require additional assistance, please do not hesitate to contact us.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Bryant J. Celestine".

Bryant J. Celestine
Historic Preservation Officer

Telephone: 936 - 563 - 1181

celestine.bryant@actribe.org

Fax: 936 - 563 - 1183

MISSISSIPPI DEPARTMENT *of* ARCHIVES AND HISTORY



PO Box 571, Jackson, MS 39205-0571
601-576-6850 • Fax 601-576-6975
mdah.state.ms.us
H.T. Holmes, Director

February 4, 2010

Mr. A. Eric Howard
Federal Historic Preservation Officer
WT-11D-K
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, Tennessee 37902-1499

RE: Cultural Resources Survey for the Proposed Starkville and Columbus Power Improvement Project in Oktibbeha and Lowndes Counties, MDAH Project Log #01-031-10

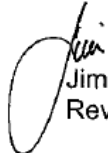
Dear Mr. Howard:

We have reviewed the November 2009 cultural resources survey report by Dr. James J. D'Angelo, Principal Investigator, et al, TRC, received on January 6, 2010, for the above referenced undertaking, pursuant to our responsibilities under Section 106 of the National Historic Preservation Act and 36 CFR Part 800. After review, we concur that no archaeological resources listed in or eligible for listing in the National Register of Historic Places will be affected. For architectural resources, we concur that none of the twenty-five historic structures identified in the report (HR-1 - HR-25) are eligible for listing in the NRHP, and concur that the two railroads (HR-1 and HR-25) are potentially eligible for the NRHP under Criterion A. Finally, we concur with TVA's recommendation that these resources will not be adversely affected, and that no further investigations are necessary. Therefore, we have no objection with the proposed undertaking.

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

If you have any questions, please let us know.

Sincerely,


Jim Woodrick
Review and Compliance Officer

FOR: H.T. Holmes
State Historic Preservation Officer

UNITED STATES DEPARTMENT OF AGRICULTURE
LOWNDES COUNTY FARM SERVICE AGENCY
2282 MARTIN LUTHER KING DRIVE SUITE 3
COLUMBUS, MISS. 39705

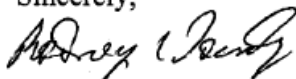
5/27/09

Dear Mr. Liskey:

I received your letter regarding the proposed TVA power line. It appears the line will cross at least three landowners who have acreage enrolled in the Conservation Reserve Program, Constance Johnson, Helen Pilkinton and Bob Raymond. Prior to any disturbance of the CRP cover these landowners need to contact us and allow us to explain the consequences of this action. If the CRP approved cover is destroyed without our consent the participants will be in violation of the CRP contract which could result in termination of the contract, subjecting the participant to severe penalties and refunds of all payments received.

If you have any questions please call me at 662-328-5921, ext. 2.

Sincerely,



Rodney L. Dowdy
County Executive Director
Lowndes County FSA

Mr. Todd C. Liskey
Tennessee Valley Authority
Siting and Environmental Design
1101 Market Street (MR 4G)
Chattanooga, Tennessee 37402-2801

Dear Mr. Liskey:

STARKVILLE-COLUMBUS POWER SUPPLY IMPROVEMENTS

This is in reference to TVA's project mailed to me on May 20, 2009.

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

NOTE: Permits will be
required at areas
where you are crossing
state highways

William M. Jammin
Signature

District Engineer
Title

MDOT
Agency

P.O. Box 2060
Address

Tupelo, Ms 38803-2060



STATE OF MISSISSIPPI
HALEY BARBOUR
GOVERNOR
MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
TRUDY D. FISHER, EXECUTIVE DIRECTOR

September 1, 2009

Mr. Todd C. Liskey
Site and Environmental Design
Tennessee Valley Authority
1101 Market Street
Chattanooga, Tennessee 37402-2801

Dear Mr. Liskey:

Re: Environmental Review
Starkville-Columbus Power Supply Improvements
Clayton Village Switching Station
Lowndes and Oktibbeha County, Mississippi

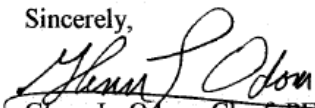
We have reviewed the information submitted on the referenced proposed project. The project is the construction of a new 161-kV transmission line from the Catalpa Creek Substation to the Starkville Switching Station as well as a Clayton Village Switching Station to be located on the north side of Old Highway 82 at the intersection with Sixteen Section Road. From the information reviewed, we know of no adverse environmental impact from the proposed project.

If this project will be disturbing 1 acre or more of land, coverage under a General Permit for control of erosion and sediment will be required in accordance the Storm Water Regulations. Please contact Mr. Jim Morris, Chief of the General Permits Branch with the Environmental Permits Division of the Office of Pollution Control for more information at 601-961-5151 or Jim_Morris@deq.state.ms.us.

This letter should not be interpreted as equivalent to any approval or permit that may be required by pollution control laws. We would remind you that the plans and specification for work on a wastewater system must be submitted to our office prior to construction.

If you have any questions, call us at 601-961-5159.

Sincerely,


Glenn L. Odom, Chief, PE, BCEE
Program Support Branch
Surface Water Division

OFFICE OF POLLUTION CONTROL
POST OFFICE BOX 2261 • JACKSON, MISSISSIPPI 39225-2261 • TEL: (601) 961-5171 • FAX: (601) 354-6612 • www.deq.state.ms.us
AN EQUAL OPPORTUNITY EMPLOYER

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

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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

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.

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.

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.

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.

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:

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

If needed, appropriate soil amendments will be added.

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.

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

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

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.

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.

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).

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.

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.

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.

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.

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.

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.

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.

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.

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:

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

If needed, appropriate soil amendments will be added.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

Damages - The movement of construction crews and equipment shall be conducted in a manner that causes as little intrusion and damage as possible to crops, orchards, woods, wetlands, and other property features and vegetation. The contractor will be responsible for erosion damage caused by his actions and especially for creating conditions that would threaten the stability of the right-of-way or site soil, the structures, or access to either. When property owners prefer the correction of ground cover condition or soil and subsoil problems themselves, the section of the contract dealing with damages will apply.

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Appendix 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.

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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.

Revision January 2008

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.

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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.
- L. 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.

6.0 References

- Muncy, J. A. 1999. *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities*, revised edition. Edited by C. Austin, C. Brewster, A. Lewis, K. Smithson, T. Broyles, and T. Wojtalik. Norris: Tennessee Valley Authority, Technical Note TVA/LR/NRM 92/1.
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**Appendix I – Score and Rank Evaluations for Alternative
Transmission Line Routes for the Starkville and Columbus Power
System Improvements Project in Lowndes and Oktibbeha
Counties, Mississippi**

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Table I. Score and Rank Evaluations for Alternative Transmission Line Routes for the Starkville and Columbus - Power System Improvements Project in Lowndes and Oktibbeha Counties, Mississippi

SCORES					
	Engineering	Environmental	Land Use	Cultural	Total Score
Route 1	7.55	9.90	13.31	17.00	47.76
Route 2	7.28	10.99	11.65	13.40	43.31
Route 3	10.70	6.20	14.75	20.31	51.96
Route 4	10.42	7.29	13.78	17.40	48.89
Route 5	10.83	2.40	18.78	20.61	52.62
Route 6	10.55	3.68	17.83	17.72	49.78
Route 7	10.79	2.62	17.52	20.61	51.54
Route 8	10.51	3.14	19.07	17.72	50.44
Route 9	5.69	11.30	14.15	3.14	34.28
Route 10	8.85	7.73	11.74	7.60	35.92
Route 11	8.96	3.93	12.78	7.92	33.59
Route 12	8.92	4.15	11.52	7.92	32.51
Route 13	7.10	14.66	11.28	3.00	36.04
Route 14	10.26	13.97	10.26	7.00	41.49
Route 15	9.93	7.17	11.96	7.32	36.37
Route 16	9.88	7.39	13.20	7.32	37.79

RANKS					
	Engineering	Environmental	Land Use	Cultural	Comparative Rank
Route 1	4	12	9	10	10
Route 2	3	13	4	9	9
Route 3	14	7	12	14	15
Route 4	11	9	10	11	11
Route 5	16	1	15	15	16
Route 6	13	4	14	12	12
Route 7	15	2	13	15	14
Route 8	12	3	16	12	13
Route 9	1	14	11	2	3
Route 10	5	11	5	6	4
Route 11	7	5	7	7	2
Route 12	6	6	3	7	1
Route 13	2	16	2	1	5
Route 14	10	15	1	3	8
Route 15	9	8	6	4	6
Route 16	8	10	8	4	7

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**Appendix J – Stream Crossings Along the Proposed Starkville–
Columbus 161-kV Transmission Line in Lowndes and Oktibbeha
Counties, Mississippi**

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Table J-1. Stream Crossings Along the Proposed Starkville–Columbus 161-kV Transmission Line in Lowndes and Oktibbeha Counties, Mississippi

Stream Identification	Stream Type	Streamside Management Zone Category	Stream Name	Field Notes
001	Other	Category A (50 feet)	Pond	Farm Pond
002	Intermittent	Category A (50 feet)	Unnamed Tributary to Catalpa Creek	4-foot-wide x 3-foot-deep channel with clay/silt substrate
003	Perennial	Category A (50 feet)	Catalpa Creek	96-foot-wide x 60-foot-deep channel with sand substrate
004	Intermittent	Category A (50 feet)	Unnamed Tributary to Catalpa Creek	40-foot-wide x 20-foot-deep channel with sand substrate
005	Perennial	Category A (50 feet)	Unnamed Tributary to Catalpa Creek	12-foot-wide x 3-foot-deep channel with clay substrate
006	Intermittent	Category A (50 feet)	Unnamed Tributary to Catalpa Creek	6-foot-wide x 4-foot-deep channel with clay substrate next to railroad
007	Intermittent	Category A (50 feet)	Unnamed Tributary to Catalpa Creek	2-foot-wide x 1-foot-deep channel with clay substrate
008	Perennial	Category A (50 feet)	Unnamed Tributary to Catalpa Creek	4-foot-wide x 8-foot-deep channel with clay substrate.
009	Perennial	Category A (50 feet)	Unnamed Tributary to Catalpa Creek	7-foot-wide x 4-foot-deep channel of clay/silt substrate, semi forested. Heavily channelized in most areas
010	Perennial	Category A (50 feet)	Unnamed Tributary to Catalpa Creek	15-foot-wide x 9-foot-deep channel with wet at 13-foot-wide x 4-foot-deep. Some fish observed. Clay substrate.
011	Perennial	Category A (50 feet)	Unnamed Tributary to Sand Creek	5-foot-wide x 2-foot-deep channel in partially forested area. Creek is channelized in some areas
012	Intermittent	Category A (50 feet)	Unnamed Tributary to Sand Creek	3-foot-wide x 2-foot-deep channel in partially forested area. Creek channelized in some areas. Floods into pools in areas.
013	Perennial	Category A (50 feet)	Unnamed Tributary to Sand Creek	8-foot-wide x 8-foot-deep channel with clay substrate
014	Intermittent	Category A (50 feet)	Unnamed Tributary to Sand Creek	4-foot-wide x 4-foot-deep channel with clay substrate
015	Perennial	Category A (50 feet)	Unnamed Tributary to Sand Creek	10-foot-wide x 15-foot-deep straight channel with clay substrate

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Stream Identification	Stream Type	Streamside Management Zone Category	Stream Name	Field Notes
016	Other	Category A (50 feet)	Pond	Small pond in cow field
017	Intermittent	Category A (50 feet)	Unnamed Tributary to Sand Creek	2-foot-wide x 1-foot-deep channel with sand/gravel substrate
018	Intermittent	Category A (50 feet)	Unnamed Tributary to Sand Creek	3-foot-wide x 1-foot-deep channel with sand/silt substrate
019	Perennial	Category A (50 feet)	Sand Creek	15-foot-wide x 10-foot-deep channel
020	Perennial	Category A (50 feet)	Unnamed Tributary to Sand Creek	12-foot-wide x 10-foot-deep channel
021	Intermittent	Category A (50 feet)	Unnamed Tributary to Sand Creek	6-foot-wide x 5-foot-deep channel with silt/clay substrate
022	Intermittent	Category A (50 feet)	Unnamed Tributary to Sand Creek	5-foot-wide x 3-foot-deep channel with silt/sand substrate.
023	Intermittent	Category A (50 feet)	Unnamed Tributary to Sand Creek	3-foot-wide x 2-foot-deep channel with wetted 2 foot-wide x 1-foot-deep channel. Silt substrate. Channelized and goes under highway
024	Intermittent	Category A (50 feet)	Unnamed Tributary to Sand Creek	1-foot-wide x 1-foot-deep channel through wetland area. Silt Substrate. Very wet.
025	Intermittent	Category A (50 feet)	Unnamed Tributary to Sand Creek	1-foot-wide x 1-foot-deep channel with sand/silt substrate in forested area near highway.
026	Intermittent	Category A (50 feet)	Unnamed Tributary to Sand Creek	Small channel <1-foot-deep. Bends back across ROW.
027	Perennial	Category A (50 feet)	Unnamed Tributary to Sand Creek	5-foot-wide x 3-foot-deep channel of primarily sand/silt substrate. Forested.
028	Perennial	Category A (50 feet)	Sand Creek	20-foot-wide x 8-foot-deep channel with wetted depth at 1 foot. Silt substrate. Channelized. Not forested on right bank. Semi-forested on left bank
029	Intermittent	Category A (50 feet)	Unnamed Tributary to Sand Creek	3-foot-wide x 1-foot-deep channel that crosses forested road.
030	Intermittent	Category A (50 feet)	Unnamed Tributary to Sand Creek	4-foot-wide x 3-foot-deep channel in forested area. Wetted depth of 1.5ft

Stream Identification	Stream Type	Streamside Management Zone Category	Stream Name	Field Notes
031	Perennial	Category A (50 feet)	Unnamed Tributary to Sand Creek	Small stream bordered by railroad tracks, creating a high slope on the left descending bank
032	Intermittent	Category A (50 feet)	Unnamed Tributary to Sand Creek	3-foot-wide x 2-foot-deep channel in forested area.
033	Other	Category A (50 feet)	Pond	Aquacultural pond

Table J-2. Stream Crossings Along Access Roads for the Proposed Transmission Line in Lowndes and Oktibbeha Counties, Mississippi

Stream Identification	Stream Type	Streamside Management Zone Category	Stream Name	Field Notes
001	Perennial	Category A (50 feet)	Unnamed Tributary to Catalpa Creek	7-foot-wide x 1-foot-deep channel in forested area with clay substrate. Parts of broken bridge within the stream channel.

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**Appendix K – Rule 41: Regulation of Noxious Weeds Under
Sections 69-25-1 Through 69-25-47, Chapter 380, Laws of
Mississippi 1974**

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RULE 41: REGULATION OF NOXIOUS WEEDS UNDER SECTIONS 69-25-1 THROUGH 69-25-47, CHAPTER 380, LAWS OF MISSISSIPPI 1974)

SECTION I: Declaration of noxious weeds. Effective January 1, 2004, the following weeds shall be considered noxious and subject to regulation as deemed necessary by the Bureau of Plant Industry (the Bureau) and approved by its Advisory Board.

MISSISSIPPI NOXIOUS WEED LIST

Benghal dayflower (*Commelina benghalensis*) * *

Brazilian Satintail (*Imperata braziliensis*) *

Chinese Tallow Tree/Popcorn Tree (*Sapium sebiferum*)

Cogongrass (*Imperata cylindrica*) *

Giant Salvinia (*Salvinia molesta*) *

Hydrilla (*Hydrilla verticillata*) *

Itchgrass (*Rottboellia cochinchinensis*) *

Kudzu (*Pueraria montana var. lobata*) *

Tropical soda apple (*Solanum viarum*) *

* Also listed on the Federal Noxious Weed List.

* * State quarantine imposed on this weed.

SECTION II: Procedures for declaring additional weeds as noxious or for deregulation of weeds listed as noxious. The Bureau shall accept written petitions requesting that weeds not listed above be regulated as noxious or that a currently listed weed be deregulated. Such petition(s) shall provide justification for listing or de-listing to the Bureau.

The Advisory Board to the Bureau, shall decide for or against the petition(s) to list a weed as noxious based on factual information as required by the Bureau for each plant proposed to be added to the noxious weed list. The Advisory Board may hear testimonial evidence for or against said listing at Board meetings or hearings.

Justification for de-listing a weed may include, but not be limited to: (1) recent factual data not previously presented to the Bureau proving that said weed has not adversely affected agricultural/horticultural production or the environment as previously declared; (2) data proving said weed no longer can be regulated, is endemic and control/regulatory activities have not been successful; or (3) the regulatory program has proven to be cost prohibitive. The Bureau Director and/or State Entomologist shall first review and based on data presented determine whether a submitted petition to de-list a weed meets justification for Advisory Board consideration. The Advisory Board may hear testimonial evidence for or against said de-listing at Board meetings or hearings.

Other than as described in SECTION II, federal noxious weeds may only be listed in SECTION I after being found in Mississippi or after USDA, APHIS, PPQ or another federal regulatory agency having such authority requests the Bureau's assistance in regulating or surveying for such weeds and provides funding through a cooperative agreement to do so.

SECTION III: Adoption of regulatory requirements for listed noxious weeds.

Should the need prevail, the Bureau and with the approval of its Advisory Board may establish separate rules, guidelines and policies for each weed so listed. Implementation of such rules shall be done in order to prevent the spread of noxious weeds into and within the state of Mississippi and to other states which adopt quarantine measures. Having such authority and with the approval of the Advisory Board, the Bureau may determine applicable pathways of spread, regulated areas, articles to be regulated and the disposition of such articles found to be in violation.

SECTION IV: Quarantine Imposed. It is hereby declared under the provisions of Sections 69-25-1 through 69-25-47 of the Mississippi Plant Act that with the approval of the Bureau's Advisory Board a quarantine may be imposed upon specific noxious weeds so listed in SECTION I when detected in the State of Mississippi. However, should a need arise dictating an emergency quarantine on a non-listed noxious weed the Bureau

may implement such effective for 90 days during which time the Advisory Board may officially declare the weed as noxious and approve a specific final quarantine rule. Unless otherwise determined and specified in such rules, regulated articles may only be moved out of a quarantined or regulated area under special permit or certificate, which has been issued by the Bureau. Also, unless otherwise specified by regulation, regulated articles moved into the state must enter under a special written permit issued by the Bureau or must be accompanied by a certificate from the state of origin. Such certificate shall be issued based upon an inspection of the article(s) by an authorized inspector in the state of origin declaring such article to be apparently free from seed, vegetative forms or any other living stage(s) of plant growth of any noxious weed listed in SECTION I.

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**Appendix L – Threatened and Endangered Aquatic Animal and Plant
Species From Lowndes and Oktibbeha Counties, Mississippi**

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Table L-1. Federally and State-Listed Aquatic Species Known From Lowndes and Oktibbeha Counties, Mississippi and/or Within a 10-Mile Radius of the Proposed Project Area

Common Name	Scientific Name	Status ¹	
		Federal	State (Rank ²)
Fish			
Alabama Hog Sucker	<i>Hypentelium etowanum</i>	-	TRKD (S3)
Alabama Shiner	<i>Cyprinella callistia</i>	-	TRKD (S2)
Black Redhorse ³	<i>Moxostoma duquesnei</i>	-	TRKD (S1)
Blue Sucker ³	<i>Cycleptus elongatus</i>	-	TRKD (S3)
Crystal Darter ³	<i>Crystallaria asprella</i>	-	END (S1)
Fluvial Shiner	<i>Notropis edwardraneyi</i>	-	TRKD (S1)
Frecklebelly Madtom ³	<i>Noturus munitus</i>	-	END (S2)
Freckled Darter	<i>Percina lenticula</i>	-	TRKD (S2)
Mobile Logperch	<i>Percina kathae</i>	-	TRKD (S2S3)
Rock Darter	<i>Etheostoma rupestre</i>	-	TRKD (S3)
Southern Sand Darter	<i>Ammocrypta meridiana</i>	-	TRKD (S3)
Striped Bass ³	<i>Morone saxatilis</i>	-	TRKD (S1)
Mussels			
Alabama Hickorynut	<i>Obovaria unicolor</i>	-	TRKD (S1S2)
Alabama Moccasinshell	<i>Medionidus acutissimus</i>	THR	END (S1)
Alabama Spike	<i>Elliptio arca</i>	-	TRKD (S1S2)
Orange-nacre Mucket	<i>Lampsilis perovalis</i>	THR	END (S1)
Ovate Clubshell	<i>Pleurobema perovatum</i>	END	END (S1)
Ridged Mapleleaf	<i>Quadrula rumphiana</i>	-	TRKD (S2)
Rough Fatmucket ³	<i>Lampsilis straminea straminea</i>	-	TRKD (S2)
Southern Clubshell	<i>Pleurobema decisum</i>	END	END (S1)
Southern Combshell	<i>Epioblasma penita</i>	END	END (S1)
Southern Creekmussel	<i>Strophitus subvexus</i>	-	TRKD (S2)
Southern Hickorynut	<i>Obovaria jacksoniana</i>	-	TRKD (S1)
White Heelsplitter	<i>Lasmigona complanata</i>	-	TRKD (S2)
Crayfish			
Tombigbee Riverlet Crayfish ³	<i>Hobbseus petilus</i>	-	TRKD (S2)

Source: TVA data November 2009

¹Status Codes: END = Listed Endangered; TRKD = Tracked as sensitive but has no legal status.

²State Ranks: S1 = Critically Imperiled in Mississippi because of extreme rarity (five or fewer occurrences or very few remaining individuals) or because of some factor(s) making it vulnerable to extirpation; S2 = Imperiled in Mississippi because of rarity (six to 20 occurrences or few remaining individuals) or because of some factor(s) making it vulnerable to extirpation; S3 = Rare or uncommon in Mississippi (on the order of 21 to 100 occurrences)

³Species known to occur within a ten-mile radius of the project area.

Table L-2. Federally and State-Listed Plant Species Known From Lowndes and Oktibbeha Counties, Mississippi and/or Within a 5-Mile Radius of the Proposed Project Area

Common Name	Scientific Name	Status ¹	
		Federal	State (Rank ²)
American columbo	<i>Frasera caroliniensis</i>	-	TRKD (S2S3)
American ginseng	<i>Panax quinquefolius</i>	-	TRKD (S3)
Bald spikerush	<i>Eleocharis erythropoda</i>	-	TRKD (SR)
Barrens silky aster	<i>Symphyotrichum pratense</i>	-	TRKD (S1)
Beard-tongue	<i>Penstemon tenuiflorus</i>	-	TRKD (S2S3)
Big shellbark hickory ³	<i>Carya laciniosa</i>	-	TRKD (S2S3)
Big-head evax	<i>Evax prolifera</i>	-	TRKD (S1)
Blue ash	<i>Fraxinus quadrangulata</i>	-	TRKD (S2)
Broom-snakeroot	<i>Gutierrezia dracunculoides</i>	-	TRKD (SE1)
Bur oak ³	<i>Quercus macrocarpa</i>	-	TRKD (S2)
Canada moonseed ³	<i>Menispermum canadense</i>	-	TRKD (S3)
Canada wild-ginger	<i>Asarum canadense</i>	-	TRKD (S2S3)
Canadian milkvetch	<i>Astragalus canadensis</i>	-	TRKD (S2)
Carolina anglepod	<i>Matelea carolinensis</i>	-	TRKD (S3)
Crested coralroot	<i>Hexalectris spicata</i>	-	TRKD (S2)
Dwarf larkspur	<i>Delphinium tricorne</i>	-	TRKD (S2)
Earleaf foxglove	<i>Agalinis auriculata</i>	-	TRKD (S1)
Eastern purple coneflower	<i>Echinacea purpurea</i>	-	TRKD (S3S4)
Great plains ladies'-tresses	<i>Spiranthes magnicamporum</i>	-	TRKD (S2S3)
Green violet	<i>Hybanthus concolor</i>	-	TRKD (S2)
Horse-gentian	<i>Triosteum angustifolium</i>	-	TRKD (S3)
Lake-cress	<i>Neobeckia aquatica</i>	-	TRKD (S1S2)
Lance-leaved buckthorn	<i>Rhamnus lanceolata</i>	-	TRKD (S2)
Leather-flower	<i>Clematis beadlei</i>	-	TRKD (S1)
Lesser ladies'-tresses	<i>Spiranthes ovalis</i>	-	TRKD (S2S3)
Limestone adder's-tongue	<i>Ophioglossum engelmannii</i>	-	TRKD (S3)
Ohio buckeye ³	<i>Aesculus glabra</i>	-	TRKD (S2?)
Perideridia	<i>Perideridia americana</i>	-	TRKD (S1S2)
Prairie parsley	<i>Polytaenia nuttallii</i>	-	TRKD (S2)
Prairie pleatleaf	<i>Nemastylis geminiflora</i>	-	TRKD (S2)
Price's potato-bean	<i>Apios priceana</i>	THR	TRKD (S1S2)
Pumpkin ash	<i>Fraxinus profunda</i>	-	TRKD (S3)
Ridge-stem false-foxglove	<i>Agalinis oligophylla</i>	-	TRKD (S2)
Rock stonecrop	<i>Sedum pulchellum</i>	-	TRKD (S1)
Rough rattlesnake-root	<i>Prenanthes aspera</i>	-	TRKD (S2)
Scarlet Indian-paintbrush	<i>Castilleja coccinea</i>	-	TRKD (S1)
Sedge	<i>Carex jamesii</i>	-	TRKD (S1S2)
September elm	<i>Ulmus serotina</i>	-	TRKD (S3?)
Shooting star	<i>Dodecatheon meadia</i>	-	TRKD (S2)
Slender sedge	<i>Carex gracilescens</i>	-	TRKD (S3)
Small-toothed sedge	<i>Carex microdonta</i>	-	TRKD (S3)
Southern meadow-rue	<i>Thalictrum debile</i>	-	TRKD (S1S2)
Stiff-greenthread	<i>Thelesperma filifolium</i>	-	TRKD (S1)
Sundrops	<i>Oenothera triloba</i>	-	TRKD (SU)
Turk's cap lily	<i>Lilium superbum</i>	-	TRKD (S3)
Wahoo	<i>Euonymus atropurpureus</i>	-	TRKD (S2S3)
Waterleaf	<i>Hydrophyllum appendiculatum</i>	-	TRKD (S1)

Common Name	Scientific Name	Status ¹	
		Federal	State (Rank ²)
White heath aster	<i>Symphyotrichum ericoides</i>	-	TRKD (S2)
White trout-lily	<i>Erythronium albidum</i>	-	TRKD (S2)
Wild hyacinth	<i>Camassia scilloides</i>	-	TRKD (S2S3)

Source: TVA data, November 2009

¹Status codes: TRKD = Tracked as sensitive but has no legal status; THR = Threatened

²State Ranks: S1 = Critically Imperiled in Mississippi because of extreme rarity (five or fewer occurrences or very few remaining individuals) or because of some factor(s) making it vulnerable to extirpation; S2 = Imperiled in Mississippi because of rarity (six to 20 occurrences or few remaining individuals) or because of some factor(s) making it vulnerable to extirpation; S3 = Rare or uncommon in Mississippi (on the order of 21 to 100 occurrences) S4 = Widespread, abundant, apparently secure in the state, but with cause for long-term concern (more than 101 occurrences); SR = Reported from the state, but without persuasive demonstration, which would provide a basis for either accepting or rejecting the report; SU = Possibly in peril in Mississippi but status uncertain; need more information. May also be represented by S?; S? = Unranked: Element is not yet ranked in the state; SE = Exotic: An exotic established in the state; may be native in nearby regions (e.g. pecans along the eastern seaboard of the United States); S#S# = Denotes a range of ranks because the exact rarity of the element is uncertain (e.g., S1S2)

³Species documented from within the proposed right-of-way