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ENVIRONMENTAL ASSESSMENT

COLUMBUS AIR FORCE BASE 161-KV SUBSTATION AND TAP FROM WEST POINT-LOWNDES 161-KV TRANSMISSION LINE

Lowndes County, Mississippi

TENNESSEE VALLEY AUTHORITY
COLUMBUS AIR FORCE BASE

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CHAPTER 1

1. PURPOSE OF AND NEED FOR ACTION

1.1. Proposed Action: Improve Power Supply to Columbus Air Force Base

The Tennessee Valley Authority's (TVA) proposes to construct a new 161/13-kilovolt (kV) substation just outside the Columbus Air Force Base (CAFB) and near its existing CAFB 46/13-kV substation. In addition, TVA would construct approximately 3.2 miles of new 161-kV transmission line to connect the new substation to TVA's existing West Point-Lowndes 161-kV transmission line by summer 2006 (Figure 1-1).

1.2. Need

TVA supplies electricity to the local electrical distributor 4-County Electric Power Association (EPA) and to CAFB. 4-County EPA and CAFB jointly take delivery of this power at TVA's CAFB 46/13-kV substation. The existing substation is supplied by the 20.7 mile long West Point-CAFB 46-kV transmission line. This line also serves 4-County EPA's Bent Tree Substation located 5 miles south of CAFB.

TVA's load studies indicate that this line is approaching its capacity, and 4-County EPA has confirmed that their increasing electrical demand will likely cause the line to experience overload conditions as early as summer 2006. The power demand by CAFB is not expected to increase substantially from its historical maximum 9,000 to 10,000 kilowatt (kW) usage in the near future and will remain well below its contracted maximum of 15,000 kW for several years.

In addition to the overload conditions projected for the existing 46-kV transmission line serving 4-County EPA and CAFB in the near future, the base is expected to soon experience increasing reliability problems. TVA continuously monitors its transmission system in order to detect possible existing or developing reliability problems. Out of 814 customers, CAFB ranks 19th worst for load not served, 17th worst for number of interruptions, and 3rd worst for duration of outages.

A previous project developed by TVA and Regenesys Ltd. was intended to address some of these problems by providing an energy storage/uninterruptible power supply facility for CAFB. For a number of reasons, construction of the Regenesys facility was ended, prior to its completion, in 2002. In early 2005, TVA determined that completion of the Regenesys facility, or its conversion into a different type of energy storage facility, is not feasible. Thus an energy storage facility will not be available to address CAFB reliability and associated power quality problems. Another need is to make effective use of the Regenesys facility site now that TVA has decided not to use that site for an energy storage facility.

1.3. Objectives of the Proposed Action

To improve the power reliability and quality needs at CAFB and capacity problems at 4-County EPA, TVA proposes to provide a new 161/13-kV connection to CAFB by constructing a new substation and a new 161-kV transmission line connection to the new

substation. The substation would be located on the site of TVA's recently abandoned Regenesys facility on the south side of CAFB property.

Objectives of these activities are to improve reliability, capacity, and quality of the power supply for CAFB and 4-County EPA at the CAFB Substation. The proposed new 161-kV transmission line would be the primary power supply for CAFB and the existing 46-kV line would serve as a backup supply.

1.4. Decisions To Be Made

TVA must decide whether and where to construct the new substation and whether and where to build a new 161-kV transmission line to improve the electrical service in the 4-County EPA service area. This is described in detail in Sections 2.1.2 and 2.3.

Columbus Air Force Base must decide whether to grant TVA the property rights for those portions of the base where part of the proposed transmission line would be located.

The U.S. Army Corps of Engineers (USACE) has granted TVA the necessary land rights for the part of the proposed transmission line that would be located on Corps property.

1.5. Other Pertinent Environmental Reviews or Documentation

Tennessee Valley Authority. 2001. The Regenesys Energy Storage System – Environmental Assessment and Finding of No Significant Impact. Tennessee Valley Authority, Muscle Shoals, AL. This Environmental Assessment (EA) describes environmental conditions in the vicinity of the proposed substation upgrade site and the portion of the proposed transmission line on Columbus AFB property. It also provides further discussion of the need for power supply improvements at Columbus AFB. The partially completed Regenesys facility is located off the base and its construction did not affect environmental conditions on the base.

Tennessee Valley Authority. 2004. Environmental Baseline Survey – Lowndes-West Point 161-kV Transmission Line Tap to Columbus Air Force Base. Tennessee Valley Authority, Muscle Shoals, AL. This report, submitted to Columbus AFB, presents the results of an environmental due diligence evaluation of the proposed substation upgrade site and the portion of the proposed transmission line on Columbus AFB property.

1.6. Scoping and Public Involvement

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

- U.S. Air Force – Columbus Air Force Base
- U.S. Army Corps of Engineers
- Mississippi Department of Archives and History
- Weyerhaeuser Corporation

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

1.7. Necessary Permits or Licenses

A permit would be required from the state of Mississippi for construction site storm water discharge for the transmission line construction. TVA's Transmission Construction organization would prepare the required erosion and sedimentation control plans and

coordinate them with the appropriate state and local authorities. A permit would also be required for burning trees and other combustible materials removed during transmission line construction. No burning of trees would occur on CAFB property.

The USACE has determined that a Section 404 permit for the construction activities in wetlands would not be required (see Appendix I).

CHAPTER 2

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1. Alternatives

2.1.1. Alternative A – The No Action Alternative

TVA would not construct a new transmission line or a new substation. While this alternative may appear economically attractive, it would allow the identified reliability and overloading problems to escalate and potentially result in equipment failure and/or a complete loss of service at CAFB.

2.1.2. Alternative B – Construct 161-kV Delivery Point and 161-kV Substation

TVA would construct a transmission line connection from its West Point-Lowndes 161-kV transmission line to the new substation. The new transmission line would be approximately 3.2 miles long and occupy a right-of-way (ROW) with a width of 100 feet and an area of approximately 38 acres. TVA would also construct a new 161-kV substation. In addition to this work, TVA would upgrade communications facilities at its West Point 500-kV and Columbus 161-kV substations, and update the mapboard at the System Operation Center in Chattanooga.

The West Point-Lowndes line is located about 3 miles from the proposed substation site at its closest point, and runs outside the northern and western perimeter of CAFB property. Since the proposed substation is just outside the southern entrance to CAFB, transmission line routes connecting to the West Point-Lowndes line are limited by the need to keep tall structures out of the glide path of the base airfield. However, initial siting studies indicated that there are few other constraints to prevent developing a practical transmission line route from the West Point-Lowndes 161-kV line to the proposed substation.

A new 161-kV transmission line connection would allow the existing 46-kV transmission line serving the existing CAFB substation to remain in place as a backup power supply. These two connections would each have the advantage of not being co-located with other facilities (as with double circuit lines, for example) further reducing risks that all sources would be lost simultaneously.

2.2. Alternatives Eliminated From Detailed Study

2.2.1. Upgrade Existing 46-kV Facilities

The existing 46-kV facilities are inadequate for serving future load increases projected by 4-County EPA. In order to provide adequate service, the existing 46-kV transmission line from West Point, Mississippi to CAFB would need to be upgraded for higher capacity. The age of the wooden structures and their observed deteriorating condition eliminate the option of upgrading the capacity of this line by simply re-tensioning the existing conductors for a higher operating temperature.

The conductors installed on the West Point-Columbus transmission line would need to be replaced with larger conductors to provide the necessary current carrying capability. The

existing structures are not adequate for the weight of larger conductors making structure replacement necessary as well.

Total cost for a complete rebuild would be prohibitive due to the long length of transmission line (almost 21 miles). The long length of the West Point-Columbus 46-kV transmission line also poses reliability issues due to a lack of a backup power supply for the CAFB electrical load. The long single source line is less preferable when reliability is the primary driver for improvement. As a result of these issues, this alternative was deemed unreasonable and eliminated from further consideration.

2.2.2. Remove 46-kV Transmission Line and Build New 161-kV Line from West Point

A rebuild of the West Point-Columbus AFB 46-kV line would more likely be completed for 161-kV operation, rather than 46-kV operation, to provide for future load growth. This option would take advantage of existing easement, and provide the needed capacity increases. It would also require the construction of a 161-kV substation.

This option would necessitate building nearly 21 miles of new 161-kV transmission line. This would be a very large investment that would still have the problems associated with long radial transmission lines. It would not provide any backup capability, although reliability should be improved by having all new structures and associated equipment. Ultimately, this option could provide some relief from the current power supply problems, but it is an expensive and incomplete solution. Providing a second source of electricity would still be required to adequately address area reliability needs. Thus, this alternative would not meet the identified need and was considered unreasonable.

2.2.3. Provide a New 161-kV Line Connection from Lowndes-Columbus 161-kV Transmission Line

TVA would construct a 161-kV transmission line connection from its Lowndes-Columbus 161-kV transmission line to the proposed new substation.

The Lowndes-Columbus 161-kV transmission line is located east of the proposed substation site and is over 7 miles away at its closest approach. In addition, the “straight line” path would route the new 161-kV transmission line directly through an area governed by Air Force glide path restrictions. This would make a realistic transmission line route at least 10 miles long.

The Lowndes-Columbus 161-kV line could provide an acceptable source, but has no additional benefits electrically over the West Point-Lowndes 161-kV line which is closer to the proposed substation. In addition, because the line would likely be almost 7 miles longer than the shortest alternative, land use impacts, landowner concerns, cost and overall project footprint would be greater; environmental impacts could also be greater. For these reasons, this alternative was eliminated from further study.

2.2.4. Provide a New 161-kV Line Connection from West Point-Columbus No.2 161-kV Transmission Line

TVA would construct a new 161-kV transmission line connection from its West Point-Columbus No. 2 161-kV line to the proposed new substation.

The West Point-Columbus No. 2 line is located approximately 7 miles west of the proposed substation site at its closest approach. Initial siting studies indicate a practical line route would be about 9 miles long due to known constraints. Air Force glide path restrictions would be of little concern since the route could stay outside the restricted area. As a 161-kV source, the West Point-Columbus No. 2 line is already well utilized with two direct serve customer connections.

The West Point-Columbus No. 2 161-kV line could provide an acceptable source, but has no additional benefits electrically over the West Point-Lowndes 161-kV line which is significantly closer to the proposed new substation. In addition, land use impacts, land owner concerns, environmental issues, cost and overall project footprint would increase as a result of the longer new transmission line route. Finally, this route would cross the Tennessee-Tombigbee Waterway, which would require a special permit. Subsequently, this alternative was eliminated from further study.

2.3. Description of Construction, Operation, and Management of the Proposed 161-kV Transmission Line and Substation

2.3.1. Transmission Line Construction

2.3.1.1. Structures and Conductors

The proposed transmission line would utilize mostly H-frame steel-pole structures (Figure 2-1). Their structure height varies according to the terrain and would average between 80 to 90 feet above ground. Use of single steel pole structures would have resulted in a greater number of structures as well taller structures (at least 15 feet higher)

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

Figure 2-1. H-frame 161-kV transmission structure.

Poles at angles in the transmission line may require supporting guys. Some structures for larger angles could require two or three poles. Most poles would be directly imbedded in holes augured into the ground to a depth equal to 10 percent of the pole's length plus an additional 2 feet. The holes would normally be back-filled with the excavated material. In some cases gravel or a cement and gravel mixture might be used. Some structures may be self-supporting (non-guyed) poles fastened to a concrete foundation which is formed and poured into an excavated hole. Switches would be installed at the tap point and placed on laced steel structures on concrete foundations. These switch structures would be about 30 to 40 feet tall.

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

2.3.1.2. Right-of-Way Acquisition and Clearing

New ROW 100-feet wide would be needed for the transmission line, per National Electric Safety Code (NESC) requirements. TVA would purchase easements from landowners for the new ROW on private land. These easements and land give TVA the right to construct, operate, and maintain the transmission line, as well as remove danger trees off the ROW. Danger trees include any trees that are located off the cleared ROW and are tall enough to pass within 5 feet of a conductor or structure should it fall toward the transmission line. Fee title for the land within the ROW would normally remain with the landowner, and a number of activities could be continued on the property by the landowner. The easement would prohibit certain activities such as the construction of buildings and any other activities within the ROW that could interfere with the transmission line or create a hazardous situation.

Because of the need to maintain adequate clearance between tall vegetation and transmission line conductors, as well as to provide access for construction equipment, most trees and shrubs would be initially removed from the entire width of the ROW. Equipment used during this ROW clearing would include chain saws, skidders, bulldozers, and/or low ground pressure feller-bunchers. Marketable timber would be salvaged where feasible; otherwise, woody debris and other vegetation would be piled and burned, chipped, or taken offsite. In some instances, vegetation may be windrowed along the edge of the ROW to serve as sediment barriers. Streamside management zones (SMZs) would be established along intermittent and perennial streams; their width would be based on stream characteristics, slope, soil types, and other factors (see Muncy 199). Vegetation removal in SMZs and wetlands would be restricted to trees tall enough, or with the potential to soon grow tall enough, to interfere with conductors. Clearing in SMZs would be accomplished using hand-held equipment or remote handling equipment, such as a feller-buncher, in order to limit ground disturbance. Right-of-Way Clearing Specifications, Environmental Quality Protection Specifications for Transmission Line Construction, and Guidelines for Transmission Line Construction Near Streams are in Appendices II, III, and IV.

Subsequent to clearing and construction, the ROW would be restored as much as is possible to its state prior to construction. Pasture areas would be reseeded with suitable grasses. Wooded areas would be restored using native grass and other low-growing species. Erosion controls would remain in place until the plant communities were fully established. Streamside areas would be revegetated as described in Appendices II-IV.

2.3.1.3. Access Roads

Permanent access roads would be needed to allow vehicle access to each structure and other points along the ROW. TVA would obtain the necessary rights for these access roads from landowners. Existing roads, including farm and field roads, some of which may need upgrading, would be used for the entire project. No new access roads would be constructed. Applicable environmental quality protection specifications are listed in Appendices II and III.

2.3.1.4. Construction Assembly Areas

A construction assembly area would be required for worker assembly, vehicle parking, and material storage. This area may be on existing substation property or leased from a private landowner for the duration of the construction period. These areas are typically 5 to 10 acres in size, relatively flat, previously cleared, and located adjacent to an existing paved road near the transmission line. Depending on site conditions, some minor grading and installation of drainage structures may be required. The area would be graveled and fenced so that trailers used during the construction process for material storage and office space could be parked at this location. Following the completion of construction activities, all trailers, unused materials, and construction debris would be removed from the site. Removal of the fence and restoration would be at the discretion of the landowner.

2.3.1.5. Conductor and Ground Wire Installation

Reels of conductor and ground wire would be delivered to various staging areas along the ROW, and temporary clearance poles would be installed at road and railroad crossings to reduce interference with traffic. A small rope would be pulled from structure to structure. It would be connected to the conductor and ground wire and used to pull them down the line through pulleys suspended from the insulators. A bulldozer and specialized tensioning equipment would be used to pull conductors and ground wires to the proper tension. Crews would then clamp the wires to the insulators and remove the pulleys.

2.3.2. Substation Construction

The proposed substation would be located on the site of the recently abandoned Regenesys facility. This six acre site is adjacent to and south of the existing CAFB 46-kV substation and a shot distance east of the south base entrance gate (Figure 1-1). An existing conference trailer and several utility poles would be removed from the site. Silt fences would be installed and about 1.8 acres of the site would be graded. A new gravel access road would be built on the north side of the site as the existing access road along the east side of the site is not wide enough to transport the necessary substation equipment. Site drainage structures, as well as oil containment structures at the new transformer, would be installed. Portions of the existing fence would be removed. The substation yard would be covered with crushed stone and enclosed with chain link fencing 7 feet high. The unused portion of the site would be restored as much as possible to its pre-construction state.

The major equipment in the new substation would consist of one 161-13 kV power transformer, one 161-kV disconnect switch, one 161-kV circuit switching device, 13-kV switches, and associated buswork. The equipment would be interconnected with aluminum pipe and copper strand conductors. The 13-kV breaker in the existing 46-kV substation would also be replaced and an electrical connection would be constructed between the two

substations. The conductors and some equipment would be supported on steel structures. Environmental protection measures that would be applied during substation construction are listed in Appendix VI.

2.3.3. Operation and Maintenance

2.3.3.1. Inspection

Periodic inspections of 161-kV transmission lines are performed from the ground and by aerial surveillance using a helicopter. These inspections, which occur on approximately two to three year cycles after operation begins, are conducted to locate damaged conductors, insulators, or structures, and to report any abnormal conditions which might hamper the normal operation of the line or adversely impact the surrounding area. During these inspections, the condition of vegetation within the ROW, as well as immediately adjoining the ROW, is noted. These observations are then used to plan corrective maintenance and routine vegetation management.

2.3.3.2. Vegetation Management

Management of vegetation along the ROW would be necessary to ensure access to structures and to maintain an adequate distance between transmission line conductors and vegetation. For a 161-kV transmission line, National Electric Safety Code standards require a minimum clearance of 24 feet.

Management of vegetation along the ROW would consist of two different activities: felling of danger trees adjacent to the cleared ROW, and control of vegetation within the cleared ROW. Management of vegetation within the cleared ROW would use an integrated vegetation management approach designed to encourage the low-growing plant species and discourage tall-growing plant species. A vegetation reclearing plan would be developed for each transmission line segment based on the results of the periodic inspections described above. The two principal management techniques are mechanical mowing using tractor-mounted rotary mowers and herbicide application. Herbicides are normally applied in areas where heavy growth of woody vegetation is occurring on the ROW and mechanical mowing is not practical. Herbicides would be selectively applied by helicopter or from the ground with backpack sprayers or vehicle mounted sprayers.

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

Other than vegetation management, little other maintenance work would normally be required. The transmission line structures and other components typically last several decades. In the event that a structure must be replaced, the structure would normally be lifted out of the ground by crane-like equipment and the replacement structure inserted into the same hole or an immediately adjacent hole. Access to the structures would be on existing roads where possible. Replacement of structures may require grading the area

surrounding the replaced structures, but there would be little, if any, additional area disturbance compared to the initial installation of the structure.

2.4. Project and Siting Alternatives

Factors affecting the location of the proposed 161-kV substation included availability of land, proximity to the existing 46-kV transmission line and substation serving CAFB, and proximity to a heavy duty all-weather road. These factors limited potential sites to the vicinity of the existing substation and TVA's nearby Regenesys Facility site. Early in the planning of this project while TVA was considering the use of alternative technologies to complete an energy storage facility on the Regenesys site, TVA proposed siting the new substation on CAFB adjacent to the existing substation. CAFB personnel expressed concerns over the visual impacts that would result from selection of this site due to the appearance of the substation and the removal of trees on CAFB for construction of the transmission line connection.

Following TVA's decision in early 2005 to cease work on the energy storage facility, the former Regenesys site became available as a potential substation site. TVA identified this site as its preferred location for the substation because it would require a very short connection to the existing substation, eliminate the need for five 13-kV bays, and require the installation of only one 161-kV transformer while using the existing 46-kV transformer as a backup supply. It would also make effective use of a site that TVA already owns and disturbed when the Regenesys facility was being built. No other possible substation site in the area has these positive attributes or would be better environmentally.

Once the preferred substation site was identified, TVA used the following process to identify a transmission line route:

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

2.4.1. Definition of Study Area

The first task in defining the study area was to identify the power sources that could supply the identified need. As previously discussed, the most practical power source was the West Point-Lowndes 161-kV Transmission Line located north and west of the proposed substation site. Therefore, based on this location, the study area was defined as an area that encompasses approximately 20.3 square miles or 13,000 acres and is located entirely within Lowndes County (Figure 2-2) on the Columbus North, MS and Hamilton, MS 7.5 minute quadrangle maps. The study area boundary is limited to the West Point-Lowndes line to the north and west, and CAFB to the south and east.

A geographic information system (GIS) based routing map and color orthophotography were developed. The GIS data was used during the routing process to identify obvious routing conflicts or sensitive areas including, but not limited to, houses, rivers, historical sites, and wetlands (Figure 2-2). Following is a brief description of other aspects of the study area.

- Natural and Cultural Features: The study area is primarily a flat to rolling lowland area used for agriculture, forestry, and gravel mining. Most of the study area lies within a floodplain and contains many wetland areas. Minimizing impacts to the wetlands was a primary consideration for transmission line routing. The Tennessee-Tombigbee Waterway is located on the western edge of the study area.

Figure 2-1. The project study area and potential routes for the transmission line connection to the West Point-Lowndes 161-kV transmission line.

- Land Use: The majority of the land within the study area is used for agriculture and forestry. The study area currently consists of a combination of agricultural fields, pasturelands, old fields, and forests of various ages. There are several tracts of forested bottomland in the study area, mostly along the Tennessee-Tombigbee Waterway and the southwestern edge of Columbus AFB. Weyerhaeuser Corporation and Columbus AFB property encompass most of the study area. The USACE also owns a tract of land in the western part of the study area.
- Transportation: Major transportation routes in the study area include U.S. Highway 45, Highway 373, Air Base Road, and Barton Ferry Road.

2.4.2. Collect Data

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

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

The siting team used GIS to analyze multiple factors when defining and comparing alternative routes. GIS displays and analyzes multiple layers of information simultaneously using geographically referenced digital information. A 1:100,000 GIS database was developed and used for regional opportunity and constraint analysis, while a 1:24,000 database was developed for more complex computations such as acreage of wetlands and percent slope.

2.4.3. Develop Route Corridor Options

Based on the data described above, two potential route corridors were developed. The corridor options were greatly limited by the following considerations:

- Columbus AFB runway orientation and glide path restrictions
- West Point-Lowndes 161-kV line runs largely on the north side of the base, with possible tap connection locations being limited to areas east or west of the base
- Substation site is near the center of the southern border of the base
- Aerial photos indicate large areas of standing water in the area
- The area east of the substation is more developed
- The area west of the substation is less developed but with denser vegetation cover, and

- Preliminary data suggest much of study area is in the floodplain of the Tennessee-Tombigbee Waterway.

Western Corridor A western corridor would connect to the West Point-Lowndes 161-kV line just east of the Tennessee-Tombigbee Waterway, and then continue eastward until reaching a point outside the Columbus AFB perimeter. It would then turn southeast to continue along the perimeter of the base, until reaching the section line between the Hamilton and Columbus North quadrangle maps. The corridor would then turn and continue due east to the substation site. This corridor would be about 3 miles in length.

The connection options to the West Point-Lowndes 161-kV line are limited by geography and glide path. Moving farther west to connect would mean crossing the Tennessee-Tombigbee Waterway, an action with no benefits but many disadvantages. Moving farther north would impact glide path concerns.

Similarly, at the eastern end of this route, there are few options available for final approach to the substation. Any route must pass between development to the south of the base entrance on Highway 373, and base facilities to the north. This leaves rather narrow corridor for the final spans leading into the substation.

Most of the routing options only exist in the area between these two points, and they have been identified on Figure 2-2.

Eastern Corridor An eastern corridor would connect to the West Point-Lowndes 161-kV line about 2 miles east of Highway 45. Due to glide path restrictions, the line would proceed due south for 2 miles to remain outside the glide path, then turn westward and cross Highway 45 just south of Air Base Road. The route would turn northwest and proceed roughly parallel to but diverging from Air Base Road in order to make the final approach to the CAFB substation. This corridor would be at least 6 miles long, and likely would increase as siting restrictions add to the overall length.

The connection to the West Point-Lowndes 161-kV line should be located near an all-weather access road, such as a state or county road, to facilitate maintenance and operation of the line switches. This places the only feasible connection point approximately 2 miles east of Hwy 45.

Similar to an approach from the west, a transmission line corridor from the east must pass through a rather narrow path to reach the CAFB substation. The proximity of residences, road crossings, existing utilities and structures all combine to form a single corridor for locating the final spans of the new 161-kV line from the east.

As with the western alternative, the only area where there is significant flexibility in route location is in between these two locations. With the eastern corridor, the only option is to move the route further south due to the glide path of Columbus AFB. Unfortunately, this only serves to increase the minimum 6 mile length, and further degrade the eastern route as a viable alternative.

Further evaluation of the two proposed corridor alternatives shows that overall impact is minimized by the western corridor. Primary drivers for this determination are that the western corridor:

- Eliminates impacts to Columbus AFB glide path from tall structures
- Minimizes overall project "footprint" due to floodplain and wetland issues
- Maintains reasonable access to transmission line facilities for maintenance and emergency restoration, and
- Minimizes land use impacts by following property lines.

Many other factors must also be considered and were evaluated using a GIS based constraint model to ensure that no single consideration was omitted during this process.

Preliminary field environmental surveys indicated that the constraint model is accurate, with a high degree of certainty for the ability to use the GIS model for avoidance of sensitive areas and other areas unsuitable to transmission line structures and easement. In part, this is due to the low occurrence of identified constraints for transmission line routes. At any rate, the GIS model is an important tool for this process, and is heavily referenced as the final proposed route is developed.

Due to the preliminary study results, TVA has identified the approximately 3 mile long western corridor for detailed study and final route development.

2.4.4. Develop General Route Options and Potential Routes

The western transmission line corridor would tap the West Point-Lowndes 161-kV transmission line on the east side of the Tennessee-Tombigbee Waterway and proceed southeast to the new substation.

Normally, there would be many locations suitable for a transmission line connection to the West Point-Lowndes 161-kV line. However, in this case, the physical barriers create a narrow "window" of opportunity for making this connection. Specifically, it is impractical to cross the Tennessee-Tombigbee Waterway since navigable channel crossings are recommended only when necessary. This limits the western connection point.

Moving the transmission line connection eastward also meets limits quickly. Since the West Point-Lowndes line turns north and proceeds along the northern perimeter of the base, the new connection point is limited to a relatively small area just north of structure 91 on the West Point-Lowndes line.

Therefore, TVA selected a span of transmission line between structures 90 and 91 on the existing West Point-Lowndes line as the starting point.

At the substation site, physical constraints also present a rather unique situation. All routing alternatives target a narrow final approach into the substation site that is just south of the southern boundary of the base. These physical constraints are three overhead distribution circuits running parallel to and immediately south of the base boundary, along with a road and multiple buildings to the south.

Route alternatives studied are shown on Figure 2-2. A discussion of each alternative considered follows.

Route 1 (segments 1-5-8-10-11-12) would follow roughly a straight line from the West Point-Lowndes transmission line connection to a line angle east of the existing CAFB substation, following the line segment 11-12 into the new substation site south of the base.

A straight line connection between points 1 and 11, while being the shortest length, does not take into consideration line routing constraints. An acceptable transmission line route must minimize or eliminate impacts to identified routing constraints, so further route study is needed.

Wetland acreage crossed is higher for this alternative than any other route studied. In addition, land use impacts are not considered.

Route 2 (segments 1-4-9-10-11-12) would also begin at the connection to the West Point-Lowndes transmission line. Segment 1-4 would continue east along a line roughly parallel to old route 373 inside the base perimeter. At line vertex 4, Route 2 would turn and follow a line section that runs roughly parallel to a property boundary west of the southern entrance. Segment 9-10 would travel along the western edge of a large wetland area identified on the constraint model. Finally, segment 10-11 would run along a property boundary until reaching segment 11-12 shared by all alternatives.

Route 2 would violate the siting criteria to eliminate impacts to the glide path and flight plans of the Columbus AFB. Vertex 4 and the line segment 4-9 would require pole height restrictions which would prevent a practical transmission line design. Practical pole heights would be in the range of 80-100 feet, and would not be acceptable for air space and glide path requirements.

Route 3 (segments 1-3-5-8-10-11-12) would proceed from the West Point-Lowndes transmission line connection to a point just west of Barton Ferry Road. Segment 3-5 would proceed near due south along Barton Ferry Road, crossing the road on to Columbus AFB property just north of vertex 5 in order to avoid a Weyerhaeuser test plot. At vertex 5, Route 3 would proceed along a line roughly parallel to a boundary between East Mississippi Junior College Trustees (EMJCC) and Weyerhaeuser Corporation property. At vertex 11, the route would follow segment 11-12.

Route 3 would minimize impacts to wetlands while following property boundaries as much as possible. Following property boundaries can help reduce land use impacts from parcel fragmentation. Other constraints are minimized or eliminated from consideration along this route.

Route 4 (segments 1-2-7-8-10-11-12) would leave the West Point-Lowndes connection point and proceeds southeast to the vertex 2 alongside Barton Ferry Road. The route would then turn due east and travel through vertex 7 to vertex 8 located on the line parallel to the boundary between Weyerhaeuser Corporation and EMJCC property. It then would proceed through vertex 10, along the property boundary, to vertex 11 and finally along segment 11-12.

Route 4 would cause a fair amount of parcel segmentation on the western section due to the need to avoid wetland areas prevalent along that section. Segment 2-7-8 would be ideal as it follows a property boundary and intersects no constraints. Segment 8-10-11-12 is similar in impact to other routes sharing these segments. In addition, the “cross-country” characteristics of segment 2-7-8 provide fewer options for construction access, creating the need for new access roads and the associated impacts.

Route 5 (segments 1-2-7-11-12) varies from Route 4 only in segment 7-11; this option reduces the overall line length and moves south of the base boundary.

This alternative shares the same problems with Route 4 in that it also has parcel fragmentation problems, as well as large areas of wetland that would be crossed.

Route 6 (segments 1-2-6-11-12) attempts to reduce the parcel fragmentation problems on the eastern end of the new transmission line. However, it still has the large wetland acreage and the parcel fragmentation problems as Routes 4 and 5.

In addition, Route 6 could possibly negatively impact future expansion of an industrial area along the section line parallel to segment 6-11. Construction access is somewhat limited as well, due to large wooded areas between road crossings on this route.

2.4.5. Establish and Apply Siting Criteria

TVA has long employed a set of evaluation criteria that represent opportunities and constraints for development of transmission line routes. The criteria are oriented toward factors such as existing land use, ownership patterns, environmental features, cultural resources, and visual quality. Cost is also an important factor, with engineering considerations and right-of-way acquisition cost being the most important elements of this factor. Information gathered from potentially affected landowners is also taken into account while refining criteria specific to the study area.

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

- *Engineering Criteria*: total length of the transmission route, length of new ROW and rebuilt ROW, primary and secondary road crossings, pipeline and transmission line crossings, and total line cost.
- *Environmental Criteria*: slopes greater than 30 percent (steeper slopes mean more potential for erosion and potential water quality impacts), slopes between 20 and 30 percent, visual aesthetics, forested acres, open water crossings, sensitive stream (those supporting endangered or threatened species) crossings, perennial and intermittent stream crossings, wetlands, rare species habitat, natural area crossings, and wildlife management areas.
- *Land Use Criteria*: the number of fragmented property parcels, schools, houses, commercial or industrial buildings, barns, and parkland crossings.
- *Cultural Criteria*: archaeological and historic sites, churches, and cemeteries.

Scores for each of the alternatives were calculated by adding individual criterion values for each transmission line route. The resulting sum values were evaluated using standard statistical techniques and were assigned a ranking from 1 to 4 for each route in each subcategory (engineering, environmental, land use, and cultural).

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

2.4.6. Route Evaluation and Selection

After evaluation of all six routing alternatives, Route 3 is the only option which meets all of the criteria outlined in the previous section.

Early routing studies helped reduce the siting constraints to four major considerations. These are wetland areas, property boundaries, construction access, and overall transmission line length. Overall transmission line length is used as an indicator of project footprint and implied impacts.

Route 3 is the second shortest route at 3.2 miles. It has the smallest wetland acreage affected, the largest number of structures accessible from existing access roads, and follows property boundaries as much as possible in an area with very large parcel acreages.

In addition, Route 3 further reduces land use impacts by reducing angle-type structures and the associated anchors and guy wires, as well as overall project cost.

For these reasons, Route 3 was selected as the best overall route. The environmental impacts of selecting this route are analyzed in detail in the rest of this EA

2.5. Identification of the Preferred Alternative

Alternative B: Provide 161-kV Delivery Point along Route 3 is TVA's preferred alternative. The preferred route, Route 3 as described in Section 2.4.4, is 3.2 miles in length, and affects approximately 38 acres.

2.6. Summary of Mitigation Measures

The following measures identified in this EA would be applied during construction and operation of the proposed transmission line:

- Best Management Practices as described in Muncy (1999)
- Environmental quality protection specifications as described in Appendixes II – VI.

CHAPTER 3

3. AFFECTED ENVIRONMENT

3.1. Groundwater

The project area is located within a region where groundwater resources are widely available. Three primary principal aquifers located within this region area include, in descending stratigraphic order, surficial alluvial terrace deposits associated with the Tombigbee River (Pliocene-Pleistocene age), the Eutaw-McShan aquifer (Cretaceous age), and the Tuscaloosa Aquifer System (Cretaceous age). Other deeper Paleozoic aquifers are present in the region; characteristics of these aquifers within the local area are currently unknown.

Alluvial terrace deposits generally consist of unconsolidated sand and gravel with minor amounts of silt and clay. These sediments are essentially flat-lying and have a total thickness of about 20 to 30 feet. Groundwater within the terrace aquifer generally occurs under unconfined conditions. Seasonal water table fluctuations of several feet can be expected in this region. Groundwater from the terrace aquifer discharges into the underlying Eutaw-McShan aquifer. Regional groundwater movement within the terrace aquifer is generally westward toward the Tombigbee River. However, groundwater movement should be influenced partially, due to the locality of the project, to an unnamed tributary of Stinson Creek.

The Eutaw-McShan aquifer lies directly beneath the terrace aquifer in the project area. It primarily consists of interbedded glauconitic sands, silts, and clays having a total thickness of approximately 300 feet. The Eutaw-McShan aquifer is widely used in northeastern Mississippi for municipal, industrial and domestic water supplies.

The Tuscaloosa Aquifer System (TAS) is comprised of four hydraulically connected regional aquifers; i.e., the Gordo, Coker, Massive Sand, and undifferentiated Lower Cretaceous sediments. These aquifers generally consist of interbedded sands, gravels, silts, and clays having an estimated composite thickness of about 500 feet in the site area. The TAS is the primary source of large municipal and industrial well supplies within the region.

Columbus Air Force Base receives water from the City of Columbus Water System, which obtains groundwater from eight water wells in the Eutaw aquifer. In 2000, there were several active community-use water supply wells located within one mile of the substation site and off of CAFB property. These wells tapped the Eutaw-McShan aquifer (TVA 2001).

3.2. Surface Water

The project area is drained by the Tombigbee River via direct runoff, unnamed small tributary streams to the Tombigbee River, and an unnamed tributary to Stinson Creek, which enters the Tombigbee River. The eastern end of the proposed transmission line and the substation site are drained by the unnamed tributary to Stinson Creek. Stinson Creek is on the state 303(d) list for impaired support of aquatic life due to excessive nutrients, organic enrichment and low dissolved oxygen, pesticides, and siltation (MDEQ 2004).

3.3. Vegetation and Wildlife

The major vegetation types present in the project area include mowed lawns with shade trees in the vicinity of the substation site and at the eastern end of the proposed transmission line, pine plantations, and young hardwood and mixed flatwoods forest regenerating after clearcutting. The substation site has been extensively modified by the construction of the Regenesys facility and most of the remaining vegetation consists of planted grasses. Much of the transmission line route has been impacted by forest management and other disturbances and several woods roads cross and run parallel to the proposed transmission line ROW. Portions of the area are low and poorly drained, and several wetlands are present. Commonly occurring species include loblolly pine, southern red oak, overcup oak, willow oak, sweetgum, and red maple. The invasive species Japanese honeysuckle and privet are common in the forest understory. Black willow, green ash, and swamp privet are common in wetter areas. All of these vegetation types are common in the area and no uncommon plant communities were observed in the project area.

The predominant wildlife habitats in the project area are young to mid-aged pine, mixed pine-hardwood, and hardwood forests. Common wildlife species present include white-tailed deer, raccoon, red-shouldered hawk, wild turkey, red-bellied and downy woodpeckers, red-eyed and white-eyed vireos, Carolina wren, wood thrush, Kentucky warbler, northern cardinal, and white-throated sparrow. Wetlands and seasonal ponds provide important habitat for several species of reptiles and amphibians such as the leopard frog, spring peeper, and spotted salamander. The wetlands in the area, including those along the Tombigbee River and Tennessee-Tombigbee Waterway at the western edge of the project area, also provide habitat for waterfowl and other riparian dwelling species including belted kingfisher, great blue heron and muskrat. No unusual or rare wildlife habitats were observed in the project area.

3.4. Aquatic Life

The project area lies within the Tombigbee River drainage; little information is available on the aquatic communities in the tributary streams draining the project area.

The proposed transmission line would cross one perennial stream, one intermittent stream, and two ephemeral streams. The proposed transmission line would also run parallel to a perennial stream for several hundred feet. Perennial streams can typically support a permanent assemblage of aquatic biota including invertebrates, reptiles, amphibians, and fish. Intermittent streams flow during only a portion of the year, and usually not during the drier, summer months. These streams typically have a strong bed and bank structure, receive both surface and subsurface flow, and support a limited amount of aquatic biota. Ephemeral streams, often referred to as wet-weather conveyances, typically only flow for approximately 24 to 48 hours after a rain event, receive negligible subsurface flow, and have weak to moderate bed and bank structure. These factors make it difficult for aquatic biota to survive in these channels.

3.5. Endangered and Threatened Species

Nine species listed under the Endangered Species Act have been previously reported from the Lowndes County (Table 3-1). The portion of the Buttahatchee River just north of the project area is also designated critical habitat for the southern clubshell, orange-nacre

mucket, ovate clubshell, and Alabama moccasinshell. None of these species are known from the project area or in streams draining the project area. Suitable habitat for these species was not observed during field visits in January 2004 and May 2005 and no other federally listed species were observed during these field visits.

Table 3-1. Federally listed endangered and threatened species reported from Lowndes County, Mississippi.

Scientific Name	Common Name	Status
Epioblasma penita	Southern combshell	Endangered
Lampsilis perovalis	Orange-nacre mucket	Threatened
Medionidus acutissimus	Alabama moccasinshell	Endangered (likely extirpated)
Pleurobema decisum	Southern clubshell	Endangered
Pleurobema marshalli	Flat pigtoe	Endangered (likely extirpated)
Pleurobema perovatum	Ovate clubshell	Endangered
Pleurobema taitianum	Heavy pigtoe	Endangered
Quadrula stapes	Stirrupshell	Endangered (likely extirpated)
Haliaeetus leucocephalus	Bald eagle	Threatened

Ten state-listed plant species have been previously reported from within 5 miles of the proposed transmission line, and some of these species occur on Columbus AFB. Suitable habitat for two state-listed plants, swamp hickory (*Carya leiodermis*) and pumpkin ash (*Fraxinus profunda*), is present in forested wetlands. Neither of these species, however, was observed. Suitable habitat for other listed plants is not present and none were observed.

No state-listed animals have previously been reported from the vicinity of the proposed transmission line. No listed animals, or suitable habitat for listed animals, were observed during field inspections of the project area.

3.6. Wetlands

Activities in wetlands are regulated under Sections 404 and 401 of the Federal Clean Water Act. Executive Order (E.O.) 11990 (Protection of Wetlands) also applies to some Federal activities. To conduct activities in jurisdictional wetlands, a nationwide general permit or an individual permit from the USACE is required. State Water Quality Certification issued by the Mississippi Department of Environmental Quality is also required. E.O. 11990 requires all Federal agencies to provide leadership and to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities.

Wetlands in the project area were surveyed in January and March 2004 and April 2005. Wetland determinations were performed according to USACE standards (Environmental Laboratory 1987), which require documentation of hydrophytic vegetation (Reed 1997), hydric soil, and wetland hydrology. Wetlands are classified according to the Cowardin system for the classification of wetlands and deepwater habitats (Cowardin, et al. 1979).

Nine wetlands were identified along the proposed Right-Of-Way (ROW) totaling 3.87 acres. Descriptive data for the wetlands are reported on Routine Wetland Determination Data Forms (Appendix VII) and are summarized in Table 3-2. No wetlands occur at the site of the proposed substation.

Table 3-2. Wetlands Affected by the Proposed Transmission Line.

Wetland ID	Type*	Size of Impact Area (Acres)
W1	PFO1A	0.20
W2	PSS/PEM	0.51
W3	PFO1A	0.30
W4	PFO1A/PSS	0.60
W5	PFO1A	0.07
W6	PEM1A	0.07
W7	PFO1A/PEM	0.74
W8	PFO1A	0.16
W9	PFO1A	1.21
TOTAL		3.87 acres

*PFO1A – Palustrine forested.
PSS – Palustrine scrub-shrub.
PEM – Palustrine emergent.

A review of National Wetland Inventory (NWI) data and the Lowndes County soil survey indicated wetlands and hydric soils occur at approximately the same locations as determined in the field survey. Numerous other wetlands, both natural and man-made as a result of gravel mining and dredge disposal activities, occur in the surrounding area.

3.7. Floodplains

The project area extends from about Tennessee Tombigbee Waterway (Tenn-Tom) mile 342.3 to 343.9. The 100-year floodplain would be the area below elevation 183 at Tenn-Tom mile 342.3 and elevation 185 at Tenn-Tom mile 343.9. The substation site and the eastern 0.7 mile of the proposed transmission line are outside of the 100-year floodplain. The remainder of the proposed transmission line is in the floodplain.

3.8. Recreation, Parks, and Managed Areas

The proposed substation site and east end of the proposed transmission line are about 700 feet south of the Whispering Pines Golf Course on CAFB. Other developed recreation facilities in the vicinity are the DeWayne Hayes Recreation Area and Campground, the Town Creek Campground, and the Bartons Ferry Access Area. All of these facilities are operated by the USACE. Bartons Ferry Access Area, consisting of a boat ramp and parking area, is on the west bank of the original Tombigbee River channel about 0.7 miles southwest of the west end of the proposed transmission line. The other two areas both include camping, day use, and boat launch facilities. The DeWayne Hayes area is on the east bank of the Tombigbee River about 1.5 miles southwest of the substation upgrade area and east end of the proposed transmission line. The Town Creek area is on the west bank of the Tombigbee River about 2.5 miles southwest of the proposed transmission line.

The predominant dispersed recreation activity in the project area is hunting. A few deer stands occur along the proposed transmission line ROW and some of the project area is leased by private hunting clubs.

The lower portion of the Buttahatchee River, about 0.8 miles north of the western end of the proposed transmission line, is listed on the Nationwide Rivers Inventory by the National Park Service. This listing is based on the river's scenic, recreational, geologic, fishing, wildlife, historic, and cultural values.

3.9. Visual Resources

The project area is close to the Tennessee-Tombigbee Waterway where topography is gently sloping to flat. From the proposed tap point near the waterway eastward to the CAFB, the topography remains consistent and the vegetation patterns transition from dense lowland forest to intensively managed forest stands to rural residential to modified residential. The area south of CAFB near the southern entrance, including the proposed substation site, exhibits a mixed landscape character of residential, commercial, and small to medium scale industrial land uses. Lower voltage transmission and distribution lines and street lighting are visible from within the foreground (up to ½ mile) viewing distance. The existing CAFB 46-kV substation is visible from parts of the base but generally is not visible from outside the base perimeter fencing. On Columbus AFB, the landscape character is principally modified residential, with expanses of maintained turf, large shade trees, residential development, perimeter fencing, light to medium duty commercial facilities associated with military operations, and the Whispering Pines Golf course all visible from within the foreground viewing distance.

The scenic attractiveness is common and the scenic integrity is moderate to low throughout the project area.

3.10. Cultural Resources

Section 106 of the National Historic Preservation Act requires Federal agencies, including TVA and the Air Force, to consider the effect of their actions on historic properties. Historic properties, which include archaeological sites, historic sites, and historic structures, are evaluated in terms of their ability to meet the criteria for eligibility for the National Register of Historic Places (NRHP). These criteria include association with events that have made a significant contribution to historical patterns, association with the lives of significant persons, possession of distinctive characteristics such as design, construction, and artistic value, and/or potential to yield important historic or prehistoric information.

TVA, in consultation with the Mississippi State Historic Preservation office, determined that the Area of Potential Effect (APE) for archaeological resources would be those lands upon which the new transmission line and substation would be built. The APE for the architectural inventory was those areas from which the transmission line and substation would be visible in a 0.5-mile radius. No sites previously listed on the NRHP occur within the project APE.

A Phase I cultural resources survey of the APE was conducted in January 2004 and April 2005. During this survey, 171 possible shovel test locations were examined and 103 locations were excavated. No previously recorded archaeological sites lie within the APE.

One new site, 22LO975 was identified just outside the proposed ROW. This site is located a few hundred feet west of Highway 373 adjacent to the CAFB property line and consists of shallowly buried worked stone flakes and fragments. The site lacks diagnostic artifacts and has no further research potential, and was therefore determined to be ineligible for the NRHP. An old stable/barn was also identified near the western portion of the ROW; this structure was previously considered and is not eligible for listing on the NRHP. No eligible or potentially eligible historic structures were identified in the APE.

CHAPTER 4

4. ENVIRONMENTAL CONSEQUENCES

4.1. Alternative A – The No Action Alternative

Under the No Action Alternative, the proposed substation and 3.2 mile transmission line would not be built and the impacts described below would not occur. The No Action Alternative, however, would not address the Columbus AFB-area power supply problems and some other alternative action would be necessary. Potential alternative actions include those initially considered but rejected from further consideration in the development of Alternative B in this EA. The reasons for rejecting other potential alternatives from further evaluation are discussed in Chapter 2.

4.2. Alternative B - Provide 161-kV Delivery Point and Construct New Columbus AFB 161-kV Substation

4.2.1. Groundwater

The proposed transmission line and substation would not result in any new groundwater withdrawals. Best Management Practices (BMPs) would be used during construction to minimize potential sediment infiltration. During revegetation and maintenance activities along the ROW, fertilizers and herbicides would be avoided or used sparingly to avoid contamination of groundwater. The substation would have spill containment facilities, which would prevent leaking transformer oil or other pollutants from entering groundwater. Potential impacts to groundwater would therefore be insignificant.

4.2.2. Surface Water

Soil disturbances associated with substation construction, ROW clearing, access road construction, and other construction activities can potentially result in adverse water quality impacts. Stream bank erosion and sedimentation can clog small streams, increase nutrient flows, and threaten aquatic life. Removal of the tree canopy along stream crossings can increase water temperatures, algal growth, dissolved oxygen depletion, and adverse impacts to aquatic life. Improper use of herbicides to control vegetation could result in runoff to streams and subsequent aquatic impacts.

TVA routinely includes precautions in the design, construction, and maintenance of transmission lines and substation to minimize these potential impacts. Permanent stream crossings would be designed to not impede runoff patterns and the natural movement of aquatic fauna. Temporary stream crossings and other construction and maintenance activities would comply with appropriate state permit requirements and TVA requirements as described in Muncy (1999) and Appendices II-VI. ROW maintenance would employ only EPA-registered herbicides used in accordance with label directions designed in part to restrict applications in the vicinity of receiving waters and to prevent unacceptable aquatic impacts. With the implementation of these measures, the effects on surface water are expected to be insignificant and no adverse cumulative surface water impacts are anticipated.

4.2.3. Vegetation and Wildlife

The major impacts to vegetation would result from the clearing of tall-growing vegetation from within the proposed transmission line ROW, of which about 30 acres is presently forested, and the subsequent maintenance of ROW vegetation in an early successional stage. The vegetation types in the project area are common and widespread in the region, and no unusual vegetation types are present. Much of the project area vegetation has also been heavily disturbed by forest management and other activities. Invasive species are widespread in the project area; no significant changes in numbers or species present is expected to occur, and no invasive species new to the area would be introduced during revegetation activities. The proposed action would result in insignificant impacts on the vegetation of the area.

Construction and operation of the proposed transmission line and substation would result in the long term conversion of about 30 acres of young to mid-aged forest habitat to an early successional mixture of grasses, herbs, and shrubs. This would eliminate some forest habitat and increase the amount of forest edge habitats in the area. Little high quality, closed canopy forest would be affected, and the impacts to forest wildlife would be minor. Because of forest management and other activities in the surrounding area, the proportion of edge habitats is fairly high and the effects of the increased forest fragmentation would be small. Overall impacts to wildlife would be insignificant.

4.2.4. Aquatic Life

The construction and operation of the substation would have little to no effect on aquatic life. No streams occur on the substation site and impacts from site runoff from be minimized through the use of BMPs (Muncy 1999) during construction and site drainage control during operation.

Potential impacts to aquatic life from the proposed transmission line construction and maintenance include sedimentation, removal of streambank vegetation, damage to streambanks and streambeds from heavy equipment, and pesticide runoff. BMPs (Muncy 1999) would be used during all construction and maintenance activities. Level A Standard Stream Protection guidelines, listed in Appendix IV, would also be used at perennial and intermittent streams within the project area. Appendix VIII lists the approximate locations of these watercourses. These measures include maintenance of 50-foot wide streamside management zones, use of hand-held or low ground-pressure equipment for vegetation removal, retention of tree stumps, and minimization of soil disturbance. Vegetation management activities along streams would be by mechanical cutting or by selective use of USEPA-registered herbicides. With the implementation of these measures, impacts to aquatic life would be insignificant.

4.2.5. Endangered and Threatened Species

No federally listed endangered or threatened species are known from the project area and no impacts to such species would occur. No project-related activities would occur within the drainage area of the portion of the Buttahatchee River designated as critical habitat. Similarly, no state-listed species are present in the project. Therefore, no impacts to endangered or threatened species or to critical habitat are anticipated.

4.2.6. Wetlands

A review of National Wetland Inventory (NWI) data and the Lowndes County soil survey indicated wetlands and hydric soils occur at approximately the same locations as determined in the field survey. The proposed project area is in a heavily impacted area, both for sand and gravel mining and timber extraction. About 3.9 acres of wetlands, most of which are forested, would be affected. Appendix VIII lists the approximate locations of the wetlands. Wetland impacts are expected to be minor and insignificant if construction is performed during the dry season and standard BMPs for work in wetlands are utilized. Specifically if work is conducted during the winter or spring when standing water is present or soils are saturated, vehicles and heavy equipment should not be permitted in the wetlands. If avoidance is not possible when standing water is present or soils are saturated, pressure-reducing ground mats should be used to reduce impacts. Use of existing access roads will avoid or minimize damage to the wetlands. Wetlands are relatively common in the surrounding area and the cumulative impacts to wetlands would also be insignificant.

4.2.7. Floodplains

The proposed substation and the eastern end of the proposed transmission line are not located in the 100-year floodplain and the proposed activities in these areas would not affect floodplains or flooding. The proposed tap structure and new transmission line would involve construction within the 100-year floodplain. There is no practicable alternative to siting the tap structure and the transmission line in the 100-year floodplain because the entire area surrounding the existing transmission line is in the floodplain. To minimize adverse impacts, the switches would be elevated above the 100-year flood elevation and no additional fill would be placed in the floodplain beyond that needed for road access. The presence of the transmission line structures and minor road fill are not expected to result in any increase in flood hazard either as a result of increased flood elevations or changes in flow carrying capacity of the streams being crossed. Therefore, the proposed project would comply with Executive Order 11988.

In accordance with local floodplain regulations, TVA has provided information about the project to the Lowndes County Development Officer for his review. A Floodplain Development Permit was issued to TVA in December 2004 for the construction of the transmission line.

4.2.8. Recreation, Parks, and Managed Areas

None of the USACE recreation areas along the Tennessee-Tombigbee Waterway would be affected by the construction and operation of the proposed transmission line and substation upgrade. The Buttahatchee River, listed on the Nationwide Rivers Inventory, would also not be affected. The proposed substation and eastern end of the proposed transmission line would be visible from part of the Whispering Pines Golf Course on CAFB. Because of the presence of the existing 46-kV CAFB substation and several other lower voltage transmission and distribution lines in this area, this visual impact would be minor and use of the golf course would not be significantly affected. Some short-term disruption of hunting could occur along the proposed transmission line during construction, depending on the time of year when construction occurs. This impact, and other impacts to recreation, parks, and managed areas, is expected to be insignificant.

4.2.9. Visual Resources

From the proposed tap point near the Tennessee Tombigbee Waterway, views of transmission structures and potential access roadways would generally not be available due to existing land uses, topography, and vegetation. Those few views available would be from within the foreground and would occur generally within the vicinity of Barton Ferry Road. The duration of views would be short and between structures for motorists traveling this unimproved road. Continuing eastward, the transmission line would become visible from a greater number of vantage points within the foreground surrounding Highway 373, the entrance to CAFB, and from other positions within the base, including portions of the Whispering Pines Golf Course.

The proposed transmission line, consisting of metal poles and near-horizontal conductors, would increase the number of adversely contrasting vertical elements seen in the landscape. The visual character of the transmission line and substation facilities would be very similar in character to existing conditions. The change in landscape character discernable from positions both on and off of CAFB would be minor, as similar existing structures and facilities are currently visible from within the foreground viewing distance. Overall visual impacts from the proposed transmission line and substation would be insignificant.

4.2.10. Cultural Resources

The proposed action would affect one archaeological site within the proposed transmission line right-of-way. This site was determined to be ineligible for listing on the NRHP, and would not be significantly affected. No historic structures would be affected. TVA consulted with the Mississippi State Historic Preservation Officer (SHPO) over its findings; in letters dated May 12, 2004 and June 7, 2005 (Appendix I), the SHPO concurred with TVA's determinations.

4.2.11. Electric and Magnetic Fields

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

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

However, equal or greater numbers of similar studies show no association or cannot reproduce data interpreted as demonstrating an association. No laboratory research has found cause and effect health impacts from EMF. Similarly there is no scientific consensus

on how these fields could cause health effects. There is also no agreement in the scientific or EMF research communities as to what if any electric or magnetic field parameters might be associated with potential health effects.

There are no scientifically or medically defined safe or unsafe field strengths, although state regulatory bodies in Florida and New York have established edge of right-of-way magnetic-field-strength limits for 230-kV and larger power transmission lines. TVA has analyzed and continues to analyze the fields associated with its typical line designs using the best available models and has measured actual fields for a large number of locations along its transmission line easements. Both model data and measurements show that the field strengths for TVA transmission lines are well within Florida and New York limits. Based on such models, expected field strengths for the proposed lines discussed in this document would also be within those existing state guidelines.

TVA's standard location practice has the effect of minimizing continuous public exposures to transmission line EMF. The transmission line route selection team uses a constraint model that place a 300-foot radius buffer around occupied buildings, except schools, for which a 1200-foot buffer is used. The purpose of these buffers is to reduce potential land use conflicts with yard trees, outbuildings, and ancillary facilities and potential visual impacts as well as exposures to EMF. Although not absolute location constraints, these buffers weigh heavily in location decisions, influencing selection of route options and alignments. Because EMF diminishes quickly with distance from the conductors, the routing of transmission lines using constraint buffers effectively reduces potential continuous public exposure to EMF. Crossing under lines or otherwise being near them for short periods may increase overall EMF exposure but only minutely.

CHAPTER 5

5. SUPPORTING INFORMATION

5.1. List of Preparers

5.1.1. Project Management

Todd C. Liskey
Position: Environmental Engineer – Siting and Environmental Design
Involvement: Purpose and Need; Alternatives

Charles P. Nicholson
Position: Senior NEPA Specialist and Team Leader
Involvement: NEPA Compliance; Document Preparation

5.1.2. Other Contributors

Shannon L. Burks
Position: Contract Environmental Engineer
Involvement: Groundwater

Stephanie A. Chance
Position: Aquatic Biologist
Involvement: Aquatic Life; Endangered and Threatened Species

J. Leo Collins
Position: Senior Botanist
Involvement: Vegetation; Endangered and Threatened Species

Kenny D. Gardner
Position: Environmental Scientist
Involvement: Parks and Natural Areas

T. Hill Henry
Position: Senior Zoologist
Involvement: Wildlife; Endangered and Threatened Species

John M. Higgins
Position: Water Quality Specialist
Involvement: Surface Water

Jeanne Jones
Position: Contract Zoologist
Involvement: Wildlife; Endangered and Threatened Species

Victor Maddox
Position: Contract Botanist
Involvement: Vegetation; Endangered and Threatened Species

Jack D. Milligan
Position: Groundwater Specialist
Involvement: Groundwater

Roger A. Milstead
Position: Floodplain Specialist
Involvement: Floodplains

Richard L. Pflueger
Position: Land Use and Recreation Specialist
Involvement: Recreation

Kim Pilarski
Position: Wetlands Biologist
Involvement: Wetlands

Jon C. Riley
Position: Landscape Architect
Involvement: Visual Resources

Barbara Rosensteel
Position: Contract Wetlands Biologist
Involvement: Wetlands

W. Richard Yarnell
Position: Archaeologist
Involvement: Cultural Resources

5.2. Literature Cited

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APPENDIX I – CORRESPONDENCE

MISSISSIPPI Department of
MDAH
ARCHIVES & HISTORY

HISTORIC PRESERVATION
PO Box 571, Jackson, MS 39205-0571
601-576-6940 • Fax 601-576-6955
mdah.state.ms.us

May 12, 2004

Mr. J. Bennett Graham
Manager and Senior Archaeologist
Cultural Resources
Tennessee Valley Authority
Post Office Box 1589
Norris, Tennessee 37828-1589

RE: Tennessee Valley Authority Proposed 161-kV Transmission Tap Line, Lowndes County

Dear Mr. Graham:

We have reviewed the February 2004, cultural resources survey report for the above referenced undertaking pursuant to our responsibilities under Section 106 of the National Historic Preservation Act and 36 CFR Part 800. We concur that site 22LO975 is not eligible for listing in the National Register of Historic Places. We also concur that there are no historic structures located within the project's visual APE.

There remains the remote possibility that unrecorded cultural resources may be encountered during construction. If this occurs, we would appreciate your contacting this office immediately in order that we may offer appropriate comments under 36 CFR 800.13 within forty-eight hours. If you need further information, please let us know.

Sincerely,

Elbert R. Hilliard
State Historic Preservation Officer

Thomas H. Waggener

BY: Thomas H. Waggener
Review and Compliance Officer

cc: Clearinghouse for Federal Programs

MISSISSIPPI Department of
MDAH
ARCHIVES & HISTORY

HISTORIC PRESERVATION
PO Box 571, Jackson, MS 39205-0571
601-576-6940 • Fax 601-576-6955
mdah.state.ms.us

June 7, 2005

Mr. J. Bennett Graham
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, Tennessee 37902-1401

Dear Mr. Graham:

RE: Cultural Resources Survey of West Point-Lowndes tap to Columbus AFB 161 KV substations, Lowndes County, report #05-174

We have reviewed the May 2004, cultural resources survey report of TRC for the above referenced undertaking. No sites or properties listed in or eligible for listing in the National Register of Historic Places will be affected. We, therefore, have no further reservations with this undertaking.

In addition, we are not aware of any potential of this undertaking to affect Indian cultural or religious sites. However, if you require confirmation of this, the tribal entities will have to be contacted directly.

There remains a very remote possibility that unrecorded cultural resources may be encountered during construction. If this occurs, we would appreciate your contacting this office immediately in order that we may offer appropriate comments under 36 CFR 800.13 within forty-eight hours. Your continued cooperation is appreciated.

Sincerely,

H. T. Holmes
State Historic Preservation Officer

Thomas H. Waggener

By: Thomas H. Waggener
Review and Compliance Officer

cc: Clearinghouse for Federal Programs

DEPARTMENT OF THE ARMY
MOBILE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2288
MOBILE, ALABAMA 36628-0001

REPLY TO ATTENTION OF:

January 12, 2005

Regulatory Branch
Operations Division

SUBJECT: No Permit Required to Construct Aerial Electric Transmission Line - Jurisdictional Number MSJ04-03397-S

Tennessee Valley Authority
Attention: Mr. Todd Liskey
1101 Market Street MR4G
Chattanooga, Tennessee 37402

Dear Mr. Liskey:

Reference is made to your letter requesting a jurisdictional determination regarding the construction of a 3.2-mile 161kV aerial electric transmission line serving Columbus Air Force Base in Columbus, Mississippi. Specifically, the transmission line alignment is located in Section 32, Township 16 South, Range 18 West, Lowndes County, Mississippi. A portion of the alignment will cross property adjacent to the Tenn-Tom Waterway owned and maintained by the U. S. Army Corps of Engineers as part of the Tenn-Tom Wildlife Mitigation Project.

A desk review conducted on January 12, 2005, revealed that a Department of the Army permit pursuant to Section 404 of the Clean Water Act will not be required to construct the transmission line. Although the line will cross a number of jurisdictional wetlands and other Section 404 waters of the United States, there will be no permanent discharge of fill material into these areas. Additionally, there will be no permanent or temporary structures placed in the resource areas, and landclearing will consist of cutting woody material at ground level only; no stumps will be removed, and there will be no resulting elevation contour changes or similar disturbances within resource area boundaries.

Please be advised that this jurisdictional determination reflects current policy and regulation and is valid for a period of 5 years from the date of this letter. If after the 5-year period this jurisdictional determination has not been specifically revalidated by the U.S. Army Corps of Engineers, it shall automatically expire. Should you disagree with

certain terms and/or conditions of this determination, the enclosed Notification of Applicant Options outlines the steps to take to file your objection.

Please be aware that this authorization is contingent upon the execution of a real estate instrument that will provide for an easement across property owned and maintained by the U. S. Army Corps of Engineers as part of the Tenn-Tom Wildlife Mitigation Project. Further, the Tennessee Valley Authority is required to replace the mitigation habitat in kind through the real estate process.

The statements contained herein do not convey any property rights or any exclusive privileges, and do not authorize any injury to property or obviate the requirements to obtain other local, State, or Federal assent required by law for the activities discussed above.

If the scope of work or project location changes, you are urged to contact this office for a verification of this determination. Thank you for your cooperation with our permit program. If you have any questions concerning this matter, please contact Mr. Tad M. Zebryk of the Enforcement Section at (251) 694-3779.

Sincerely,

Deborah J. Shoemake
Acting Chief, Regulatory Branch
Operations Division

Enclosures

Copy Furnished:

Mr. James Curry
Tenn-Tom Project Office
U. S. Army Corps of Engineers
3606 West Plymouth Road
Columbus, Mississippi 39701-9504

APPENDIX II – TVA RIGHT-OF-WAY CLEARING SPECIFICATIONS

1. General - The clearing contractor 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, and any TVA commitments to property owners. The contractor shall then plan and carry out operations using techniques consistent with good engineering and management practices as outlined in TVA's Best Management Practice (BMP) manual (Muncy 1999). 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 pre-bid or pre-work meeting or present in contract specifications, TVA will order corrective changes and additional work, as deemed necessary in TVA's judgment, to meet the intent of environmental laws and regulations or other guidelines. Major violations or continued minor violations will result in work suspension until correction of the situation is achieved or other remedial action is taken at the contractor's expense. Penalty clauses may be invoked as appropriate.

2. Regulations - The clearing contractor shall comply with all applicable federal, state, and local environmental and anti-pollution laws, regulations, and ordinances, including, without limitation, all air, water, solid and hazardous waste, noise, and nuisance laws, regulations, and ordinances. He 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 pre-work 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 or ground water. 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 re-clearing modified to protect the buffer and sensitive area. Some areas may require planting native plants or grasses to meet the criteria of regulatory agencies or commitments to special program interests.

4. Streamside Management Zones - The clearing contractor must leave as many rooted ground cover plants as possible in buffer zones along streams and other bodies of water or wet weather conveyances thereto. . In such streamside management zones (SMZ), tall growing tree species (trees that would interfere with TVA's National Electric Safety Code clearances) shall be cut, and the stumps may be treated to prevent re-sprouting. Low growing trees identified by TVA as marginal electrical clearance problems may be cut, then stump treated with

growth regulators to allow low, slow growing canopy development and active root growth. Only approved herbicides shall be used, and herbicide application shall be conducted by certified applicators from the TOM organization after initial clearing and construction. Cutting of trees within SMZs must be accomplished by using either hand-held equipment or other appropriate clearing equipment, such as a feller-buncher. The method will be selected based on site specific conditions and topography to minimize soil disturbance and impacts to the SMZ and surrounding area. Disturbed soils in SMZs must be stabilized by appropriate methods immediately after the 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 which will minimize dragging or scarring the banks or stream bottom. No debris will be left in the water or watercourse. Equipment will cross streams, ditches, or wet areas only at locations designated by TVA after the application of appropriate erosion control BMPs 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.

6. Sensitive Area Preservation - If prehistoric or historic artifacts or features that might be of archaeological significance are discovered during clearing or re-clearing 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 waters or ground water. Special care shall be exercised in refueling equipment to prevent spills. Fueling areas shall be remote from any sinkhole, crevice, stream or other water body. Open burning debris 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 steam, 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 which enters streams or other water bodies shall be removed as soon as possible. Appropriate Corps of Engineers and state permits shall be obtained for stream crossings.

9. Air Quality Control - The clearing or re-clearing 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 which 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 which minimizes the creation of fugitive dust. This may require limitations as to type of equipment, allowable speeds, and routes utilized. Control measures such as water, gravel, etc., or similar measures may be used subject to TVA approval. On new construction sites and easements, the last 100 feet before an access road approaches a county road or highway shall be graveled to prevent transfer of mud on to the public road.

11. Burning - The Contractor shall obtain applicable permits and approvals to conduct controlled burning. The Contractor will comply with all provisions of the permit, notification or authorization including burning site locations, controlled draft, burning hours, and such other conditions as stipulated. If weather conditions such as wind speed or wind direction change rapidly, the Contractor's burning operation may be temporarily stopped by TVA's field engineer. The debris to be burned shall be kept as clean and dry as possible and stacked and burned in a manner which produces the minimum amount of smoke. Residue from burning will be disposed of according to permit stipulations. No fuel starters or enhancements other than kerosene will be allowed.

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

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

14. Vehicle Servicing - Routine maintenance of personnel vehicles will not be performed on the right-of-way. However, if emergency or “have to” situations arise, minimal/temporary maintenance to personnel vehicles will occur in order to mobilize the vehicle to an off-site maintenance shop. Heavy equipment will be serviced on the right-of-way, except in designated sensitive areas. The clearing or re-clearing 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 re-clearing 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 which 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 (Re-clearing) - The re-clearing 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 or ground water source might occur.

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

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

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

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

    C. All disturbed areas will initially be seeded with a temporary ground cover such as winter wheat, rye, or millet, depending on the season. Perennials may also be planted during initial seeding if proper growing conditions exist. Final restoration and final seeding will be performed as line construction is completed. Final seeding will consist of permanent perennial grasses such as those outlined in TVA's "A Guide for Environmental Protection

and Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities." Exceptions would include those areas designated as native grass planting areas. Initial and final restoration will be performed by the clearing contractor

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

APPENDIX III – TVA ENVIRONMENTAL QUALITY PROTECTION SPECIFICATIONS FOR TRANSMISSION LINE CONSTRUCTION

1. General - TVA and/or the assigned Contractor shall plan, coordinate, and conduct his operations in a manner which protects the quality of the environment and complies with TVA's environmental expectations discussed in the pre-construction meeting. This specification contains provisions which 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 shall 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 anti-pollution 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 BMPs such as silt fences on steep slopes and adjacent to any stream, wetland, or other water body. Additional BMPs may be required for areas of disturbance created by construction activities. BMPs will be inspected, by the TVA field engineer or other designated TVA or contractor personnel, routinely and during periods of high runoff, and any necessary repairs will be made as soon as practicable. BMP inspections will be conducted in accordance with permit requirements. Records of all inspections will be maintained on site, and copies of inspection forms will be forwarded to the TVA construction environmental engineer.

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

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

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

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

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

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

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

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

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

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

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

13. Air Quality Control - Construction crews shall take appropriate actions to minimize the amount of air pollution created by their construction operations. All operations must be conducted in a manner which 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 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 on to 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 personnel vehicles will not be performed on the right-of-way. However, if emergency or “have to” situations arise, minimal/temporary maintenance to personnel vehicles will occur in order to mobilize the vehicle to an off-site maintenance shop. Heavy equipment 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 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.

18. Smoke and Odors - TVA and/or the Contractors shall properly store and handle combustible material which 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. Also, 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 which 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.

APPENDIX IV – TVA GUIDELINES FOR TRANSMISSION LINE CONSTRUCTION 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 of it (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 TVA Transmission Construction staff and their contractors avoid impacts to streams and stream life as they work in and near SMZs. These guidelines expand on information presented in "A Guide for Environmental Protection and Best Management Practices for TVA Construction and Maintenance Activities."

Three Levels of Protection

During the pre-construction review of a proposed transmission line, TVA Resource Stewardship staff will have studied each possible stream impact site and will have identified it as falling into one of three categories: A) standard 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 waterbodies without causing adverse impacts on the construction work.

Guidelines:

1. All construction work around streams will be done using pertinent Best Management Practices (BMPs) such as those described in "A Guide for Environmental Protection and Best Management Practices for TVA Construction and Maintenance Activities," especially Chapter 6, Standards and Specifications.

2. All equipment crossings of streams must comply with appropriate state permitting requirements. Crossings of all drainage channels, intermittent streams, and permanent streams must be done in ways that avoid erosion problems and long-term changes in water flow. Crossings of any permanent streams must allow for natural movement of fish and other aquatic life.

3. Cutting of trees within SMZs must be accomplished by using either hand-held equipment or other appropriate clearing equipment (e.g. a feller-buncher) that would result in minimal soil disturbance and damage to low lying vegetation. The method will be selected based on site specific conditions and topography to minimize soil disturbance and impacts to the SMZ and surrounding area. Stumps can be cut close to ground level but must not be removed or uprooted.

4. Other vegetation near streams must be disturbed as little as possible during construction. Soil displacement by the actions of plowing, discing, 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 which 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 reasons why a permanent (always-flowing) stream requires protection beyond that provided by standard BMPs. Reasons for requiring this additional protection include the presence of important sports fish (trout, for example) and habitats for federal endangered species. The purpose of the following guidelines is to minimize the disturbance of the banks and water in the flowing stream(s) where this level of protection is required.

Guidelines:

1. Except as modified by guidelines 2-4 below, all construction work around streams will be done using pertinent BMPs such as those described in "A Guide for Environmental Protection and Best Management Practices for TVA Construction and Maintenance Activities," especially Chapter 6, Standards and Specifications.

2. All equipment crossings of streams must comply with appropriate state (and, at times, federal) permitting requirements. Crossings of drainage channels and intermittent streams must be done in ways that avoid erosion problems and long-term changes in water flow. Proposed crossings of permanent streams must be discussed in advance with Resource Stewardship staff and may require an on-site planning session before any work begins. The purpose of these discussions will be to minimize the number of crossings and their impact on the important resources in the streams.

3. Cutting of trees within SMZs must be accomplished by using either hand-held equipment or other appropriate clearing equipment (e.g. a feller-buncher) that would result in minimal soil disturbance and damage to low lying vegetation. The method will be selected based on site specific conditions and topography to minimize soil disturbance and impacts to the SMZ and surrounding area. Cutting of trees near permanent streams must be limited to those required to meet National Electric Safety Code (NESC) 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, discing, blading or other tillage or grading equipment will not be allowed in SMZs, however, a minimal amount of soil disturbance may occur as a result of clearing operations. Shorelines that have to be disturbed must be stabilized as soon as possible and revegetated as soon as feasible.

C) Protection of Unique Habitats

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

Guidelines:

1. Except as modified by guidelines 2-4 below, all construction work around the unique habitat will be done using pertinent BMPs such as those described in "A Guide for Environmental

Protection and Best Management Practices for TVA Construction and Maintenance Activities," especially Chapter 6, Standards and Specifications.

2. All construction activity in and within 30 meters (100 feet) of the unique habitat must be approved in advance by Resource Stewardship staff, preferably as a result of an on-site planning session. The purpose of this review and approval will be to minimize impacts on the unique habitat. All crossings of streams also must comply with appropriate state (and, at times, federal) permitting requirements.

3. Cutting of trees within 30 meters (100 feet) of the unique habitat must be discussed in advance with Resource Stewardship staff, preferably during the on-site planning session. Cutting of trees near the unique habitat must be kept to an absolute minimum. Stumps must not be removed, uprooted, or cut shorter than one 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, discing, blading, or grading. Areas that have to be disturbed must be stabilized as soon as possible and revegetated as soon as feasible, in some cases with specific kinds of native plants. These and other vegetative requirements will be coordinated with Resource Stewardship staff.

Additional Help

If you have any questions about the purpose of these guidelines or how to apply them, please contact your supervisor or the Environmental Coordinator in the local Transmission Service Center.

APPENDIX V – TVA RIGHT-OF-WAY VEGETATION MANAGEMENT

TVA must manage its rights-of-way and easements -to ensure emergency maintenance access; and routine access to structures, switches, conductors, and communications equipment. In addition, TVA must ensure National Electrical Safety Code electrical clearances between structures, tall growing vegetation, and any other structures. Trees located off right-of-way trees that could fall or be cut into a transmission line are also very important.

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

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

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

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

When slopes become hazardous to farm tractors and rotary mowers TVA may use a variety of herbicides specific to the species present with a variety of possible application techniques. When scattered small segments of tall growing vegetation are present but accessibility along the right-of-way is difficult or the path to such segments is very long compared to the amount present herbicides may be used.

In very steep terrain, in sensitive environmental areas, in extensive wetlands, at stream banks and in sensitive property owner land use areas hand clearing may be utilized. Hand clearing is recognized as one of the most hazardous occupations documented by the Occupational Health and Safety

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

TVA does not encourage individual property owner tree reclearing activity because of the high hazard potential of hand clearing; possible interruptions of the line; and, electrical safety considerations for untrained personnel that might do the work. Private property owners may reclear the right-of-way with trained reclearing professionals.

TVA's experience initially was completely with hand clearing. World War II manpower shortages forced TVA to look toward developments in herbicide research. An era of near exclusive use of herbicides existed, then as herbicide prices increased and high volume applications lost favor because of high volume applications and discovery of residue accumulations with many pesticides TVA sought other modes of vegetation control. Farm equipment of greater power and efficiency allowed use of tractor mounted rotary mowers. These mowers not only cut the tall saplings and seedlings on the right-of-way they shatter the stump and the supporting near surface root crown. The tendency of resistant species is to resprout from the root crown and shattered stumps produce a multistem dense stand in the immediate area. Repeated use of the mowers on short cycle reclearing with many original stumps regrowing in the above manner creates a single species thicket or monoculture. With the original large root system and multiple stems the resistant species can and usually does produce regrowth at the rate of 5-10 feet in a year. In years with high rainfall the growth can reach 12-15 feet in a single year.

These created, dense, monoculture stands can become nearly impenetrable for even large tractors. Such stands have low diversity, little wildlife food or nesting potential, and become a property owner concern. They tend to spread off the right-of-way into more desirable species areas. Increasingly, TVA is receiving complaints about the shatter sapling debris density. The potential exists for insect invasion or fungus infection resulting from the easy invasion of damaged specimens or debris. Once started such infestations or invasions can spread into valuable timber of the same or related species off the right-of-way.

Therefore, TVA has been working with universities (such as Mississippi State University, University of Tennessee, Purdue University and others) chemical companies, other utilities, U. S. Department of Transportation, U.S. Fish and Wildlife and U.S. Forest Service personnel to explore other means of dealing with problem vegetation. The results have been strong recommendations to use species specific, low volume, herbicide applications in more situations. Research, demonstrations, and other right-of-way programs show a definite improvement of rights-of-way treated with selective low volume applications of new herbicides using a variety of application techniques and timing.

The above named universities strongly recommend low volume herbicide applications since their research demonstrates much wider plant diversity after such applications. They report better ground erosion protection and 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.

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

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

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

TVA discusses with property owners the potential to sign an agreement to manage their land for wildlife under the auspices of "Project Habitat" a joint TVA, American Cyanamid, and wildlife organization. The property owner maintains the right-of-way in wildlife food and cover with emphasis on quail, turkey, deer or related forms. A variation used in or adjacent to developing suburban areas is to sign agreements with the developer and residents to plant and maintain wildflowers on the right-of-way.

TVA places strong emphasis on developing rights-of-way in the above manner. When the property owners do not agree to these opportunities TVA must maintain the right-of-way in the most environmentally acceptable, cost and vegetation effective and efficient manner possible.

Approved Herbicides for Usage on TVA Rights-of-Way

Trade Name	Active Ingredients	Label Signal Word
Accord	Glyphosate/Liquid	Caution
Arsenal	Imazapyr/Liquid/Granule	Caution
Escort	Metsulfuron Methyl/dry flowable	Caution
Garlon	Triclopyr/Liquid	Caution
Garlon 3A	Triclopyr/Liquid	Danger
Diuron	Diuron/Flowable powder	Caution
Spike 40P	Tebuthiuron/Pellet	Caution
Spike 80W	Tebuthiuron/Wettable powder	Caution
Transline	Clopyralid/Liquid	Caution
Pathfinder II	Triclopyr/RTU	Caution
Krenite UT	Fosamine Ammoinium	Warning
Vanquish	Diglycolamine	Caution

Approved Herbicides for Bare Ground Areas

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

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

Approved TGRs for Use on TVA Property

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

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

These herbicides have been evaluated in extensive studies at universities, in support of registration applications and label requirements. Most have been reviewed in the U.S. Forest Service Vegetation Management Environmental Impact Statements and those evaluations are incorporated here by reference. The result of these reviews has been a consistent finding of limited environmental impact beyond that of control of the target vegetation. All the listed herbicides have been found to be of low environmental toxicity when applied by trained applicators following the label and registration procedures, including buffer zones for listed threatened or endangered species.

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

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

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

	Application Method					
Herbicide	Aerial Liquid	Aerial Granule	Mechanical Liquid	Mechanical Granule	Manual Hand	Manual Foliar
Tebuthiuron	1.0	1.0	1.0	1.0		4.0
Triclopyr amine	4.0		4.0			4.0
Triclopyr ester	4.0		4.0			4.0

TVA currently uses primarily low volume applications of foliar and basal applications of Accord (Glyphosate) and Accord (Glyphosate)-Arsenal (Imazapyr) tank mixes. Glyposate is one of the most widely used herbicidal active ingredients in the world, and has been continuously the subject of numerous exhaustive studies and scrutiny to determine it's potential impacts on humans, animals and the environment.

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

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

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

Glyphosate is naturally degraded by microbes in soil and water under both aerobic (with oxygen) and anaerobic (without oxygen) conditions. AMPA is further degraded in soil and sediments to: phosphorus, nitrogen, hydrogen and carbon dioxide. Glyphosate binds rapidly and completely to a wide range of soils and sediment when introduced into the environment. This essentially eliminates movement in the soil. The average half-life of glyphosate in soils is less than 45 days. Half-life for the dissipation of glyphosate in environmental waters ranges from 1.5 to 14 days.

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

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

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

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

APPENDIX VI – TVA ENVIRONMENTAL QUALITY PROTECTION SPECIFICATIONS FOR TRANSMISSION SUBSTATION OR COMMUNICATIONS CONSTRUCTION

1. General - TVA and/or the assigned Contractor and subcontractors shall plan, coordinate, and conduct his or her operations in a manner which protects the quality of the environment and complies with TVA's environmental expectations discussed in the pre-construction meeting (including clearing and grading, or re-clearing and removal or dismantling). This specification contains provisions which 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 shall 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 anti-pollution 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 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.

   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 waste. 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 onsite 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 onsite, 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 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 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 de-watering 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 re-stabilized 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 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 which 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 on to 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 personnel 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 personnel 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 which 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. Also, 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 which 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

so 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 walkdown the site and complete an approval inspection.

Revision February 2001

APPENDIX VII – WETLAND DATA FORMS

Project: Lowndes-W. Point	Investigator: Hixson/Pilarski	Normal Circumstances:	x	Sample ID:	W1
County: Lowndes		Atypical Situation:		Station or Structure Number(s):	
State: MS	Date: 03/03/2004	Problem Area:		Cowardin Code:	PFO1A

Vegetation

	Plant Species	Stratum	Indicator		Plant Species	Stratum	Indicator
1.	*Acer rubrum*	T	FAC	9.			
2.	*Liquidambar styraciflua*	T	FAC+	10.			
3.	*Quercus phellos*	T	FACW-	11.			
4.	*Forestiera acuminate*	S	OBL	12.			
5.	*Scirpus spp.*	H	OBL	13.			
6.	*Saururus cernus*	H	OBL	14.			
7.				15.			
8.				16.			

Percent of Dominant Species That are OBL, FACW, or FAC: % 100

Hydrology

Field Observations:

Depth of Surface Water: 12 (in.)

Depth to Free Water in Pit: ____ (in.)

Depth to Saturated Soil: ____ (in.)

Wetland Hydrology Indicators:

	Primary Indicators			Secondary Indicators
x	Inundated	x	Drift Lines	x Oxidized Root Channels
____	Saturated in Upper 12 in.	x	Water Marks	x Water Stained Leaves
____	Sediment Deposits	x	Drainage Patterns	

Remarks:

Soils

Profile Description:

Depth (Inches)	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance (%)	Texture
1-6”	10YR 3/2	10YR5/8	15%	Sandy silt
6-12”	10YR5/2	10YR5/8	25%	Sandy silt

Hydric Soil Indicators:

x	Gleyed or Low Chroma Colors	____	Histic Epipedon	____	Aquic Moisture Regime
____	Sulfidic Odor	____	High Organic Cont. Surf. Layer Sandy Soils	x	Reducing Conditions
____	Concretions	____	Organic Streaking in Sandy Soils	____	Other (Explain in Remarks)

Remarks:

Wetland Determination

Hydrophytic Vegetation Present?	Yes		No		Is this Sampling Point Within a USACE Wetland?	Yes		No	
Wetland Hydrology Present?	Yes		No		Does area only meet USFWS wetland definition?	Yes		No	
Hydric Soils Present?	Yes		No		Size (obtain from TPS survey):	87.7' x 100' ROW = 8770 sq ft. = ..20 acre			

Wetland Descriptors

Sample ID: W1 Lowndes W. Point	**Photo ID(s) (Sample ID - Photo #):**															
Flagging Description: (i.e.; A1-A4; C1-C7)																
Drawing																
Please Include: North Arrow, Project Centerline, Survey Corridor Boundaries, Length of Wetland Feature, Distances from Centerline, Photo Locations See maps 5.2.1																
Obvious Connections to Waters of the US/State?	x	Yes		No	Waterbody:											
Primary Water Source (If other, note in comments)		Cap. Fringe		Overbanking	x	Sheet Flow		Groundwater	x	Precipitation		Other				
Wetland Quality (High, Moderate, Low)		Comments: Moderate														
Wetland Functional Quality (High, Moderate, Low)		Comments: High														

Description of Wetland and Other Comments: (i.e. forest age class; habitat features; hydrologic regime; description of the wetland outside of or adjacent to ROW; erosion potential, existing disturbances, adjacent land use, wildlife observations, station numbers, lat-long, etc)

~50+ year old forested wetland in logged / pine plantation; good habitat features; amphibian activity

WETLAND QUALITY CRITERIA (includes, but is not limited to)

WETLAND QUALITY:
HIGH QUALITY WETLAND: no indication of stress or disturbance in wetland or adjacent area – diverse and/or mature vegetation community – hydrologic and soil indicators are characteristic of the specific community type – provides high-quality and/or rare/important habitat for wildlife (i.e., structural diversity; vernal pools; diverse, dense emergent vegetation). May be associated with high-quality, relatively undisturbed, perennial streams.
MODERATE QUALITY WETLAND: mild to moderate disturbances have caused alterations in wetland or immediately adjacent areas – slightly altered natural vegetation, hydrology and/ or soil characteristics – provides suitable habitat for wildlife and vegetation diversity – associated perennial or intermittent streams are of relatively good quality and aren't significantly disturbed
LOW QUALITY WETLAND: severe disturbances have caused significant changes to vegetation, soils, or hydrology – hydroperiod alterations, if present, have directly affected plant species – community composition has changed – noticeable stress or death of plant species – soil subsidence may have occurred in areas with decreased hydroperiod – mechanical alteration of plant species or soils – grazing from livestock – channelization of stream courses or ditching – little suitable habitat for wildlife and vegetation – associated perennial or intermittent streams significantly disturbed

WETLAND FUNCTIONAL QUALITY:
HIGH QUALITY: Because of wetland characteristics and/or landscape position, performs critical water quality, flood control, wildlife habitat, biodiversity, and/or landscape diversity functions
MODERATE QUALITY: Performs important water quality, flood control, wildlife habitat, biodiversity, and/or landscape diversity functions.
LOW QUALITY: Because of wetland characteristics, landscape position, or level of disturbance, wetland functions are minimal.

Wetland Determination Form

Project: Lowndes-W. Point	Investigator: Hixson/Pilarski	Normal Circumstances:		Sample ID:	W2
County: Lowndes		Atypical Situation:	x	Station or Structure Number(s):	
State: MS	Date: 03/03/2004	Problem Area:		Cowardin Code:	PEM1A/PSS1A

Vegetation

	Plant Species	Stratum	Indicator		Plant Species	Stratum	Indicator
1.	*Salix nigra*	S	OBL	9.			
2.	*Lonicera japonica*	S	FAC-	10.			
3.				11.			
4.	*Forestiera acuminate*	S	OBL	12.			
5.	*Scirpus spp.*	H	OBL	13.			
6.	*Juncus effusus*	H	OBL	14.			
7.	*Typha latifolia*	H	OBL	15.			
8.	*Acer rubrum*	T	FAC	16.			

Percent of Dominant Species That are OBL, FACW, or FAC: % 100

Hydrology

Field Observations:

Depth of Surface Water: 6-12 (in.)

Depth to Free Water in Pit: (in.)

Depth to Saturated Soil: (in.)

Wetland Hydrology Indicators:

Primary Indicators

- x Inundated
- Saturated in Upper 12 in.
- Sediment Deposits
- x Drift Lines
- x Water Marks
- x Drainage Patterns

Secondary Indicators

- x Oxidized Root Channels
- x Water Stained Leaves

Remarks:

Soils

Profile Description:

Depth (Inches)	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance (%)	Texture
0-12”	5Y 4/2	5Y4/6	25%	Silty clay loam

Hydric Soil Indicators:

- x Gleyed or Low Chroma Colors
- Sulfidic Odor
- x Concretions
- Histic Epipedon
- High Organic Cont. Surf. Layer Sandy Soils
- Organic Streaking in Sandy Soils
- Aquic Moisture Regime
- x Reducing Conditions
- Other (Explain in Remarks)

Remarks:

Wetland Determination

Hydrophytic Vegetation Present?	Yes	x	No		Is this Sampling Point Within a USACE Wetland?	Yes	x	No
Wetland Hydrology Present?	Yes	x	No		Does area only meet USFWS wetland definition?	Yes		No
Hydric Soils Present?	Yes	x	No		Size (obtain from TPS survey):	221.1’ long x 100’ wide ROW	= 22110 sq ft. = .51 acre	

Wetland Descriptors

Sample ID: W2 Lowndes W. Point	**Photo ID(s) (Sample ID - Photo #):**
Flagging Description: (i.e.; A1-A4; C1-C7)	
Drawing	
Please Include: North Arrow, Project Centerline, Survey Corridor Boundaries, Length of Wetland Feature, Distances from Centerline, Photo Locations See maps 5.2.1	

Obvious Connections to Waters of the US/State?	x	Yes		No	Waterbody:												
Primary Water Source (If other, note in comments)		Cap. Fringe		Overbanking	x	Sheet Flow		Groundwater	x	Precipitation		Other					
Wetland Quality (High, Moderate, Low)		Comments: low															
Wetland Functional Quality (High, Moderate, Low)		Comments: low															

Description of Wetland and Other Comments: (i.e. forest age class; habitat features; hydrologic regime; description of the wetland outside of or adjacent to ROW; erosion potential, existing disturbances, adjacent land use, wildlife observations, station numbers, lat-long, etc)

PEM/PSS in midst of pine plantation; ruts, ground disturbance; amphibian activity

WETLAND QUALITY CRITERIA (includes, but is not limited to)

WETLAND QUALITY:
HIGH QUALITY WETLAND: no indication of stress or disturbance in wetland or adjacent area – diverse and/or mature vegetation community – hydrologic and soil indicators are characteristic of the specific community type – provides high-quality and/or rare/important habitat for wildlife (i.e., structural diversity; vernal pools; diverse, dense emergent vegetation). May be associated with high-quality, relatively undisturbed, perennial streams.
MODERATE QUALITY WETLAND: mild to moderate disturbances have caused alterations in wetland or immediately adjacent areas – slightly altered natural vegetation, hydrology and/ or soil characteristics – provides suitable habitat for wildlife and vegetation diversity – associated perennial or intermittent streams are of relatively good quality and aren't significantly disturbed
LOW QUALITY WETLAND: severe disturbances have caused significant changes to vegetation, soils, or hydrology – hydroperiod alterations, if present, have directly affected plant species – community composition has changed – noticeable stress or death of plant species – soil subsidence may have occurred in areas with decreased hydroperiod – mechanical alteration of plant species or soils – grazing from livestock – channelization of stream courses or ditching – little suitable habitat for wildlife and vegetation – associated perennial or intermittent streams significantly disturbed

WETLAND FUNCTIONAL QUALITY:
HIGH QUALITY: Because of wetland characteristics and/or landscape position, performs critical water quality, flood control, wildlife habitat, biodiversity, and/or landscape diversity functions
MODERATE QUALITY: Performs important water quality, flood control, wildlife habitat, biodiversity, and/or landscape diversity functions.
LOW QUALITY: Because of wetland characteristics, landscape position, or level of disturbance, wetland functions are minimal.

Wetland Determination Form

Project: Lowndes-W. Point	Investigator: Hixson/Pilarski	Normal Circumstances:	x	Sample ID:	W3
County: Lowndes		Atypical Situation:		Station or Structure Number(s):	
State: MS	Date: 03/03/2004	Problem Area:		Cowardin Code:	PFO1A

Vegetation

	Plant Species	Stratum	Indicator		Plant Species	Stratum	Indicator
1.	*Salix nigra*	S	OBL	9.			
2.	*Lonicera japonica*	S	FAC-	10.			
3.	*Quercus phellos*	T	FACW-	11.			
4.	*Forestiera acuminate*	S	OBL	12.			
5.	*Acer rubrum*	T	OBL	13.			
6.	*Liquidambar styraclflua*	T	FAC+	14.			
7.				15.			
8.				16.			

Percent of Dominant Species That are OBL, FACW, or FAC: % 100

Hydrology

Field Observations:

Depth of Surface Water: 12-18” (in.)

Depth to Free Water in Pit: (in.)

Depth to Saturated Soil: (in.)

Wetland Hydrology Indicators:

Primary Indicators				Secondary Indicators	
x	Inundated	x	Drift Lines	x	Oxidized Root Channels
	Saturated in Upper 12 in.	x	Water Marks	x	Water Stained Leaves
X	Sediment Deposits	x	Drainage Patterns		

Remarks:

Soils

Profile Description:

Depth (Inches)	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance (%)	Texture
0-12”	2.5Y 4/2	5Y4/8	20%	Sandy silt

Hydric Soil Indicators:

x	Gleyed or Low Chroma Colors		Histic Epipedon		Aquic Moisture Regime
	Sulfidic Odor		High Organic Cont. Surf. Layer Sandy Soils	x	Reducing Conditions
	Concretions		Organic Streaking in Sandy Soils		Other (Explain in Remarks)

Remarks:

Wetland Determination

Hydrophytic Vegetation Present?	Yes	x	No		Is this Sampling Point Within a USACE Wetland?	Yes	x	No
Wetland Hydrology Present?	Yes	x	No		Does area only meet USFWS wetland definition?	Yes		No
Hydric Soils Present?	Yes	x	No		Size (obtain from TPS survey):	166’ long x 80’ wide = 13280 sq ft. = .30 acre		

Wetland Descriptors

Sample ID: W2 Lowndes W. Point	**Photo ID(s) (Sample ID - Photo #):**
Flagging Description: (i.e.; A1-A4; C1-C7)	
Drawing	
Please Include: North Arrow, Project Centerline, Survey Corridor Boundaries, Length of Wetland Feature, Distances from Centerline, Photo Locations See maps 5.2.1	

Obvious Connections to Waters of the US/State?	x	Yes		No	Waterbody:												
Primary Water Source (If other, note in comments)		Cap. Fringe		Overbanking	x	Sheet Flow		Groundwater	x	Precipitation		Other					
Wetland Quality (High, Moderate, Low)		Comments: moderate															
Wetland Functional Quality (High, Moderate, Low)		Comments: moderate															

Description of Wetland and Other Comments: (i.e. forest age class; habitat features; hydrologic regime; description of the wetland outside of or adjacent to ROW; erosion potential, existing disturbances, adjacent land use, wildlife observations, station numbers, lat-long, etc)

Relatively high quality forested wetland adjacent to Columbus AFB; totally inundated; amphibian usage; directly adjacent to access road; receiving runoff from AFB

WETLAND QUALITY CRITERIA (includes, but is not limited to)

WETLAND QUALITY:
HIGH QUALITY WETLAND: no indication of stress or disturbance in wetland or adjacent area – diverse and/or mature vegetation community – hydrologic and soil indicators are characteristic of the specific community type – provides high-quality and/or rare/important habitat for wildlife (i.e., structural diversity; vernal pools; diverse, dense emergent vegetation). May be associated with high-quality, relatively undisturbed, perennial streams.
MODERATE QUALITY WETLAND: mild to moderate disturbances have caused alterations in wetland or immediately adjacent areas – slightly altered natural vegetation, hydrology and/ or soil characteristics – provides suitable habitat for wildlife and vegetation diversity – associated perennial or intermittent streams are of relatively good quality and aren't significantly disturbed
LOW QUALITY WETLAND: severe disturbances have caused significant changes to vegetation, soils, or hydrology – hydroperiod alterations, if present, have directly affected plant species – community composition has changed – noticeable stress or death of plant species – soil subsidence may have occurred in areas with decreased hydroperiod – mechanical alteration of plant species or soils – grazing from livestock – channelization of stream courses or ditching – little suitable habitat for wildlife and vegetation – associated perennial or intermittent streams significantly disturbed

WETLAND FUNCTIONAL QUALITY:
HIGH QUALITY: Because of wetland characteristics and/or landscape position, performs critical water quality, flood control, wildlife habitat, biodiversity, and/or landscape diversity functions
MODERATE QUALITY: Performs important water quality, flood control, wildlife habitat, biodiversity, and/or landscape diversity functions.
LOW QUALITY: Because of wetland characteristics, landscape position, or level of disturbance, wetland functions are minimal.

Wetland Determination Form

Project: Lowndes-W. Point	Investigator: Hixson/Pilarski	Normal Circumstances:	x	Sample ID:	W4
County: Lowndes		Atypical Situation:		Station or Structure Number(s):	PI 1409; 89+7037
State: MS	Date: 03/03/2004	Problem Area:		Cowardin Code:	PFO1A/PSS

Vegetation

	Plant Species	Stratum	Indicator		Plant Species	Stratum	Indicator
1.	*Salix nigra*	S	OBL	9.	*Fraxinus pennsylvanica*	T	FACW
2.	*Lonicera japonica*	S	FAC-	10.			
3.	*Quercus phellos*	T	FACW-	11.			
4.	*Forestiera acuminate*	S	OBL	12.			
5.	*Acer rubrum*	T	OBL	13.			
6.	*Liquidambar styraclflua*	T	FAC+	14.			
7.	*Juncus effuses*	H	OBL	15.			
8.	*Scirpus spp.*	H	OBL	16.			

Percent of Dominant Species That are OBL, FACW, or FAC: % 100

Hydrology

Field Observations:

Depth of Surface Water: 2" (in.)

Depth to Free Water in Pit: ____ (in.)

Depth to Saturated Soil: ____ (in.)

Wetland Hydrology Indicators:

	Primary Indicators			Secondary Indicators
x	Inundated	x	Drift Lines	____ Oxidized Root Channels
____	Saturated in Upper 12 in.	x	Water Marks	x Water Stained Leaves
X	Sediment Deposits	x	Drainage Patterns	

Remarks:

Soils

Profile Description:

Depth (Inches)	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance (%)	Texture
0-12"	5Y3/1	-	-	Sandy

Hydric Soil Indicators:

x	Gleyed or Low Chroma Colors	____	Histic Epipedon	____	Aquic Moisture Regime
x	Sulfidic Odor	____	High Organic Cont. Surf. Layer Sandy Soils	x	Reducing Conditions
____	Concretions	____	Organic Streaking in Sandy Soils	____	Other (Explain in Remarks)

Remarks:

Wetland Determination

Hydrophytic Vegetation Present?	Yes	x	No	____	Is this Sampling Point Within a USACE Wetland?	Yes	x	No	____
Wetland Hydrology Present?	Yes	x	No	____	Does area only meet USFWS wetland definition?	Yes	____	No	____
Hydric Soils Present?	Yes	x	No	____	Size (obtain from TPS survey):	263.5'x100' ROW = 26350 sq. ft. = .60 acre			

Wetland Descriptors

Sample ID: W4 Lowndes W. Point	**Photo ID(s) (Sample ID - Photo #):**
Flagging Description: (i.e.; A1-A4; C1-C7)	

Drawing

Please Include: North Arrow, Project Centerline, Survey Corridor Boundaries, Length of Wetland Feature, Distances from Centerline, Photo Locations

See maps

5.2.1

Obvious Connections to Waters of the US/State?	x	Yes		No	Waterbody:													
Primary Water Source (If other, note in comments)		Cap. Fringe		Overbanking	x	Sheet Flow		Groundwater	x	Precipitation		Other						
Wetland Quality (High, Moderate, Low)		Comments: low																
Wetland Functional Quality (High, Moderate, Low)		Comments: low																

Description of Wetland and Other Comments: (i.e. forest age class; habitat features; hydrologic regime; description of the wetland outside of or adjacent to ROW; erosion potential, existing disturbances, adjacent land use, wildlife observations, station numbers, lat-long, etc)

Mixed PFO/PSS along drainage channel. Low quality overall.

WETLAND QUALITY CRITERIA (includes, but is not limited to)

WETLAND QUALITY:
HIGH QUALITY WETLAND: no indication of stress or disturbance in wetland or adjacent area – diverse and/or mature vegetation community – hydrologic and soil indicators are characteristic of the specific community type – provides high-quality and/or rare/important habitat for wildlife (i.e., structural diversity; vernal pools; diverse, dense emergent vegetation). May be associated with high-quality, relatively undisturbed, perennial streams.
MODERATE QUALITY WETLAND: mild to moderate disturbances have caused alterations in wetland or immediately adjacent areas – slightly altered natural vegetation, hydrology and/ or soil characteristics – provides suitable habitat for wildlife and vegetation diversity – associated perennial or intermittent streams are of relatively good quality and aren't significantly disturbed
LOW QUALITY WETLAND: severe disturbances have caused significant changes to vegetation, soils, or hydrology – hydroperiod alterations, if present, have directly affected plant species – community composition has changed – noticeable stress or death of plant species – soil subsidence may have occurred in areas with decreased hydroperiod – mechanical alteration of plant species or soils – grazing from livestock – channelization of stream courses or ditching – little suitable habitat for wildlife and vegetation – associated perennial or intermittent streams significantly disturbed

WETLAND FUNCTIONAL QUALITY:
HIGH QUALITY: Because of wetland characteristics and/or landscape position, performs critical water quality, flood control, wildlife habitat, biodiversity, and/or landscape diversity functions
MODERATE QUALITY: Performs important water quality, flood control, wildlife habitat, biodiversity, and/or landscape diversity functions.
LOW QUALITY: Because of wetland characteristics, landscape position, or level of disturbance, wetland functions are minimal.

Wetland Determination Form

Project: Lowndes-W. Point	Investigator: Hixson/Pilarski	Normal Circumstances:	x	Sample ID:	W5
County: Lowndes		Atypical Situation:		Station or Structure Number(s):	
State: MS	Date: 03/03/2004	Problem Area:		Cowardin Code:	PFO1A

Vegetation

	Plant Species	Stratum	Indicator		Plant Species	Stratum	Indicator
1.	*Salix nigra*	S	OBL	9.	*Fraxinus pennsylvanica*	T	FACW
2.	*Lonicera japonica*	S	FAC-	10.	*Typha latifolia*	H	OBL
3.	*Quercus phellos*	T	FACW-	11.	*Saururus cernus*	H	OBL
4.	*Forestiera acuminate*	S	OBL	12.			
5.	*Acer rubrum*	T	OBL	13.			
6.	*Liquidambar styraclflua*	T	FAC+	14.			
7.	*Juncus effuses*	H	OBL	15.			
8.	*Scirpus spp.*	H	OBL	16.			

Percent of Dominant Species That are OBL, FACW, or FAC: % 100

Hydrology

Field Observations:

Depth of Surface Water: 2" (in.)

Depth to Free Water in Pit: (in.)

Depth to Saturated Soil: (in.)

Wetland Hydrology Indicators:

	Primary Indicators			Secondary Indicators
x	Inundated	x	Drift Lines	Oxidized Root Channels
	Saturated in Upper 12 in.	x	Water Marks	x Water Stained Leaves
X	Sediment Deposits	x	Drainage Patterns	

Remarks:

Soils

Profile Description:

Depth (Inches)	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance (%)	Texture
0-12"	2.5Y 4/2	10Y5/8	15%	Sandy clay loam

Hydric Soil Indicators:

x	Gleyed or Low Chroma Colors		Histic Epipedon		Aquic Moisture Regime
x	Sulfidic Odor		High Organic Cont. Surf. Layer Sandy Soils	x	Reducing Conditions
	Concretions		Organic Streaking in Sandy Soils		Other (Explain in Remarks)

Remarks:

Wetland Determination

Hydrophytic Vegetation Present?	Yes	x	No		Is this Sampling Point Within a USACE Wetland?	Yes	x	No
Wetland Hydrology Present?	Yes	x	No		Does area only meet USFWS wetland definition?	Yes		No
Hydric Soils Present?	Yes	x	No		Size (obtain from TPS survey):	61.4'x50' ROW = 3070 sq. ft. = .07 acre		

Wetland Descriptors

Sample ID: W4 Lowndes W. Point	**Photo ID(s) (Sample ID - Photo #):**
Flagging Description: (i.e.; A1-A4; C1-C7)	
Drawing	
Please Include: North Arrow, Project Centerline, Survey Corridor Boundaries, Length of Wetland Feature, Distances from Centerline, Photo Locations See maps 5.2.1	

Obvious Connections to Waters of the US/State?	x	Yes		No	Waterbody:												
Primary Water Source (If other, note in comments)		Cap. Fringe		Overbanking	x	Sheet Flow		Groundwater	x	Precipitation		Other					
Wetland Quality (High, Moderate, Low)		Comments: moderate															
Wetland Functional Quality (High, Moderate, Low)		Comments: moderate															

Description of Wetland and Other Comments: (i.e. forest age class; habitat features; hydrologic regime; description of the wetland outside of or adjacent to ROW; erosion potential, existing disturbances, adjacent land use, wildlife observations, station numbers, lat-long, etc)

Moderate quality wetlands – good plant diversity. Located directly adjacent to access road.

WETLAND QUALITY CRITERIA (includes, but is not limited to)

WETLAND QUALITY:
HIGH QUALITY WETLAND: no indication of stress or disturbance in wetland or adjacent area – diverse and/or mature vegetation community – hydrologic and soil indicators are characteristic of the specific community type – provides high-quality and/or rare/important habitat for wildlife (i.e., structural diversity; vernal pools; diverse, dense emergent vegetation). May be associated with high-quality, relatively undisturbed, perennial streams.
MODERATE QUALITY WETLAND: mild to moderate disturbances have caused alterations in wetland or immediately adjacent areas – slightly altered natural vegetation, hydrology and/ or soil characteristics – provides suitable habitat for wildlife and vegetation diversity – associated perennial or intermittent streams are of relatively good quality and aren't significantly disturbed
LOW QUALITY WETLAND: severe disturbances have caused significant changes to vegetation, soils, or hydrology – hydroperiod alterations, if present, have directly affected plant species – community composition has changed – noticeable stress or death of plant species – soil subsidence may have occurred in areas with decreased hydroperiod – mechanical alteration of plant species or soils – grazing from livestock – channelization of stream courses or ditching – little suitable habitat for wildlife and vegetation – associated perennial or intermittent streams significantly disturbed

WETLAND FUNCTIONAL QUALITY:
HIGH QUALITY: Because of wetland characteristics and/or landscape position, performs critical water quality, flood control, wildlife habitat, biodiversity, and/or landscape diversity functions
MODERATE QUALITY: Performs important water quality, flood control, wildlife habitat, biodiversity, and/or landscape diversity functions.
LOW QUALITY: Because of wetland characteristics, landscape position, or level of disturbance, wetland functions are minimal.

Wetland Determination Form

Project: Lowndes-W. Point	Investigator: Hixson/Pilarski	Normal Circumstances:	x	Sample ID:	W6
County: Lowndes		Atypical Situation:		Station or Structure Number(s):	
State: MS	Date: 03/03/2004	Problem Area:		Cowardin Code:	PEM

Vegetation

	Plant Species	Stratum	Indicator		Plant Species	Stratum	Indicator
1.	*Typha latifolia*	H	OBL	9.			
2.	*Scirpus spp.*	H	OBL	10.			
3.	*Juncus effusus*	H	OBL	11.			
4.	*Scirpus cyperinus*	H	OBL	12.			
5.				13.			
6.				14.			
7.				15.			
8.				16.			

Percent of Dominant Species That are OBL, FACW, or FAC: % 100

Hydrology

Field Observations:

Depth of Surface Water:	6-12”	(in.)
Depth to Free Water in Pit:	8”	(in.)
Depth to Saturated Soil:	2”	(in.)

Wetland Hydrology Indicators:

Primary Indicators				Secondary Indicators	
x	Inundated		Drift Lines		Oxidized Root Channels
x	Saturated in Upper 12 in.		Water Marks	x	Water Stained Leaves
	Sediment Deposits	x	Drainage Patterns		

Remarks:

Soils

Profile Description:

Depth (Inches)	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance (%)	Texture
0-12”	5YR 5/1	15YR5/8	10%	Sandy clay

Hydric Soil Indicators:

x	Gleyed or Low Chroma Colors		Histic Epipedon		Aquic Moisture Regime
x	Sulfidic Odor		High Organic Cont. Surf. Layer Sandy Soils	x	Reducing Conditions
	Concretions		Organic Streaking in Sandy Soils		Other (Explain in Remarks)

Remarks:

Wetland Determination

Hydrophytic Vegetation Present?	Yes	x	No		Is this Sampling Point Within a USACE Wetland?	Yes	x	No	x
Wetland Hydrology Present?	Yes	x	No		Does area only meet USFWS wetland definition?	Yes		No	
Hydric Soils Present?	Yes	x	No		Size (obtain from TPS survey):	42.4’x70 ROW = 2968 sq. ft. = 0.07 acre			

Wetland Descriptors

Sample ID: W4 Lowndes W. Point	**Photo ID(s) (Sample ID - Photo #):**
Flagging Description: (i.e.; A1-A4; C1-C7)	
Drawing	
Please Include: North Arrow, Project Centerline, Survey Corridor Boundaries, Length of Wetland Feature, Distances from Centerline, Photo Locations See maps 5.2.1	

Obvious Connections to Waters of the US/State?		Yes	x	No	Waterbody:											
Primary Water Source (If other, note in comments)		Cap. Fringe		Overbanking		Sheet Flow		Groundwater	x	Precipitation	x	Other				
Wetland Quality (High, Moderate, Low)		Comments: low														
Wetland Functional Quality (High, Moderate, Low)		Comments: low														

Description of Wetland and Other Comments: (i.e. forest age class; habitat features; hydrologic regime; description of the wetland outside of or adjacent to ROW; erosion potential, existing disturbances, adjacent land use, wildlife observations, station numbers, lat-long, etc)

Small (<.10 acre) emergent wetland.

WETLAND QUALITY CRITERIA (includes, but is not limited to)

WETLAND QUALITY:
HIGH QUALITY WETLAND: no indication of stress or disturbance in wetland or adjacent area – diverse and/or mature vegetation community – hydrologic and soil indicators are characteristic of the specific community type – provides high-quality and/or rare/important habitat for wildlife (i.e., structural diversity; vernal pools; diverse, dense emergent vegetation). May be associated with high-quality, relatively undisturbed, perennial streams.
MODERATE QUALITY WETLAND: mild to moderate disturbances have caused alterations in wetland or immediately adjacent areas – slightly altered natural vegetation, hydrology and/ or soil characteristics – provides suitable habitat for wildlife and vegetation diversity – associated perennial or intermittent streams are of relatively good quality and aren't significantly disturbed
LOW QUALITY WETLAND: severe disturbances have caused significant changes to vegetation, soils, or hydrology – hydroperiod alterations, if present, have directly affected plant species – community composition has changed – noticeable stress or death of plant species – soil subsidence may have occurred in areas with decreased hydroperiod – mechanical alteration of plant species or soils – grazing from livestock – channelization of stream courses or ditching – little suitable habitat for wildlife and vegetation – associated perennial or intermittent streams significantly disturbed

WETLAND FUNCTIONAL QUALITY:
HIGH QUALITY: Because of wetland characteristics and/or landscape position, performs critical water quality, flood control, wildlife habitat, biodiversity, and/or landscape diversity functions
MODERATE QUALITY: Performs important water quality, flood control, wildlife habitat, biodiversity, and/or landscape diversity functions.
LOW QUALITY: Because of wetland characteristics, landscape position, or level of disturbance, wetland functions are minimal.

Wetland Determination Form

Project: Lowndes-W. Point	Investigator: Hixson/Pilarski	Normal Circumstances:		Sample ID:	W7
County: Lowndes		Atypical Situation:	x	Station or Structure Number(s):	Between CP 1422-1423
State: MS	Date: 03/03/2004	Problem Area:		Cowardin Code:	PFO1A/PEM

Vegetation

	Plant Species	Stratum	Indicator		Plant Species	Stratum	Indicator
1.	*Salix nigra*	S	OBL	9.	*Fraxinus pennsylvanica*	T	FACW
2.	*Lonicera japonica*	S	FAC-	10.	*Eleocharis spp.*	H	OBL
3.	*Quercus phellos*	T	FACW-	11.			
4.	*Forestiera acuminate*	S	OBL	12.			
5.	*Acer rubrum*	T	OBL	13.			
6.	*Liquidambar styraclflua*	T	FAC+	14.			
7.	*Juncus effuses*	H	OBL	15.			
8.	*Scirpus spp.*	H	OBL	16.			

Percent of Dominant Species That are OBL, FACW, or FAC: % 100

Hydrology

Field Observations:

Depth of Surface Water: 4-8" (in.)

Depth to Free Water in Pit: (in.)

Depth to Saturated Soil: (in.)

Wetland Hydrology Indicators:

	Primary Indicators			Secondary Indicators
x	Inundated	x	Drift Lines	Oxidized Root Channels
x	Saturated in Upper 12 in.	x	Water Marks	x Water Stained Leaves
X	Sediment Deposits	x	Drainage Patterns	

Remarks:

Soils

Profile Description:

Depth (Inches)	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance (%)	Texture
0-12"	2.5Y 4/2	5Y5/8	5%	Sandy clay8

Hydric Soil Indicators:

x	Gleyed or Low Chroma Colors		Histic Epipedon		Aquic Moisture Regime
x	Sulfidic Odor		High Organic Cont. Surf. Layer Sandy Soils	x	Reducing Conditions
	Concretions		Organic Streaking in Sandy Soils		Other (Explain in Remarks)

Remarks:

Wetland Determination

Hydrophytic Vegetation Present?	Yes	x	No		Is this Sampling Point Within a USACE Wetland?	Yes	x	No	
Wetland Hydrology Present?	Yes	x	No		Does area only meet USFWS wetland definition?	Yes		No	
Hydric Soils Present?	Yes	x	No		Size (obtain from TPS survey):	647.5'x50' ROW = 32375 sq. ft. = 0.74 acres			

Wetland Descriptors

Sample ID: W4 Lowndes W. Point	**Photo ID(s) (Sample ID - Photo #):**
Flagging Description: (i.e.; A1-A4; C1-C7)	

Drawing

Please Include: North Arrow, Project Centerline, Survey Corridor Boundaries, Length of Wetland Feature, Distances from Centerline, Photo Locations

See maps

5.2.1

Obvious Connections to Waters of the US/State?	x	Yes		No	Waterbody:													
Primary Water Source (If other, note in comments)		Cap. Fringe		Overbanking	x	Sheet Flow		Groundwater	x	Precipitation		Other						
Wetland Quality (High, Moderate, Low)		Comments: moderate																
Wetland Functional Quality (High, Moderate, Low)		Comments: moderate																

Description of Wetland and Other Comments: (i.e. forest age class; habitat features; hydrologic regime; description of the wetland outside of or adjacent to ROW; erosion potential, existing disturbances, adjacent land use, wildlife observations, station numbers, lat-long, etc)

Moderate quality wetlands; PFO interspersed within pine plantation and existing access road. Access road is rarely used and flooded, herbaceous wetland vegetation is located in road bed, forested wetland areas are along road and proposed ROW.

WETLAND QUALITY CRITERIA (includes, but is not limited to)

WETLAND QUALITY:
HIGH QUALITY WETLAND: no indication of stress or disturbance in wetland or adjacent area – diverse and/or mature vegetation community – hydrologic and soil indicators are characteristic of the specific community type – provides high-quality and/or rare/important habitat for wildlife (i.e., structural diversity; vernal pools; diverse, dense emergent vegetation). May be associated with high-quality, relatively undisturbed, perennial streams.
MODERATE QUALITY WETLAND: mild to moderate disturbances have caused alterations in wetland or immediately adjacent areas – slightly altered natural vegetation, hydrology and/ or soil characteristics – provides suitable habitat for wildlife and vegetation diversity – associated perennial or intermittent streams are of relatively good quality and aren't significantly disturbed
LOW QUALITY WETLAND: severe disturbances have caused significant changes to vegetation, soils, or hydrology – hydroperiod alterations, if present, have directly affected plant species – community composition has changed – noticeable stress or death of plant species – soil subsidence may have occurred in areas with decreased hydroperiod – mechanical alteration of plant species or soils – grazing from livestock – channelization of stream courses or ditching – little suitable habitat for wildlife and vegetation – associated perennial or intermittent streams significantly disturbed

WETLAND FUNCTIONAL QUALITY:
HIGH QUALITY: Because of wetland characteristics and/or landscape position, performs critical water quality, flood control, wildlife habitat, biodiversity, and/or landscape diversity functions
MODERATE QUALITY: Performs important water quality, flood control, wildlife habitat, biodiversity, and/or landscape diversity functions.
LOW QUALITY: Because of wetland characteristics, landscape position, or level of disturbance, wetland functions are minimal.

Wetland Determination Form

Project: Lowndes-W. Point	Investigator: Hixson/Pilarski	Normal Circumstances:		Sample ID:	W8
County: Lowndes		Atypical Situation:	x	Station or Structure Number(s):	
State: MS	Date: 03/03/2004	Problem Area:		Cowardin Code:	PFO1A

Vegetation

	Plant Species	Stratum	Indicator		Plant Species	Stratum	Indicator
1.	*Salix nigra*	S	OBL	9.			
2.	*Lonicera japonica*	S	FAC-	10.			
3.	*Quercus phellos*	T	FACW-	11.			
4.	*Forestiera acuminate*	S	OBL	12.			
5.	*Acer rubrum*	T	OBL	13.			
6.	*Liquidambar styraclflua*	T	FAC+	14.			
7.	*Fraxinus pennsylvanica*	T	FACW	15.			
8.				16.			

Percent of Dominant Species That are OBL, FACW, or FAC: % 100

Hydrology

Field Observations:

Depth of Surface Water: 4-8" (in.)

Depth to Free Water in Pit: ____ (in.)

Depth to Saturated Soil: ____ (in.)

Wetland Hydrology Indicators:

	Primary Indicators			Secondary Indicators
x	Inundated	x	Drift Lines	____ Oxidized Root Channels
x	Saturated in Upper 12 in.	x	Water Marks	x Water Stained Leaves
X	Sediment Deposits	x	Drainage Patterns	

Remarks:

Soils

Profile Description:

Depth (Inches)	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance (%)	Texture
0-12"	2.5Y 4/2	5Y5/8	5%	Sandy clay8

Hydric Soil Indicators:

x	Gleyed or Low Chroma Colors		Histic Epipedon		Aquic Moisture Regime
x	Sulfidic Odor		High Organic Cont. Surf. Layer Sandy Soils	x	Reducing Conditions
	Concretions		Organic Streaking in Sandy Soils		Other (Explain in Remarks)

Remarks:

Wetland Determination

Hydrophytic Vegetation Present?	Yes	x	No		Is this Sampling Point Within a USACE Wetland?	Yes	x	No
Wetland Hydrology Present?	Yes	x	No		Does area only meet USFWS wetland definition?	Yes		No
Hydric Soils Present?	Yes	x	No		Size (obtain from TPS survey):	69.5'x100' ROW = 6950 sq. ft.. = 0.16 acre		

Wetland Descriptors

Sample ID: W4 Lowndes W. Point	**Photo ID(s) (Sample ID - Photo #):**
Flagging Description: (i.e.; A1-A4; C1-C7)	

Drawing

Please Include: North Arrow, Project Centerline, Survey Corridor Boundaries, Length of Wetland Feature, Distances from Centerline, Photo Locations

See maps

5.2.1

Obvious Connections to Waters of the US/State?	x	Yes		No	Waterbody:													
Primary Water Source (If other, note in comments)		Cap. Fringe		Overbanking	x	Sheet Flow		Groundwater	x	Precipitation		Other						
Wetland Quality (High, Moderate, Low)		Comments: moderate																
Wetland Functional Quality (High, Moderate, Low)		Comments: moderate																

Description of Wetland and Other Comments: (i.e. forest age class; habitat features; hydrologic regime; description of the wetland outside of or adjacent to ROW; erosion potential, existing disturbances, adjacent land use, wildlife observations, station numbers, lat-long, etc)

Moderate quality wetlands; PFO interspersed within pine plantation and existing access road. Access road is rarely used and flooded, forested wetland areas are along road and proposed ROW.

WETLAND QUALITY CRITERIA (includes, but is not limited to)

WETLAND QUALITY:
HIGH QUALITY WETLAND: no indication of stress or disturbance in wetland or adjacent area – diverse and/or mature vegetation community – hydrologic and soil indicators are characteristic of the specific community type – provides high-quality and/or rare/important habitat for wildlife (i.e., structural diversity; vernal pools; diverse, dense emergent vegetation). May be associated with high-quality, relatively undisturbed, perennial streams.
MODERATE QUALITY WETLAND: mild to moderate disturbances have caused alterations in wetland or immediately adjacent areas – slightly altered natural vegetation, hydrology and/ or soil characteristics – provides suitable habitat for wildlife and vegetation diversity – associated perennial or intermittent streams are of relatively good quality and aren't significantly disturbed
LOW QUALITY WETLAND: severe disturbances have caused significant changes to vegetation, soils, or hydrology – hydroperiod alterations, if present, have directly affected plant species – community composition has changed – noticeable stress or death of plant species – soil subsidence may have occurred in areas with decreased hydroperiod – mechanical alteration of plant species or soils – grazing from livestock – channelization of stream courses or ditching – little suitable habitat for wildlife and vegetation – associated perennial or intermittent streams significantly disturbed

WETLAND FUNCTIONAL QUALITY:
HIGH QUALITY: Because of wetland characteristics and/or landscape position, performs critical water quality, flood control, wildlife habitat, biodiversity, and/or landscape diversity functions
MODERATE QUALITY: Performs important water quality, flood control, wildlife habitat, biodiversity, and/or landscape diversity functions.
LOW QUALITY: Because of wetland characteristics, landscape position, or level of disturbance, wetland functions are minimal.

Wetland Determination Form

Project: Lowndes-W. Point	Investigator: Hixson/Pilarski	Normal Circumstances:	x	Sample ID:	W9
County: Lowndes		Atypical Situation:		Station or Structure Number(s):	
State: MS	Date: 03/03/2004	Problem Area:		Cowardin Code:	PFO1A

Vegetation

	Plant Species	Stratum	Indicator		Plant Species	Stratum	Indicator
1.	*Salix nigra*	S	OBL	9.			
2.	*Lonicera japonica*	S	FAC-	10.			
3.	*Quercus phellos*	T	FACW-	11.			
4.	*Forestiera acuminate*	S	OBL	12.			
5.	*Acer rubrum*	T	OBL	13.			
6.	*Liquidambar styraclflua*	T	FAC+	14.			
7.	*Fraxinus pennsylvanica*	T	FACW	15.			
8.				16.			

Percent of Dominant Species That are OBL, FACW, or FAC: % 100

Hydrology

Field Observations:

Depth of Surface Water: 4-8" (in.)

Depth to Free Water in Pit: (in.)

Depth to Saturated Soil: (in.)

Wetland Hydrology Indicators:

	Primary Indicators			Secondary Indicators
x	Inundated	x	Drift Lines	Oxidized Root Channels
x	Saturated in Upper 12 in.	x	Water Marks	x Water Stained Leaves
X	Sediment Deposits	x	Drainage Patterns	

Remarks:

Soils

Profile Description:

Depth (Inches)	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance (%)	Texture
0-12"	2.5Y 4/2	5Y5/8	5%	Sandy clay8

Hydric Soil Indicators:

x	Gleyed or Low Chroma Colors		Histic Epipedon		Aquic Moisture Regime
x	Sulfidic Odor		High Organic Cont. Surf. Layer Sandy Soils	x	Reducing Conditions
	Concretions		Organic Streaking in Sandy Soils		Other (Explain in Remarks)

Remarks:

Wetland Determination

Hydrophytic Vegetation Present?	Yes	x	No		Is this Sampling Point Within a USACE Wetland?	Yes	x	No	
Wetland Hydrology Present?	Yes	x	No		Does area only meet USFWS wetland definition?	Yes		No	
Hydric Soils Present?	Yes	x	No		Size (obtain from TPS survey):	526.6 'x 100' ROW = 52660 sq. ft.. = 1.21 acres			

Wetland Descriptors

Sample ID: W4 Lowndes W. Point	**Photo ID(s) (Sample ID - Photo #):**
Flagging Description: (i.e.; A1-A4; C1-C7)	
Drawing	
Please Include: North Arrow, Project Centerline, Survey Corridor Boundaries, Length of Wetland Feature, Distances from Centerline, Photo Locations See maps 5.2.1	

Obvious Connections to Waters of the US/State?	x	Yes		No	Waterbody:												
Primary Water Source (If other, note in comments)		Cap. Fringe		Overbanking	x	Sheet Flow		Groundwater	x	Precipitation		Other					
Wetland Quality (High, Moderate, Low)		Comments: moderate															
Wetland Functional Quality (High, Moderate, Low)		Comments: moderate															

Description of Wetland and Other Comments: (i.e. forest age class; habitat features; hydrologic regime; description of the wetland outside of or adjacent to ROW; erosion potential, existing disturbances, adjacent land use, wildlife observations, station numbers, lat-long, etc)

Moderate quality wetlands; PFO interspersed within and along Columbus AFB fence. Standing water, amphibian use. Less disturbed than W7 & W8.

WETLAND QUALITY CRITERIA (includes, but is not limited to)

WETLAND QUALITY:
HIGH QUALITY WETLAND: no indication of stress or disturbance in wetland or adjacent area – diverse and/or mature vegetation community – hydrologic and soil indicators are characteristic of the specific community type – provides high-quality and/or rare/important habitat for wildlife (i.e., structural diversity; vernal pools; diverse, dense emergent vegetation). May be associated with high-quality, relatively undisturbed, perennial streams.
MODERATE QUALITY WETLAND: mild to moderate disturbances have caused alterations in wetland or immediately adjacent areas – slightly altered natural vegetation, hydrology and/ or soil characteristics – provides suitable habitat for wildlife and vegetation diversity – associated perennial or intermittent streams are of relatively good quality and aren't significantly disturbed
LOW QUALITY WETLAND: severe disturbances have caused significant changes to vegetation, soils, or hydrology – hydroperiod alterations, if present, have directly affected plant species – community composition has changed – noticeable stress or death of plant species – soil subsidence may have occurred in areas with decreased hydroperiod – mechanical alteration of plant species or soils – grazing from livestock – channelization of stream courses or ditching – little suitable habitat for wildlife and vegetation – associated perennial or intermittent streams significantly disturbed

WETLAND FUNCTIONAL QUALITY:
HIGH QUALITY: Because of wetland characteristics and/or landscape position, performs critical water quality, flood control, wildlife habitat, biodiversity, and/or landscape diversity functions
MODERATE QUALITY: Performs important water quality, flood control, wildlife habitat, biodiversity, and/or landscape diversity functions.
LOW QUALITY: Because of wetland characteristics, landscape position, or level of disturbance, wetland functions are minimal.

APPENDIX VIII - APPROXIMATE LOCATIONS FOR PROJECT AREA WATERCOURSES AND WETLANDS

SMZs - Category A, Standard Stream Protection

For the ROW crossings of the streams at the stations listed below, use **Streamside Management Zone Category A (Standard Stream Protection)** as defined in "TVA Transmission Construction Guidelines Near Streams".

LSK-7924, sheet 7B
84+78.6 to 85+78.6
89+49.9 to 91+07.0
110+90 to 112+30
140+49.2 to 142+75.1
155+40 to 159+01.1

WWCs - Standard BMPs

When clearing & construction is to be performed around the listed stations, **Best Management Practices (BMPs)** will be implemented as soon as practical, but no later then regulatory requirements, so as not to impact water quality of any receiving waters.

LSK-7924, sheet 7B
77+50
133+95.4

Wetlands

Any clearing or construction activities necessary in these areas will be accomplished using hand-held equipment, mats, or other appropriate low ground pressure equipment. There will be no heavy vehicle entry into the wetlands and BMPs will be used.

LSK-7924, sheet 7A
Wetland 1: 9+57.1 to 10+44.8
Wetland 2: 30+84.5 to 33+05.6
Wetland 3: 64+09.7 to 65+75.7
LSK-7924, sheet 7B
Wetland 4: 86+25.5 to 88+89
Wetland 5: 111+21.6 to 111+83
Wetland 6: 121+99.3 to 122+41.7
Wetland 7: 123+79.1 to 130+26.6
Wetland 8: 133+56.7 to 134+26.2
Wetland 9: 135+08.5 to 140+35.1