

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

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

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

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

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

the buffer and sensitive area. Some areas may require planting native plants or grasses to meet the criteria of regulatory agencies or commitments to special program interests.

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

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

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

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

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

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

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

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

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

19. Brush and Timber Disposal (Reclearing) - The reclearing contractor shall place felled tree boles in neat stacks at the edge of the right-of-way, with crossing breaks at least every 100 feet. Property owner requests shall be reviewed with the project manager or right-of-way specialist before accepting them. Lop and drop activities must be specified in the contract and on plan and profile drawings with verification with the right-of-way specialist before conducting such work. When tree trimming and chipping is necessary, disposal of the chips on the easement or other locations on the property must be with the consent of the property owner and the approval of the right-of-way specialist. No trees, branches, or chips shall remain in a surface water body or be placed at a location where washing into a surface water or groundwater source might occur.
  
20. Brush and Timber Disposal (Initial Clearing) - For initial clearing, trees are commonly part of the contractor's contract to remove as they wish. Trees may be removed from the site for lumber or pulpwood or they may be chipped or stacked and burned. All such activities must be coordinated with the TVA field engineer, and the open burning permits, notifications, and regulatory requirements must be met. Trees may be cut and left in place only in areas specified by TVA and approved by appropriate regulatory agencies. These areas may include sensitive wetlands or SMZs where tree removal would cause excessive ground disturbance or in very rugged terrain where windrowed trees are used as sediment barriers along the edge of the right-of-way.
  
21. Restoration of Site - All disturbed areas, with the exception of farmland under cultivation and any other areas as may be designated by TVA's specifications, shall be stabilized in the following manner unless the property owner and TVA's engineer specify a different method:
  - A. The subsoil shall be loosened to a minimum depth of 6 inches if possible and worked to remove unnatural ridges and depressions.
  - B. If needed, appropriate soil amendments will be added.
  - C. All disturbed areas will initially be seeded with a temporary ground cover such as winter wheat, rye, or millet, depending on the season. Perennials may also be planted during initial seeding if proper growing conditions exist. Final restoration and final seeding will be performed as line construction is completed. Final seeding will consist of permanent perennial grasses such as those outlined in TVA's *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities (Muncy 2012)*. Exceptions would include those areas designated as native grass planting areas. Initial and final restoration will be performed by the clearing contractor.
  - D. TVA holds the option, depending upon the time of year and weather condition, to delay or withdraw the requirement of seeding until more favorable planting conditions are certain. In the meantime, other stabilization techniques must be applied.

References

Muncy, J. A. 2012. A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities (revised edition). Edited by Abigail Bowen, Jodie Branum, Corey Chandler, Adam Dattilo, Britta Dimick, Shea Gaither, Casey Henley, Todd Liskey, Joe Melton, Cherie Minghini, Paul Pearman, Kenton Smithson, Joe Turk, Emily Willard, Robby Wilson. Norris: TVA Technical Note TVA/LR/NRM 92/1. Retrieved from <[http://www.tva.com/power/projects/bmp\\_manual\\_2012.pdf](http://www.tva.com/power/projects/bmp_manual_2012.pdf)> (n.d.).

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

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## Tennessee Valley Authority Environmental Quality Protection Specifications for Transmission Line Construction

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

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

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

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

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

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

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

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

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

Appropriate drainage facilities for temporary construction activities interrupting natural site drainage shall be provided to avoid erosion. Watercourses shall not be blocked or diverted unless required by the specifications or the TVA engineer. Diversions shall be made in accordance with TVA's *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities (Muncy, 2012)*.

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

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

11. Clearing - No construction activities may clear additional site or right-of-way vegetation or disturb remaining retained vegetation, stumps, or regrowth at locations other than the structure sites and conductor setup areas. TVA and the construction contractor(s) must provide appropriate erosion or sediment controls for areas they have disturbed that have previously been restabilized after clearing operations. Control measures shall be

implemented as soon as practicable after disturbance in accordance with applicable federal, state, and/or local storm water regulations.

12. Restoration of Site - All construction disturbed areas, with the exception of farmland under cultivation and any other areas as may be designated by TVA's specifications, shall be stabilized in the following manner unless the property owner and TVA's engineer specify a different method:
  - A. The subsoil shall be loosened to a minimum depth of 6 inches if possible and worked to remove unnatural ridges and depressions.
  - B. If needed, appropriate soil amendments will be added.
  - C. All disturbed areas will initially be seeded with a temporary ground cover such as winter wheat, rye, or millet, depending on the season. Perennials may also be planted during initial seeding if proper growing conditions exist. Final restoration and final seeding will be performed as line construction is completed. Final seeding will consist of permanent perennial grasses such as those outlined in TVA's *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities (Muncy 2012)*. Exceptions would include those areas designated as native grass planting areas. Initial and final restoration will be performed by the clearing contractor.
  - D. TVA holds the option, depending upon the time of year and weather condition, to delay or withdraw the requirement of seeding until more favorable planting conditions are certain. In the meantime, other stabilization techniques must be applied.
13. Air Quality Control - Construction crews shall take appropriate actions to minimize the amount of air pollution created by their construction operations. All operations must be conducted in a manner that avoids creating a nuisance and prevents damage to lands, crops, dwellings, or persons.
14. Burning - Before conducting any open burning operations, the contractor shall obtain permits or provide notifications as required to state forestry offices and/or local fire departments. Burning operations must comply with the requirements of state and local air pollution control and fire authorities and will only be allowed in approved locations and during appropriate hours and weather conditions. If weather conditions such as wind direction or speed change rapidly, the contractor's burning operations may be temporarily stopped by the TVA field engineer. The debris for burning shall be piled and shall be kept as clean and as dry as possible, then burned in such a manner as to reduce smoke. No materials other than dry wood shall be open burned. The ash and debris shall be buried away from streams or other water sources and shall be in areas coordinated with the property owner.
15. Dust and Mud Control - Construction activities shall be conducted to minimize the creation of dust. This may require limitations as to types of equipment, allowable speeds, and routes utilized. Water, straw, wood chips, dust palliative, gravel, combinations of these, or similar control measures may be used subject to TVA's approval. On new construction sites and easements, the last 100 feet before an access

road approaches a county road or highway shall be graveled to prevent transfer of mud onto the public road.

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

References

Muncy, J. A. 2012. A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities (revised edition). Edited by Abigail Bowen, Jodie Branum, Corey Chandler, Adam Dattilo, Britta Dimick, Shea Gaither, Casey Henley, Todd Liskey, Joe Melton, Cherie Minghini, Paul Pearman, Kenton Smithson, Joe Turk, Emily Willard, Robby Wilson. Norris: TVA Technical Note TVA/LR/NRM 92/1. Retrieved from <[http://www.tva.com/power/projects/bmp\\_manual\\_2012.pdf](http://www.tva.com/power/projects/bmp_manual_2012.pdf)> (n.d.).

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**Appendix D – Tennessee Valley Authority Transmission  
Construction Guidelines Near Streams**

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## **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* (Muncy 2012).

### **Three Levels of Protection**

During the preconstruction review of a proposed transmission line, the TVA Environmental Biological Compliance staff will have studied each possible stream impact site and will have identified it as falling into one of three categories: (A) standard streamside management protection, (B) protection of important permanent streams, springs, and sinkholes, 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 federal requirements to avoid harming certain species.

As early as possible after field surveys are completed by the TVA Biological Compliance Staff, any streams that have been designated as either Category B or C will be discussed with the TVA Environmental Energy Delivery staff. The purpose of these discussions will be to minimize the number of crossings and their impact on the important resources in the streams during design and construction. The category designation for each stream site will then be marked on the transmission line 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, springs, sinkholes, 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, springs, and sinkholes 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 5, “Structural Controls Standards and Specifications” (Muncy 2012).

2. All equipment crossings of streams and shorelines 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 as a result of clearing operations by the actions of plowing, disking, blading, or other tillage or grading equipment will be minimized in SMZs. Shorelines that have to be disturbed must be stabilized as soon as feasible.

**(B) Protection of Important Permanent Streams, Springs, and Sinkholes**

This category will be used when there is one or more specific reason(s) why a permanent (always-flowing) stream, spring, or sinkhole requires protection beyond that provided by standard BMPs. Reasons for requiring this additional protection include high potential for occupancy by federally listed or significant state-listed species, federally designated critical habitat, or areas designated as special use classification (e.g., trout waters). 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 5, "Structural Controls Standards and Specifications" (Muncy 2012).
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. Category B designations will be discussed with the TVA Environmental Energy Delivery staff as early as possible in the process, to allow time to discuss possible avoidance or minimization of impacts with design and construction.
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 be minimized in SMZs. 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 requiring special protection is present (for example, the spawning area of a rare species), the stream is known to be occupied by a federally listed or significant state-listed species, or when required as a special condition resulting from consultation with the United States Fish and Wildlife Service to avoid project effects on a listed species or designated critical habitat. 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 5, “Structural Controls Standards and Specifications” (Muncy 2012).
2. Category C designations would be discussed with the TVA Environmental Energy Delivery staff as early as possible following field surveys to allow time to discuss possible avoidance or minimization of impacts with design and construction. Environmental Energy Delivery staff would discuss construction activities to take place in the SMZ with the Environmental Biological Compliance staff. On-site planning sessions would be conducted as needed. All crossings of streams also must comply with appropriate state (and, at times, federal) permitting requirements.
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 should be limited to those required to meet National Electrical Safety Code, Federal Energy Regulatory Commission standards, and danger tree requirements. Stumps can be cut close to ground level, but must not be removed or uprooted.
4. Other vegetation near the unique habitat must be disturbed as little as possible during construction. Soil disturbance by plowing, disking, blading, or grading must be kept at a minimum. Areas that have to be disturbed must be stabilized as soon as possible and revegetated as soon as feasible.

5. Special SMZ requirements will be coordinated with Environmental Biological Compliance staff.

**Maintenance**

During ongoing operations, SMZs will be inspected frequently; and during inactive periods, occasionally. Damaging or failing situations that may cause unacceptable water quality impacts will be corrected as soon as practical.

Revision 2.1 - June 2012

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

Guidelines	A: Standard Stream Protection	B: Protection of Important Permanent Streams, Springs, and Sinkholes	C: Protection of Unique Habitats
<p>1. <b>Reference</b></p>	<ul style="list-style-type: none"> <li>All TVA construction work around streams, springs, and sinkholes will be done using pertinent Best Management Practices (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 5, “Structural Controls Standards and Specifications.”</li> </ul>	<ul style="list-style-type: none"> <li>Except as modified by Guidelines 2-4, 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 5, “Structural Controls Standards and Specifications.”</li> </ul>	<ul style="list-style-type: none"> <li>Except as modified by Guidelines 2-4, 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 5, “Structural Controls Standards and Specifications.”</li> </ul>
<p>2. <b>Equipment Crossings</b></p>	<ul style="list-style-type: none"> <li>All equipment crossings of streams and shorelines must comply with appropriate state permitting requirements.</li> <li>Crossings of all drainage channels, intermittent streams, and permanent streams must be done in ways that avoid erosion problems and long-term changes in water flow.</li> <li>Crossings of any permanent streams must allow for natural movement of fish and other aquatic life.</li> </ul>	<ul style="list-style-type: none"> <li>All equipment crossings of streams also must comply with appropriate state (and, at times federal) permitting requirements.</li> <li>Crossings of drainage channels and intermittent streams must be done in ways that avoid erosion problems and long-term changes in water flow.</li> <li>All construction activity would be discussed with the TVA Environmental Energy Delivery staff as early as possible in the process to allow time to discuss possible avoidance or minimization of impacts with design and construction.</li> </ul>	<ul style="list-style-type: none"> <li>All crossings of streams also must comply with appropriate state (and, at times federal) permitting requirements.</li> <li>All construction activity would be discussed with the TVA Environmental Energy Delivery staff as early as possible following field surveys to allow time to discuss possible avoidance or minimization of impacts with design and construction.</li> <li>On-site planning sessions would be conducted as needed.</li> </ul>

<sup>1</sup>Source: *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities* (Muncy 2012)

**Comparison of Guidelines Under the Three Stream and Water Body Protection Categories<sup>1</sup> (page 2)**

Guidelines	A: Standard	B: Important Permanent Streams	C: Unique Water Habitats
<p><b>3.</b> <b>Cutting Trees</b></p>	<ul style="list-style-type: none"> <li>• Cutting of trees within streamside management zones (SMZs) must be accomplished by using either hand-held equipment or other appropriate clearing equipment (e.g., a feller-buncher) that would result in minimal soil disturbance and damage to low-lying vegetation. The method will be selected based on site-specific conditions and topography to minimize soil disturbance and impacts to the SMZ and surrounding area.</li> <li>• Stumps can be cut close to ground level, but must not be removed or uprooted.</li> </ul>	<ul style="list-style-type: none"> <li>• Cutting of trees within SMZs must be accomplished by using either hand-held equipment or other appropriate clearing equipment (e.g., a feller-buncher) that would result in minimal soil disturbance and damage to low-lying vegetation. The method will be selected based on site-specific conditions and topography to minimize soil disturbance and impacts to the SMZ and surrounding area.</li> <li>• Cutting of trees near permanent streams must be limited to those meeting National Electrical Safety Code (NESC) and danger tree requirements.</li> <li>• Stumps can be cut close to ground level, but must not be removed or uprooted.</li> </ul>	<ul style="list-style-type: none"> <li>• Cutting of trees within SMZs must be accomplished by using either hand-held equipment or other appropriate clearing equipment (e.g., a feller-buncher) that would result in minimal soil disturbance and damage to low-lying vegetation. The method will be selected based on site-specific conditions and topography to minimize soil disturbance and impacts to the SMZ and surrounding area.</li> <li>• Cutting of trees near permanent streams must be limited to those meeting NESC, Federal Energy Regulatory Commission standards, and danger tree requirements.</li> <li>• Stumps can be cut close to ground level, but must not be removed or uprooted.</li> </ul>
<p><b>4.</b> <b>Other Vegetation</b></p>	<ul style="list-style-type: none"> <li>• Other vegetation near streams must be disturbed as little as possible during construction.</li> <li>• Soil displacement as a result of clearing operations by the actions of plowing, disking, blading, or other tillage or grading equipment will be minimized in SMZs.</li> <li>• Shorelines that have to be disturbed must be stabilized as soon as feasible.</li> </ul>	<ul style="list-style-type: none"> <li>• Other vegetation near streams must be disturbed as little as possible during construction.</li> <li>• Soil displacement by the actions of plowing, disking, blading, or other tillage or grading equipment will be minimized in SMZs.</li> <li>• Shorelines that have to be disturbed must be stabilized as soon as possible and revegetated as soon as feasible.</li> </ul>	<ul style="list-style-type: none"> <li>• Other vegetation near the unique habitat must be disturbed as little as possible during construction.</li> <li>• The soil disturbance by plowing, disking, blading, or grading must be kept at a minimum.</li> <li>• Areas that have to be disturbed must be stabilized as soon as possible and revegetated as soon as feasible. Special SMZ requirements will be coordinated with Environmental Biological Compliance staff.</li> </ul>

<sup>1</sup>Source: *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities (Muncy 2012)*

**Appendix E – Energy Delivery Environmental Protection  
Procedures  
Right-of-Way Vegetation Management Guidelines**

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## **Energy Delivery 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 re-clearing 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 Methods**

- 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 may utilize mechanical mowing.
- B. TVA uses a variety of herbicides specific to the species present with a variety of possible application techniques. TVA utilizes control methods, including use of low volume herbicide applications, occasional single tree injections, and tree growth regulators (TGRs) to a large extent.
- C. In very steep terrain, in sensitive environmental areas, in extensive wetlands, at stream banks, and in sensitive property owner land use areas, hand clearing may be utilized. Hand clearing is recognized as one of the most hazardous occupations documented by the Occupational Health and Safety Administration. For that reason, TVA utilizes low volume herbicide applications in these areas when feasible.
- D. TVA does not encourage tree re-clearing by individual property owners because of the high hazard potential of hand clearing, possible interruptions of the line, and

electrical safety considerations for untrained personnel that might do the work. Private property owners may re-clear the right-of-way with trained re-clearing 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 re-sprout from the root crown and shattered stumps can produce a multi-stem dense stand in the immediate area. Repeated use of mowers on short cycle re-clearing with many original stumps re-growing in the above manner can create a single species thicket or monoculture. With the original large root system and multiple stems, the resistant species can produce re-growth at the rate of 5-10 feet in a year. In years with high rainfall, the growth can reach 12-15 feet in a single year. These dense, monoculture stands can become nearly impenetrable for even large tractors. Such stands have low diversity, little wildlife food or nesting potential, and become a property owner concern. Selective herbicide application may be used to control monoculture stands.
- F. TVA encourages property owners to sign an agreement to manage 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 (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 TVA rights-of-way. Table 2 identifies pre-emergent herbicides currently being 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, e.g., restrictions on complete removal. The rates of application

utilized are those listed on the U.S. Environmental Protection Agency (USEPA) approved label and consistent with utility standard practice throughout the Southeast.

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

<b>Trade Name</b>	<b>Active Ingredient</b>	<b>Label Signal Word</b>
Accord/Accord XRT II	Glyphosate/Liquid	Caution
Arsenal	Imazapyr/Liquid/Granule	Caution
Chopper	Imazapyr/RTU	Caution
Clearstand	Imazapyr/Metsulfuron Methyl/Liquid	Caution
Escort	Metsulfuron Methyl/Dry Flowable	Caution
Garlon	Triclopyr/Liquid	Caution
Garlon 3A	Triclopyr/Liquid	Danger
Habitat	Imazapyr/Liquid	Caution
Krenite S	Fosamine Ammonium	Caution
Milestone VM	Aminopyralid/Liquid	Caution
Pathfinder II	Triclopyr/RTU	Caution
Rodeo	Glyphosate/Liquid	Caution
Roundup	Glyphosate/Liquid	Caution
Roundup Pro	Glyphosate	Caution
Streamline	Aminocyclopyrachlor/Metsulfuron Methyl/Liquid	Caution
Transline	Clopyralid/Liquid	Caution
Viewpoint	Imazapyr/Aminocyclopyrachlor/Metsulfuron Methyl/Liquid	Caution

Table 2 - Pre-Emergent Herbicides Currently Used for Bare Ground Areas On TVA Rights-of-Way

<b>Trade Name</b>	<b>Active Ingredients</b>	<b>Label Signal Word</b>
Arsenal 5G	Imazapyr/Granule	Caution
Sahara	Diuron/Imazapyr	Caution
SpraKil SK-26	Tebuthiuron/Diuron/Granules	Caution
SpraKil S-5	Tebuthiuron/Granules	Caution
Topsite	Diuron/Imazapyr	Caution

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

Trade Name	Active Ingredients	Label Signal Word
Profile 2SC	TGR-paclobutrazol	Caution
TGR	Flurprimidol	Caution

- B. The herbicides listed in Table 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 around with a better mix of food species and associated high-protein insect populations for birds in the right seasons. Most also report less damage to soils (even when compared with rubber-tired equipment).
- 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 2012) 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, 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 done either by TVA or by contractors in accordance with the following guidelines identified in the TVA BMP manual (Muncy 2012):
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 (SMZ) 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 uses primarily low volume applications of foliar and basal applications, e.g., Accord (Glyphosate), Arsenal (Imazapyr), Clearstand (Imazapyr /

Metsulfuron Methyl), Milestone VM (Aminopyralid) and Streamline (Aminocyclopyrachlor / Metsulfuron Methyl).

#### 4.0 References

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**Appendix F – List of Scientific Names**

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## Animals

Common Name	Scientific Name
Acadian flycatcher	<i>Empidonax virescens</i>
Allegheney woodrat	<i>Neotoma magister</i>
American beaver	<i>Castor canadensis</i>
American bullfrog	<i>Lithobates catesbeiana</i>
American goldfinch	<i>Spinus tristis</i>
American robin	<i>Turdus migratorius</i>
Anthony's river snail	<i>Athearnia anthonyi</i>
Armored rocksnail	<i>Lithasia armigera</i>
Bald eagle	<i>Haliaeetus leucocephalus</i>
Barking treefrog	<i>Hyla gratiosa</i>
Barred owl	<i>Strix varia</i>
(American) beaver	<i>Castor canadensis</i>
Big brown bat	<i>Eptesicus fuscus</i>
Bobcat	<i>Lynx rufus</i>
Canada goose	<i>Branta canadensis</i>
Carolina chickadee	<i>Poecile carolinensis</i>
Carolina wren	<i>Thryothorus ludovicianus</i>
Common (or eastern) mole	<i>Scalopus aquaticus</i>
Common night-hawk	<i>Chordeiles minor</i>
Common raven	<i>Corvus corax</i>
Corpulent hornsnail	<i>Pleurocera corpulenta</i>
Cottonmouth	<i>Agkistrodon piscivorus</i>
Coyote	<i>Canis latrans</i>
Dromedary pearlymussel	<i>Dromas dromas</i>
Eastern box turtle	<i>Terrapene 153arolina carolina</i>
Eastern gray squirrel	<i>Sciurus carolinensis</i>
Eastern kingbird	<i>Tyrannus tyrannus</i>
Eastern meadowlark	<i>Stumella magna</i>
Eastern phoebe	<i>Sayornis phoebe</i>
Eastern red-spotted newt	<i>Notophthalmus viridescens</i>
Eastern towhee	<i>Pipilo erythrophthalmus</i>
Eastern tufted titmouse	<i>Baeolophus bicolor</i>
Fanshell (mussel)	<i>Cyprogenia stegaria</i>
Fence lizard	<i>Sceloporus undulatus</i>
Flame chub	<i>Hemitremia flammea</i>
Five-lined skink	<i>Plestiodon fasciatus</i>
Gartersnake	<i>Thamnophis sirtalis</i>
Golden darter	<i>Eteostoma denoncourti</i>
Gray bat	<i>Myotis grisescens</i>
Gray treefrog	<i>Hyla versicolor</i>
Great horned owl	<i>Bubo virginianus</i>
Groundhog	<i>Marmota monax</i>
Hairy woodpecker	<i>Picoides villosus</i>

<b>Common Name</b>	<b>Scientific Name</b>
Hickorynut (mussel)	<i>Obovaria olivaria</i>
Highfin carpsucker	<i>Carpoides velifer</i>
Hispid cotton rat	<i>Sigmodon hispidus</i>
Hoary bat	<i>Lasiurus cinereus</i>
Indiana bat	<i>Myotis sodalis</i>
Indigo bunting	<i>Passerina cyanea</i>
Kidneyshell (mussel)	<i>Ptychobranthus fasciolaris</i>
Killdeer	<i>Charadrius vociferus</i>
Least shrew	<i>Cryptotis parva</i>
Little brown bat	<i>Myotis lucifugus</i>
Loggerhead shrike	<i>Lanius ludovicianus</i>
Louisiana waterthrush	<i>Parlesia motacilla</i>
Marbled salamander	<i>Ambystoma opacum</i>
Northern long-eared bat	<i>Myotis septentrionalis</i>
Northern cricket frog	<i>Acris crepitans</i>
Northern flicker	<i>Colaptes auratus</i>
Northern mockingbird	<i>Mimus polyglottos</i>
Northern pinesnake	<i>Pituophis melanoleucus melanoleucus</i>
Northern watersnake	<i>Nerodia sipedon</i>
Orange-footed pimpleback (mussel)	<i>Plethobasus cooperianus</i>
Owen Spring limnephilid caddisfly	<i>Glyphopsyche sequatchie</i>
Pale liliput (mussel)	<i>Toxoplasma cylindrellus</i>
Pileated woodpecker	<i>Dryocopus pileatus</i>
Pink mucket (mussel)	<i>Lampsilis abrupta</i>
Prothonotary warbler	<i>Protonotaria citrea</i>
Raccoon	<i>Procyon lotor</i>
Rat snake	<i>Pantherophis obsoletus</i>
Red-bellied woodpecker	<i>Melanerpes carolinus</i>
Red-eyed vireo	<i>Vireo olivaceus</i>
Red-tailed hawk	<i>Buteo jamaicensis</i>
Red-winged blackbird	<i>Agelaius phoeniceus</i>
Red fox	<i>Vulpes vulpes</i>
Ring-necked snake	<i>Diadophis punctatus</i>
Ring pink (mussel)	<i>Obovaria refusa</i>
Rough pigtoe (mussel)	<i>Pleurobema plenum</i>
Royal marstonia (snail)	<i>Pyrgulopsis ogmorhappe</i>
Ruby-crowned kinglet	<i>Regulus calendula</i>
Ruby-throated hummingbird	<i>Archilochus colubris</i>
Silver-haired bat	<i>Lasionycteris noctivagans</i>
Slabside pearlymussel	<i>Lexingtonia dolabelloides</i>
Slimy salamander	<i>Plethodon glutinosus</i>
Smooth mudalia (snail)	<i>Leptoxis virgata</i>
Smooth rabbitsfoot (mussel)	<i>Quadrula cylindrical cylindrical</i>

Common Name	Scientific Name
Snail darter	<i>Percina tanasi</i>
Snuffbox (mussel)	<i>Epioblasma triquetra</i>
Southern leopard frog	<i>Lithobates sphenoccephalus</i>
Spectaclecase (mussel)	<i>Cumberlandia monodonta</i>
Spiny riversnail	<i>Io fluviialis</i>
Spotted salamander	<i>Ambystoma maculatum</i>
Striped skunk	<i>Mephitis mephitis</i>
Tennessee heelsplitter (mussel)	<i>Lasmigona holstonia</i>
Tricolored bat (or eastern pipestrelle)	<i>Perimyotis subflavus</i>
Upland chorus frog	<i>Pseudacris feriarum</i>
Varicose rocksnail	<i>Lithasia verrucosa</i>
Virginia opossum	<i>Didelphis marsupialis</i>
Warty rocksnail	<i>Lithasia lima</i>
White-breasted nuthatch	<i>Sitta carolinensis</i>
White-footed mouse	<i>Peromyscus leucopus</i>
White-tailed deer	<i>Odocoileus virginianus</i>
Wood frog	<i>Rana sylvatica</i>
Yellow-bellied sapsucker	<i>Sphyrapicus varius</i>
Yellow-billed cuckoo	<i>Coccyzus americanus</i>

### Plants

Common Name	Scientific Name
American beech	<i>Fagus grandifolia</i>
American elm	<i>Ulmus americana</i>
American hart's-tongue fern	<i>Asplenium scopopendrium</i> var. <i>americanum</i>
Annual ivy	<i>Iva annua</i>
Aster	<i>Symphytotrichum</i> sp.
Barnyard grass	<i>Echinochloa crus-galli</i>
Black oak	<i>Quercus velutina</i>
Black willow	<i>Salix nigra</i>
Box elder	<i>Acer negundo</i>
Bulrush	<i>Scirpus cyperinus</i>
Buttercup	<i>Ranunculus</i> spp.
Callery pear	<i>Pyrus calleryana</i>
Cherrybark oak	<i>Quercus pagoda</i>
Chinese lespedeza	<i>Lespedeza cuneata</i>
Chinese privet	<i>Ligustrum sinense</i>
Corn	<i>Zea mays</i>
Crabgrass	<i>Digitaria sanguinalis</i>
Eastern swampprivet	<i>Forestiera acuminata</i>

Common Name	Scientific Name
Featherfoil	<i>Hottonia inflata</i>
Flatsedge	<i>Cyperus strigosus</i>
Great Plain ladies'-tresses	<i>Spiranthes magnicamporum</i>
Green ash	<i>Fraxinus pennsylvanica</i>
Hairy false gromwell	<i>Onosmodium hispidissimum</i>
Hairy white oldfield aster	<i>Symphyotrichum pilosum</i> var. <i>pilosum</i>
Hickory	<i>Carya tomentosa</i>
Honeylocust	<i>Gleditsia triacanthos</i>
Japanese honeysuckle	<i>Lonicera japonica</i>
Japanese stiltgrass	<i>Microstegium vimineum</i>
John Beck's leafcup	<i>Polymnia johnbeckii</i>
Johnsongrass	<i>Sorghum halepense</i>
Lance-leaf trillium	<i>Trillium lancifolium</i>
Large-flowered skullcap	<i>Scutellaria montana</i>
Lizard's tail	<i>Saururus cernuus</i>
Loblolly pine	<i>Pinus taeda</i>
Michigan lily	<i>Lilium michiganse</i>
Monkey-face orchid	<i>Platanthera integrilabia</i>
Nevius' stonecrop	<i>Sedum nevii</i>
Oak	<i>Quercus</i> spp.
Overcup oak	<i>Quercus lyrata</i>
Pathrush	<i>Juncus effusus</i>
Price's potato bean	<i>Apios priceana</i>
Ragweed	<i>Ambrosia artemesiifolia</i>
Red maple	<i>Acer rubrum</i>
Redtop panic grass	<i>Panicum rigidulum</i>
Royal catchfly	<i>Silene regia</i>
Rush	<i>Juncus</i> spp.
Sedge	<i>Carex</i> spp.
Sericea lespedeza	<i>Lespedeza cuneata</i>
Shagbark hickory	<i>Carya ovata</i>
Silver maple	<i>Acer saccharinum</i>
Slender blazing-star	<i>Liatris cylindracea</i>
Smartweed	<i>Polygonum</i> spp.
Soybean	<i>Glycine max</i>
Spikerush	<i>Eleocharis obtusa</i>
Spreading rockcress	<i>Arabis patens</i>
Sugarberry	<i>Celtis laevigata</i>
Swamp chestnut oak	<i>Quercus michauxii</i>
Sweetgum	<i>Liquidambar styraciflua</i>
Switchcane	<i>Arundinaria gigantea</i>

Common Name	Scientific Name
Tall fescue	<i>Festuca arundinacea</i>
Tall goldenrod	<i>Solidago altissima</i>
Three-parted violet	<i>Viola tripartitae</i> var. <i>tripartita</i>
Trumpet vine	<i>Campsis radicans</i>
Virginia sweetspire	<i>Itea virginica</i>
Wheat	<i>Triticum</i> spp.
Whitegrass	<i>Leersia virginiana</i>
White oak	<i>Quercus alba</i>
Willow oak	<i>Quercus phellos</i>

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**Appendix G – Noise During Transmission Line and Substation  
Construction and Operation**

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## Noise During Transmission Line and Substation Construction and Operation

At high levels, noise can cause hearing loss; at moderate levels, noise can interfere with communication, disrupt sleep, and cause stress; and at low levels, noise can cause annoyance. Noise is measured in decibels (dB), a logarithmic unit, so an increase of 3 dB is just noticeable, and an increase of 10 dB is perceived as a doubling of sound level. Because not all noise frequencies are perceptible to the human ear, A-weighted decibels (dBA), which filter out sound in frequencies above and below human hearing, are typically used in noise assessments.

Both the U.S. Environmental Protection Agency (USEPA) and the Department of Housing and Urban Development (HUD) have established noise guidelines. USEPA guidelines are based on an equivalent day/night average sound level (DNL), which is a 24-hour average sound level with 10 dB added to hours between 10 p.m. and 7 a.m., since people are more sensitive to nighttime noise. USEPA recommends a guideline of DNL less than 55 dBA to protect the health and well-being of the public with an adequate margin of safety. HUD guidelines use an upper limit DNL of 65 dBA for acceptable residential development and an upper limit DNL of 75 dBA for acceptable commercial development. TVA generally uses the USEPA guideline of 55 dBA DNL at the nearest residence and 65 dBA at the property line in industrial areas to assess the noise impact of a project. In addition, TVA gives consideration to the Federal Interagency Committee on Noise (FICON) 1992 recommendation that a 3-dB increase indicates possible impact, requiring further analysis when the existing DNL is 65 dBA or less.

Annoyance from noise is highly subjective. The FICON used population surveys to correlate annoyance and noise exposure (FICON 1992). Table J-1 gives estimates of the percentage of typical residential populations that would be highly annoyed from a range of background noise and the average community reaction description that would be expected.

**Table J-1. Estimated Annoyance From Background Noise (FICON 1992)**

Day/Night Level (dBA)	Percent Highly Annoyed	Average Community Reaction
75 and above	37	Very severe
70	25	Severe
65	15	Significant
60	9	Moderate
55 and below	4	Slight

For comparative purposes, typical background DNLs for rural areas range from about 40 dBA in undeveloped areas to 48 dBA in mixed residential/agricultural areas (Cowan 1993). Noise levels are typically higher in higher-density residential and urban areas. Background noise levels greater than 65 dBA can interfere with normal conversations, requiring people to speak in a raised voice in order to carry on a normal conversation.

### Construction Noise

Construction noise impacts would vary with the number and specific types of equipment on the job, the construction methods, the scheduling of the work, and the distance to sensitive noise receptors such as houses. Typical construction activities for a substation and a transmission line are described in Section 2.2. Maximum noise levels generated by the various pieces of

construction equipment typically range from about 70 to 85 dBA at 50 feet (Bolt et al. 1971). An exception would be the use of track drills for building roads and installing foundations in rocky areas; track drills have a typical maximum noise level of 98 dBA at 50 feet. Use of track drills is not expected to be widespread.

Project-related construction noise levels would likely exceed background noise levels by more than 10 dBA at distances from within 500 feet in developed areas to over 1,000 feet in rural areas with little development. These distances are without the use of track drills; drilling activities could increase the distances by an additional 500 feet. A 10-dBA increase would be perceived as a large increase over the existing noise level and could result in annoyance to adjacent residents. The residential noise level guideline of 55 dBA could also be temporarily exceeded for residences near construction activities.

Construction activities would be limited to daylight hours. Because of the sequence of construction activities, construction noise at a given point along the transmission line connections would be limited to a few periods of a few days each. Construction of the substation would take longer, although it would still be limited in duration. The temporary nature of construction would reduce the duration of noise impacts on nearby residents.

### **Operational Noise**

Transmission lines and substations can produce noise from corona discharge, which is the electrical breakdown of air into charged particles. Corona noise is composed of both broadband noise, characterized as a crackling noise, and pure tones, characterized as a humming noise. Corona noise is greater with increased voltage and is also affected by weather. It occurs during all types of weather when air ionizes near irregularities, such as nicks, scrapes, dirt, and insects on the conductors. During dry weather, the noise level is low and often indistinguishable off the ROW from background noise. In wet conditions, water drops collecting on the conductors can cause louder corona discharges.

For 500-kV transmission lines, this corona noise when present, is usually about 40-55 dBA. The maximum recorded corona noise has been 60-61 dBA (TVA unpublished data). During rain showers, the corona noise would likely not be readily distinguishable from background noise. During very moist, nonrainy conditions, such as heavy fog, the resulting small increase in the background noise levels is not expected to result in annoyance to adjacent residents. The substation would also produce similar levels of noise from corona discharge, although it is not expected to cause annoyance to nearby residents.

Transformers at the substation would generally operate in self-cooled mode; although a few days a year during extreme temperatures, transformers would operate in fan-cooled mode. When fans are used, they would generate approximately 85 dB at 3 feet. This is not expected to be audible over background noise at nearby residences.

The substation would produce a loud impulse noise when a breaker is tripped due to excessive current, high voltage, low voltage, low frequency, or other less common problems. When such problems occur, the circuit breaker opens to disconnect part of the system, and the flow of current is interrupted. The noise from the breaker is expected to last 1/20 of a second and range from 96 to 105 dB at 50 feet. Breaker noise would be quite loud, although it is only expected to occur about 18 times each year. Breaker noise may be audible to nearby residents. However, because of the infrequent occurrence, it would not result in a significant impact.

Periodic maintenance activities, particularly vegetation management, would produce noise comparable to that of some phases of transmission line construction. This noise, particularly from bush-hogging or helicopter operation, would be loud enough to cause some annoyance. It would, however, be of very short duration and very infrequent occurrence.

**Literature Cited**

Bolt, Beranek, and Newman Inc. 1971. *Noise From Construction Equipment and Operation, Building Equipment, and Home Appliances*. U.S. Environmental Protection Agency Report NTID300.1.

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