Document Type: Final Environmental Assessment
Index Field: Environmental Assessment
Project Name: Artesia, MS Power System Improvements
Project Number: 2020-10

ARTESIA-WEST COLUMBUS POWER SYSTEM IMPROVEMENTS
FINAL ENVIRONMENTAL ASSESSMENT

Clay, Lowndes, and Oktibbeha Counties, Mississippi

Prepared by:
TENNESSEE VALLEY AUTHORITY
Chattanooga, Tennessee

August 2020

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Acronyms, Abbreviations and Glossary of Terms Used

acre	A unit measure of land area equal to 43,560 square feet
access road	A dirt, gravel, or paved road that is either temporary or permanent, and is used to access the right-of-way and transmission line structures for construction, maintenance, or decommissioning activities
APE	Area of potential effect
ARAP	Aquatic Resource Alteration Permit
BMP	Best management practice or accepted construction practice designed to reduce environmental effects
bus	A conductor, which may be a solid bar or pipe, normally made of aluminum or copper, used to connect one or more circuits to a common interface. An example would be the bus used to connect a substation transformer to the outgoing circuits.
CAA	Clean Air Act
CDC	Center for Disease Control and Prevention
CEQ	Council on Environmental Quality
circuit	A section of conductors (three conductors per circuit) capable of carrying electricity to various points
conductors	Cables that carry electrical current
CWA	Clean Water Act
danger tree	A tree located outside the right-of-way that could pose a threat of grounding a line if allowed to fall near a transmission line or a structure
DATOS	Dry at time of survey
dB	Decibel
DNL	Day/night average sound level
EA	Environmental Assessment
easement	A legal agreement that gives TVA the right to use property for a purpose such as a right-of-way for constructing and operating a transmission line
EIS	Environmental Impact Statement
EMF	Electromagnetic field
endangered species	A species in danger of extinction throughout all or a significant part of its range
EO	Executive Order
ephemeral stream	Watercourses or ditches that only have water flowing after a rain event; also called a wet-weather conveyance
ESA	Endangered Species Act
extant	In existence; still existing; not destroyed or lost
feller-buncher	A piece of heavy equipment that grasps a tree while cutting it, which can then lift the tree and place it in a suitable location for disposal; this equipment is used to prevent trees from falling into sensitive areas, such as a wetland
FICON	Federal Interagency Committee on Noise
FIRM	Flood Insurance Rate Maps
GIS	Geographic Information System
groundwater	Water located beneath the ground surface in the soil pore spaces or in the pores and crevices of rock formations
guy	A cable connecting a structure to an anchor that helps support the structure

hydric soil	A soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop conditions of having no free oxygen available in the upper part
HUC	Hydrologic unit code
HUD	U.S. Department of Housing and Urban Development
hydrophytic vegetation	Aquatic and wetland plants that have developed physiological adaptations allowing a greater tolerance to saturated soil conditions including with limited or absence of oxygen
IPaC	Information, Planning, and Consultation database (USFWS)
kV	Symbol for kilovolt (1 kV equals 1,000 volts)
KY	Kentucky
load	That portion of the entire electric power in a network consumed within a given area; also synonymous with “demand” in a given area
LPC	Local Power Company
MDEQ	Mississippi Department of Environmental Quality
MDOT	Mississippi Department of Transportation
MS	Mississippi
MW	Megawatt
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
NESC	National Electric Safety Code
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act
NIEHS	National Institute of Environmental Health Sciences
NLEB	Northern Long-eared Bat
NRHP	National Register of Historic Places
NRI	Nationwide Rivers Inventory
NWI	National Wetland Inventory
OPGW	Fiber Optic Groundwire
outage	An interruption of the electric power supply to a user
PA	Programmatic Agreement
PI	Point of intersection at which two straight transmission line sections intersect to form an angle
riparian	Related to or located on the banks of a river or stream
ROW	Right-of-way, a corridor containing a transmission line
runoff	That portion of total precipitation that eventually enters a stream or river
SHPO	State Historic Preservation Office
SMZ	Streamside management zone
SR	State Route
structure	A pole or tower that supports a transmission line
substation	A facility connected to a transmission line used to reduce voltage so that electric power may be delivered to a local power distributor or user
surface water	Water collecting on the ground or in a stream, river, lake, or wetland; it is naturally lost through evaporation and seepage into the groundwater
switch	A device used to complete or break an electrical connection
SWPPP	Storm Water Pollution Prevention Plan
threatened species	A species likely to become endangered within the foreseeable future
TL	Transmission line
TVA	Tennessee Valley Authority

TRAM	Tennessee Rapid Assessment Method, designed by the state of Tennessee to categorize wetland function
USACE	U.S. Army Corps of Engineers
USCB	U.S. Census Bureau
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
wetland	A marsh, swamp, or other area of land where the soil near the surface is saturated or covered with water, especially one that forms a habitat for wildlife
WHO	World Health Organization
WWC	Wet-weather conveyance (see ephemeral stream)

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CHAPTER 1

1.0 PURPOSE AND NEED FOR ACTION

Due to the continuing economic development of the Infinity Mega site (herein referred to as the Mega site) near Artesia, Mississippi, a new 12-mile 161-kV transmission line is proposed to support the expanding economic development in the area. Currently, if the Mega site's Infrastructure continues to expand as planned without upgrading the current TVA transmission system, it would result in low voltage and thermal violations to the transmission system during the summer peak and spring maintenance seasons. Reliability issues worsen when the existing local 161-kV generation is offline causing a thermal violation on the existing Starkville – West Point transmission line.

The proposed new 161-kV Transmission Line (TL) and additional system upgrades in the area surrounding the Mega site are needed to alleviate these issues and therefore increase the reliability and resiliency of the transmission system. These improvements would also increase the flexibility of renewable energy interconnections and provide an additional fiber communications path to the area.

1.1 Proposed Action – Improve Power Supply

The Tennessee Valley Authority (TVA) is planning a power system improvement project in Lowndes County, Mississippi, in an effort to increase customer reliability and support economic development at the Mega site within the Golden Triangle Region of Mississippi. This "triangle" is formed by the cities of Columbus, Starkville, and West Point, Mississippi within Lowndes County.

To accomplish this, TVA would construct the proposed approximately 12 mile 161-kV TL. This would require approximately 93.4 acres of new right-of-way (ROW) and constructed utilizing both single steel-pole single-circuit structures and double steel pole double circuit structures in some areas. These quantities are based on the final survey of the preferred route. Approximately 4 miles of the proposed Artesia TL utilizes existing TL ROW on the existing West Columbus Sw. Sta. – Severcorr Switching Station 161-kV TL. This will require a teardown of this section of the existing single circuit TL and re-building as a double circuit TL. A brief description of the proposed route and ROW, shown as the green line in Figure 1-1, is as follows:

- The first 1170 feet of the proposed Artesia TL starts at the proposed new bay on the northeast side of the West Columbus 161-kV Switching Station. The TL then parallels the existing W. Columbus Sw. Sta. – Columbus No. 2 161-kV TL on its northeast side before turning southwest. Because some existing TL ROW is overlapped, only 62.5 ROW width is required in this area. Note: a portion of this is within TVA substation property (770 feet) which does not require TL ROW.

- Once the TL turns southwest approximately 1.2 miles of new 100-ft wide ROW would be required as the line parallels the Kansas City Southern Railroad for about .6 miles and then extends another .6 miles as it crosses US Highway 45 and then parallels the highway to the southwest before connecting to the existing West Columbus Switching Station – Severcorr Switching Station 161-kV TL near existing TL structure 602.

- About 4.1 miles of the of the existing West Columbus Switching Station – Severcorr Switching Station 161-kV TL will be rebuilt as a double circuit TL to accommodate the proposed Artesia 161-kV. This will occur starting at existing TL structure 602 and ending existing TL structure 643. No new TL ROW is required along this section.

- Approximately miles 1.6 of new 100 ft. width ROW and TL would be required as the line continues west after diverging form the existing West Columbus Switching Station – Severcorr Switching Station 161-kV TL and continues west and then north before it starts to parallel the Kansas City Southern Railroad to the southwest. The proposed TL will parallel the existing West Columbus Switching Station – Severcorr Switching Station 161-kV TL and Tap Str. 648 – Modified Fluff 161-kV TL for about .8 miles into an Industrial Park property. At this point it continues west across open land, some wooded areas and two streams before and turns north and the makes a turn southwest at the Kansas City Southern Railroad. There is some TL ROW overlap with existing TL ROW as the proposed TL parallels a portion of the West Columbus Switching Station – Severcorr Switching Station 161-kV TL.

- 3 miles of new 100 ft. width ROW would then be needed as the line parallels the Kansas City Southern Railroad before turning north crossing the railroad to approach the Infinity Mega site.

- The final approximate 1.8 miles of new 100 ft. width ROW heads north into the Artesia 161-kV Switching Station. This section of the proposed Artesia TL essentially parallels Guerry Road which is being reconstructed as an eventual four lane highway into the Infinity site. It must be noted that this section of the proposed TL will be composed of two pole double circuit structures. One side will not be energized.

Need for the Proposed Action

TVA plans its transmission system according to industry-wide standards established by the North American Electric Reliability Corporation (NERC). Those standards state that the TVA transmission system must be able to survive single-failure events while continuing to serve customer loads[1] with adequate voltage and no overloaded facilities while maintaining adequate TL clearances as required by the National Electric Safety Code (NESC).

The existing Transmission Infrastructure within Lowndes County surrounding the 'Golden Triangle' Region of Mississippi cannot support anticipated and growing economic activity in the region. Lowndes County is part of what is termed the 'Golden Triangle' Region. This "triangle" is formed by the cities of Columbus, Starkville, and West Point, MS. This region generally is expanded to include all of Clay, Lowndes, and Oktibbeha counties. Operation and maintenance of the TLs in the region have historically been limited in this area due to

[1] "Load" is defined as that portion of the entire electric power in a network that is consumed within a given area. The term is synonymous with "demand" in a given area.

NERC contingency constraints that could arise if the existing TLs were out-of-service for maintenance.

The proposed Infinity Mega site is located on the west side of the Golden Triangle Airport. No industries are currently located within the site, but infrastructure is present with additional infrastructure being constructed. This site has been the subject of several industrial inquires within the past few years and has been deemed a high growth area in regional strategic planning efforts. The current electrical capacity within the industrial area is non-existent, yet the average development inquiry is for a facility is 78 megawatts (MW), ranging up to 400MW in size. Attempting to serve this load without additional upgrades would result in multiple low voltage and thermal violations in adjoining TLs within the area thereby threatening reliability. The resulting lack of electrical capacity within the proposed Infinity Mega site has limited new industrial opportunities within the area.

TVA's proposed project would alleviate the voltage and thermal loading problems at this location, improve reliability for both the bulk system as well as individual customer delivery points, provide flexibility for TVA operations and maintenance of the TLs and ROW, and support additional economic development opportunities within the Golden Triangle Region.

To ensure that the areas within the Golden Triangle Region, including the Infinity Mega site, have additional electrical capacity for future load growth, TVA needs to provide new electric service to the area. The construction of the proposed 11.9 miles of 161-kV TL originating at the Artesia Switching Station and upgrades to the existing TL within the proposed project area would meet these needs. Additionally, the proposed project would further enhance TVA's Bulk Transmission System by improving operational and maintenance flexibility, and finally would support economic development for the proposed Infinity Mega site.

1.2 Decision to be Made

The primary decisions before TVA are whether to ensure that the areas within the Golden Triangle Region of Mississippi have a continuous reliable source of power, and whether there is the ability to create an additional electrical capacity to this region to support future load growth. If the proposal is to be completed, other secondary decisions are involved. These include:

- Timing of the proposed improvements;
- Upgrade existing switching stations to include new breaker bays
- Switching stations are already present. Just the addition of new breaker bays to these switching stations will be done under this project. Most suitable route for the proposed TL, and;
- Any necessary mitigation and/or monitoring to meet TVA standards and to minimize the potential for damage to environmental resources.

A detailed description of the alternatives is provided in Section 2.1.

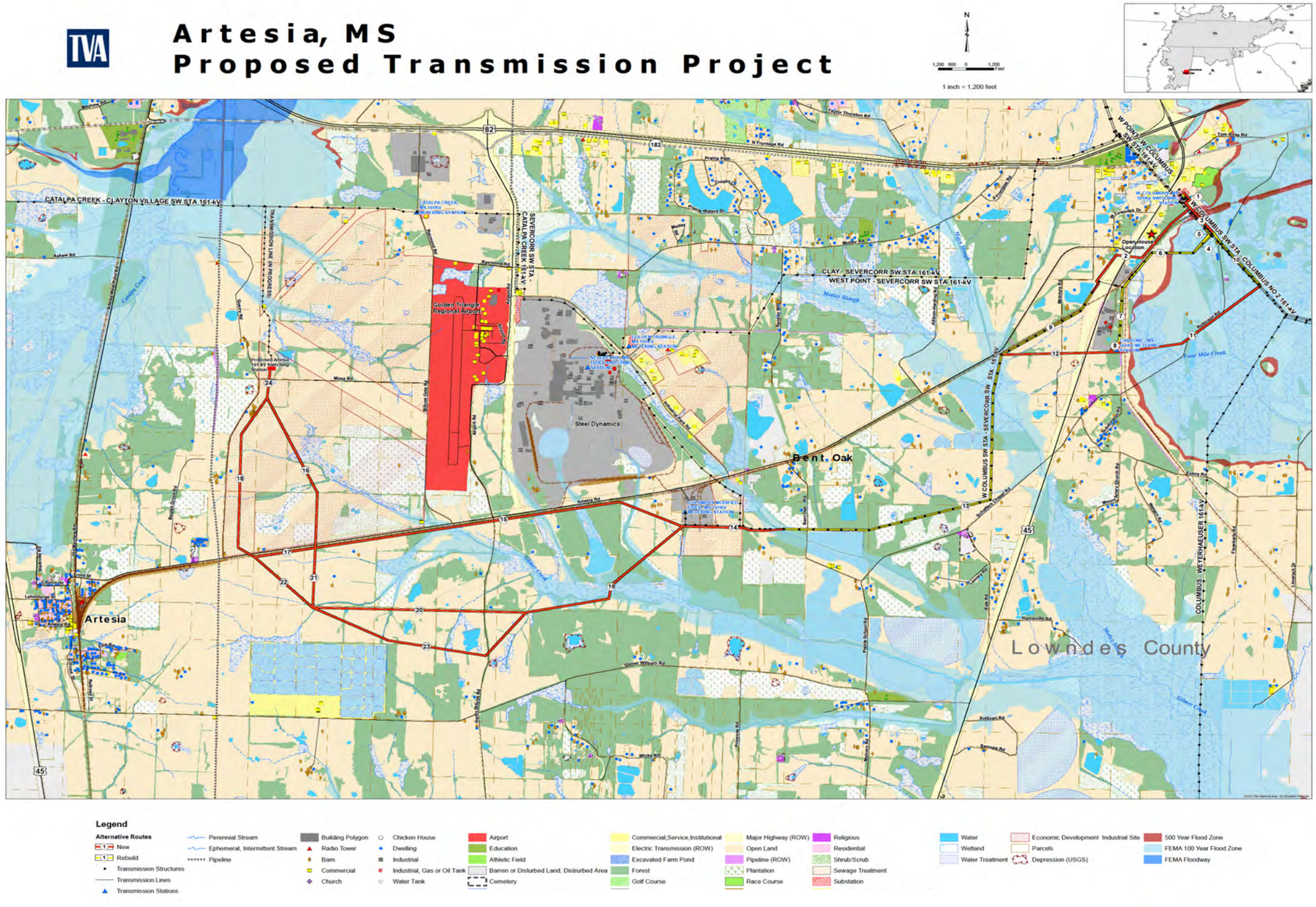

Figure 1-1 TVA's Preferred Route for the Proposed Artesia 161-kV Transmission Line

1.3 Related Environmental Reviews and Consultation Requirements

In June 2019, TVA released the final 2019 Integrated Resource Plan and the associated EIS (TVA 2019a). These documents provide direction on how TVA can best deliver clean, reliable and affordable energy in the Valley over the next 20 years, and the associated EIS looks at the natural, cultural and socioeconomic impacts associated with the IRP. TVA's Board of Directors approved the Recommendation at its August 2019 meeting and a Record of Decision was published on September 17, 2019.

In August 2019, TVA released the final Transmission System Vegetation Management Programmatic EIS (TVA 2019b). This programmatic level document encompassed ROW vegetation management across TVA's transmission system. Four alternatives were evaluated. TVA's preferred alternative (Alternative C) includes an initial re-clearing of vegetation; thereafter, the full extent of the actively managed transmission ROW would be maintained in a meadow-like end-state. This alternative is considered to provide the best balance in enhancing system reliability and safety, minimization of environmental impacts, and striving for cost effectiveness. Current vegetation management practices are prescribed by a court order issued in the *Sherwood v. TVA* case under which TVA is enjoined from removing woody vegetation except for trees that are an immediate hazard. TVA understands that the order will remain in place until TVA's Transmission System Vegetation Management Programmatic EIS has received court approval.

1.4 Scope of the Environmental Assessment

TVA contacted the following federal and state agencies, as well as federally recognized Indian tribes, concerning the proposed project:

- Absentee Shawnee Tribe of Indians of Oklahoma
- Alabama-Coushatta Tribe of Texas
- Alabama-Quassarte Tribal Town
- Cherokee Nation
- Coushatta Tribe of Louisiana
- Eastern Shawnee Tribe of Oklahoma
- Jena Band of Choctaw Indians
- Kialegee Tribal Town
- Mississippi Band of Choctaw Indians
- Mississippi Department of Environmental Quality (MDEQ)
- Mississippi Department of Transportation (MDOT)
- Mississippi State Historic Preservation Office (SHPO)
- Shawnee Tribe
- The Chickasaw Nation
- The Choctaw Nation of Oklahoma
- The Muscogee (Creek) Nation
- Thlopthlocco Tribal Town
- United Keetoowah Band of Cherokee Indians in Oklahoma
- United States Army Corps of Engineers
- United States Fish and Wildlife Service (USFWS)
- United States Forest Service (USFS)

- United States Department of Agriculture, Natural Resource Conservation Service
- United States Environmental Protection Agency

TVA developed a public communication plan that included a website with information about the project, a map of the alternative TL routes and switching station locations, and numerous feedback mechanisms. TVA held an open house on January 18, 2018, at the Lowndes County School District Central Office in Columbus, Mississippi, and 25 people attended. The 66 property owners who could be potentially affected by, or near to, any of the route alternative segments, as well as elected officials, were invited to the open house. TVA used local news outlets and notices placed in local newspapers to notify other interested members of the public.

At the open house, TVA presented maps with a network of alternative TL routes, comprised of 24 different line segments, to the public for comment. The primary interests of those who attended the open houses pertained to the effects of the proposed TL on the individual landowners, including impacts on farming, development and/or property values.

A 30-day public review and comment period was held following the open house, during which TVA accepted public comments on the alternative TL routes and other issues. A toll-free phone number and facsimile number were made available to facilitate comments. During the comment period following the open house, several landowners and members of the public wrote or called TVA to express their concerns. These comments reflected the same concerns or topics vocalized in the open house meeting. Most comments provided specific reasons for their concerns about alternative route segments shown on their property. One industry that would be affected by the line rebuild had specific questions regarding how their facility would be supplied with power during the rebuild. Their questions were addressed via a conference call involving the appropriate TVA personnel.

TVA was also contacted before the open house by the executive director of the Golden Triangle Regional Airport. The contact was via e-mail which mentioned concerns about the alternative route segments crossing the airport approach path. He was aware of the TVA submittal to the FAA regarding several locations on the alternative routes for 195 foot tall structures located within the approach paths. TVA contacted the airport executive director and explained that a model was created to account for the FAA surface elevation requirements and that all alternative route segments could be designed below these elevations. A final design was submitted to the FAA on 2/13/2020 and returned 3/10/2020. All structures were determined not to be a hazard.

At the conclusion of the comment period, TVA considered the comments and additional information, described in Section 2.3, and developed a preferred route. TVA announced the preferred route to the public in June of 2018. Letters were sent to affected property owners, elected officials, and information was provided to the public through TVA's website.

As a result of information obtained following the announcement of the preferred route from affected land owner comments, as well as from environmental field surveys, TVA made additional route adjustments to preferred TL route as shown in Figure 1-2. These adjustments are described in Section 2.4.

1.5 Issues to be Addressed

TVA prepared this environmental assessment (EA) to comply with the National Environmental Policy Act (NEPA) and regulations promulgated by the Council of Environmental Quality (CEQ) and TVA to implement NEPA. The EA investigates the improvements, operation, and maintenance of new TL, as well as the purchase of TL ROW easements, or taking no action.

TVA has determined the resources listed below are potentially affected by the alternatives considered. These resources were identified based on internal scoping as well as comments received during the scoping period.

- Water quality (surface waters and groundwater)
- Aquatic ecology
- Vegetation
- Wildlife
- Endangered and threatened species and their critical habitats
- Floodplains
- Wetlands
- Aesthetic resources (including visual, noise, and odors)
- Archaeological and historic resources
- Land use
- Recreation, parks, and managed areas
- Socioeconomics and environmental justice

TVA's action would satisfy the requirements of Executive Order (EO) 11988 (Floodplain Management), EO 11990 (Protection of Wetlands), EO 12372 (Intergovernmental Review), EO 12898 (Environmental Justice), EO 13112 as amended by 13751 (Invasive Species), and applicable laws including the Farmland Protection Policy Act, the National Historic Preservation Act of 1966 (NHPA), the Endangered Species Act of 1973 (ESA) as amended, the Clean Air Act (CAA), and the Clean Water Act (CWA). Correspondence received from agencies related to this review and coordination is included in Appendix A.

Potential effects related to air quality and global climate change, solid and hazardous waste, and health and safety were considered. Because of the nature of the action, any potential effects to these resources would be minor and insignificant. Thus, any further analysis for effects to these resources was deemed unnecessary.

1.6 Necessary Permits or Licenses

A permit would be required from the State of MS and/or the local municipality for the discharge of construction site storm water associated with the improvements to the Switching Stations and associated TLs. TVA would prepare the required erosion and sedimentation control plans and coordinate them with the appropriate state and local authorities. A permit may also be required if removed trees or other vegetation are disposed of through burning and for other combustible materials removed during construction of the proposed project. A Section 401 Water Quality Certification would be obtained as required for physical alterations to waters of the State. A Section 404 nationwide permit would be obtained from the USACE, if construction activities result in the discharge of dredge or fill into waters of the United States. A permit would be obtained from the MS Departments of Transportation for crossing state highways or federal interstates during TL construction.

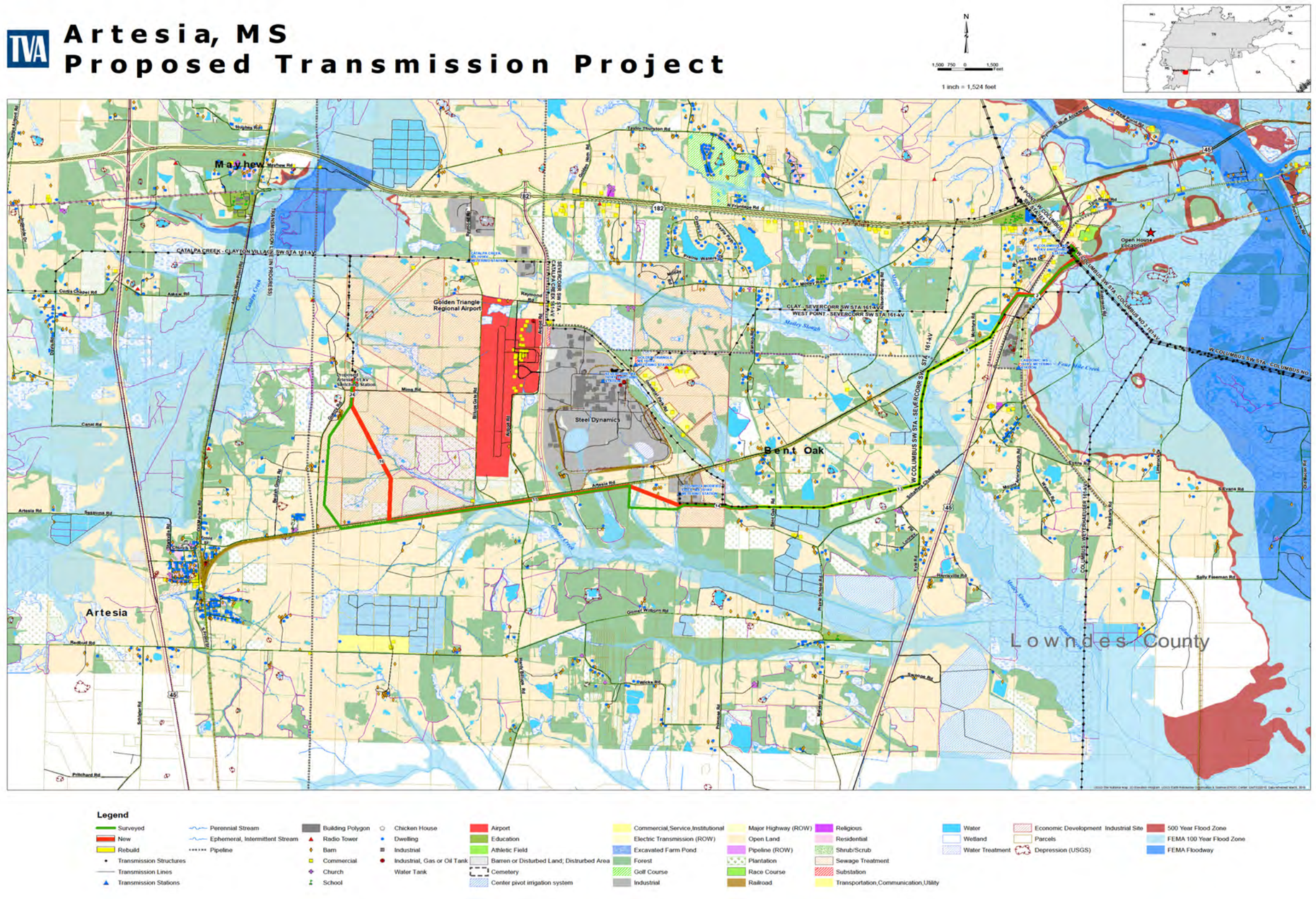

Figure 1-2 TVA's Alternative Route Segments for the Proposed Artesia 161-kV Transmission Line

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CHAPTER 2

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

As described in Chapter 1, TVA proposes to update, operate, and maintain a new 161-kV Transmission Line from the existing 161 kV West Columbus Switching Station to the Artesia 161-kV Switching Station. The replacement of and updates to the existing conductors (Reconductors) on the existing Starkville- West Point 161-KV Transmission Line (14.2 miles) and the CMF- Carbonic 161-kV Transmission Line (5 miles) is also proposed.

A description of the proposed action is provided below in Section 2.1.2. Additional background information about construction, operation, and maintenance of a Transmission Line is also provided and would be applicable if the Action Alternative is chosen.

This chapter has seven major sections:

- A description of alternatives;
- A description of the construction, operation, and maintenance of the proposed Transmission Line
- An explanation of the siting process;
- A comparison of the proposed alternative TL routes;
- A comparison of anticipated environmental effects by alternative;
- Identification of mitigation measures; and
- Identification of the preferred alternative.

2.1 Alternatives

After several alternatives were considered and subsequently eliminated, two alternatives (i.e., the No Action Alternative and the Action Alternative) are addressed in this EA. Under the No Action Alternative, TVA would not implement the proposed action. The Action Alternative involves the purchase of property for the new TL 100ft ROW, and upgrades, operation, and maintenance of the existing switching stations and TLs.

The No Action Alternative – TVA Does Not Provide a New Power Supply within the Golden Triangle Region of Lowndes County, MS Area

Under the No Action Alternative, TVA would not update the existing switching stations, associated 161-kV existing TL lines, or the new 11.9-mile Artesia 161-kV TL. As a result, the TVA power system within Golden Triangle Region of Lowndes County, MS would continue to operate under current conditions, increasing the risk of voltage and thermal loading problems, loss of service, and occurrences of violations to NERC reliability criteria. TVA's ability to provide reliable service and add electrical capacity to support economic development within the area, including the Infinity Mega site, would be jeopardized, which would not support TVA's overall mission.

Considering TVA's obligation to provide reliable electric service and support economic development within the Valley, the No Action Alternative is not a reasonable alternative.

However, the potential environmental effects of adopting the No Action Alternative were considered in the EA to provide a baseline for comparison with respect to the potential effects of implementing the proposed action.

2.1.1 Action Alternative – TVA Provides a New Power Supply to the Golden Triangle Region of Lowndes County, Mississippi

Under the Action Alternative, TVA would:

- Construct, operate, and maintain a new 161-kV Transmission Line from the existing 161 kV West Columbus Switching Station to the Artesia 161-kV Switching Station and associated breakers (approx. 12 miles)
- Replace and update conductors (Reconductor) on the existing Starkville- West Point 161-KV Transmission Line (14.2 miles) and the CMF- Carbonic 161-kV Transmission Line (4.4 miles) which includes 4 miles of rebuild (double circuit with new West Columbus – Artesia TL) and 0.4 miles of reconductor.
- The proposed ~12-mile West Columbus - Artesia 161-kV TL would require approximately 93.4 acres of new right-of-way (ROW) and would be constructed using a majority of single steel-pole, single-circuit structures, and two steel pole, double-circuit structures. The proposed 0.4 mile reconductor section from CMF-Carbonic 161-kV TL would use existing structures, and the 4 mile rebuild section would be constructed using steel-pole, double circuit structures.

- The first 1170 feet of the proposed Artesia TL starts at the proposed new bay on the northeast side of the West Columbus 161-kV Switching Station. The TL then parallels the existing W. Columbus Sw. Sta. – Columbus No. 2 161-kV TL on its northeast side before turning southwest. Because some existing TL ROW is overlapped, only 62.5 ROW width is required in this area. Note: a portion of this is within TVA substation property (770 feet) which does not require TL ROW.

- Once the TL turns southwest approximately 1.2 miles of new 100-ft wide ROW would be required as the line parallels the Kansas City Southern Railroad for about .6 miles and then extends another .6 miles as it crosses US Highway 45 and then parallels the highway to the southwest before connecting to the existing West Columbus Switching Station – Severcorr Switching Station 161-kV TL near existing TL structure 602.

- About 4.1 miles of the of the existing West Columbus Switching Station – Severcorr Switching Station 161-kV TL would be rebuilt as a double circuit TL to accommodate the proposed Artesia 161-kV. This would occur starting at existing TL structure 602 and ending existing TL structure 643. No new TL ROW would be required along this section.

- Approximately miles 1.6 of new 100 ft. width ROW and TL would be required as the line continues west after diverging form the existing West Columbus Switching Station – Severcorr Switching Station 161-kV TL and continues west and then north before it starts to parallel the Kansas City Southern Railroad to the southwest. The proposed TL will parallel the existing West Columbus Switching Station – Severcorr Switching Station 161-kV TL and Tap Str. 648 – Modified Fluff 161-kV TL for about .8 miles into an Industrial Park property. At this point it continues west across open

land, some wooded areas and two streams before and turns north and the makes a turn southwest at the Kansas City Southern Railroad. There is some TL ROW overlap with existing TL ROW as the proposed TL parallels a portion of the West Columbus Switching Station – Severcorr Switching Station 161-kV TL.

- 3 miles of new 100 ft. width ROW would then be needed as the line parallels the Kansas City Southern Railroad before turning north crossing the railroad to approach the Infinity Mega site.

- The final approximate 1.8 miles of new 100 ft. width ROW heads north into the Artesia 161-kV Switching Station. This section of the proposed Artesia TL essentially parallels Guerry Road which is being reconstructed as an eventual four lane highway into the Infinity site. It must be noted that this section of the proposed TL will be composed of two pole double circuit structures. One side will not be energized.

Additional information describing implementation of the proposed Action Alternative and how the most TL route was determined is provided below in Sections 2.2 through 2.4.

2.1.2 Alternatives Considered but Eliminated From Further Discussion

Underground UtilityLines

A frequent objection to the construction of new TLs involves their adverse visual effects. Thus, a frequently suggested alternative is the installation of underground TLs.

Although power lines can be buried, most buried TLs tend to be low-voltage distribution lines (lines that are 13-kV or less) rather than high-voltage TLs, which tend to be 69-kV and above. Although low-voltage distribution lines can be laid into trenches and buried without the need for special conduits, burying higher voltage TLs requires extensive excavation, as these TLs must be encased in special conduits or tunnels. Additionally, measures to ensure proper cooling and to provide adequate access are required. Usually, a road along or within the ROW for buried TLs must be maintained for routine inspection and maintenance.

Although buried TLs are much less susceptible to catastrophic storm damage, especially wind damage, they tend to be very expensive to install and maintain. Depending on the type of cable system used, special equipment or ventilation systems may be required to provide adequate cooling for the underground conductors. Similarly, special construction methods/equipment that are highly intrusive to the landscape must be used to protect the buried lines from flooding, which could cause an outage. High-voltage underground cables typically require the use of an underground vault that would require extensive excavation along the entire TL route for initial installation, and would also require excavation to make repairs in the event of a cable fault. Locating an electrical fault in a buried cable can be time consuming, and is often exacerbated by the need to perform excavation to locate the damaged section. Roadways and water bodies also increase the difficulties of locating faults, since the cables would be buried under roadways and streams. These issues make the installation of high-voltage underground cables cost prohibitive and impractical.

The potential adverse environmental effects of constructing and operating a buried high-voltage TL would likely be greater overall than those associated with a traditional aboveground TL. In addition, the expense of a buried high-voltage TL would be prohibitive. For these reasons, burying the proposed TL is not a feasible option and this alternative was eliminated from further consideration.

2.2 Updates, Operation, and Maintenance of the Proposed Switching Stations and Transmission Line Connections

2.2.1 Property Acquisition, Clearing and Construction

Transmission line easement for the proposed 161-kV TL would be purchased from landowners. Approximately 93.4 acres would be purchased for the new 161-kV TL, depending on final design, site soil conditions, and negotiations with landowners.

TVA would clear vegetation, remove topsoil, and grade both sites in accordance with TVA's *Site Clearing and Grading Specifications* (TVA 2019c). Equipment used during clearing would include chainsaws, skidders, bulldozers, tractors, and/or low ground-pressure feller-bunchers. While the site is open pasture, marketable timber would be salvaged where feasible; otherwise, woody debris and other vegetation would be piled and burned, chipped, or taken off-site. Prior to burning, TVA would obtain any necessary permits. In some instances, vegetation may be windrowed along the edge of the project site to serve as sediment barriers. Implementation of *TVA ROW Clearing Specifications*, *Environmental Quality Protection Specifications for Transmission Line Construction*, *Transmission Construction Guidelines Near Streams*, (TVA 2019c) and *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities* (TVA 2017a) provide further guidance for clearing and construction activities.

Following clearing, grading, and construction, disturbed areas on the properties (excluding area within the finished switching station fences) would be restored to approximate pre-construction conditions, to the extent practicable, utilizing appropriate seed mixtures as described in TVA's BMP guidance (TVA 2017a). Erosion controls would remain in place for each phase until that portion of the project is stabilized in accordance with MS General Stormwater Permits.

As described in TVA's *Substation Lighting Guidelines* (TVA 2019c), lights at the end of each of the proposed switching station locations would be fully shielded or would have internal low-glare optics, such that no light is emitted from the fixtures at angles above the horizontal plane. TVA's *Environmental Quality Protection Procedures for Transmission Substation or Communications Construction* (TVA 2019c) would be utilized during the construction of the substation.

2.2.2 Right-of-Way Acquisition and Clearing

A ROW utilizes an easement that would be designated for a TL and associated assets. The easement would require maintenance to maintain performance, avoid the risk of fires and other accidents, and to ensure reliable operation. The ROW provides a buffer and safety margin between the high-voltage conductors and surrounding structures and vegetation. The ROW for this project is described in Section 2.1.2.

TVA would purchase easements from landowners whose land the proposed new ROW would cross. These easements would give TVA, among other things, the right to clear the ROW, to construct, operate, and maintain the TL, and to remove "danger trees" adjacent to the ROW. Danger trees include any trees located off the ROW that, under maximum sag and blowout conditions, would strike a TL structure or come within an unsafe distance of a TL if it were to fall toward the TL. For most TLs, this distance is five feet, but for higher voltage TLs, the distance is generally 10 feet. The fee simple ownership of the land within the ROW would remain with the landowner, and many activities and land uses could continue to occur on the property. However, the terms of the easement agreement prohibit certain activities, such as construction of buildings and any other activities within the ROW that could interfere with the operation or maintenance of the TL or create a hazardous situation.

Because of the need to maintain adequate clearance between tall vegetation and the TL conductors, as well as to provide access for construction equipment, all trees and most shrubs would be removed from the entire width of the ROW. Equipment used during this ROW clearing would include chain saws, skidders, bulldozers, tractors, and/or low ground-pressure feller-bunchers. Marketable timber would be salvaged where feasible; otherwise, woody debris and other vegetation would be piled and burned, chipped, or taken off-site. Prior to burning, TVA would obtain any necessary permits (See Section 1.7). In some instances, vegetation may be windrowed along the edge of the ROW to serve as sediment barriers[2].

Vegetation removal in streamside management zones (SMZs) and wetlands would be restricted to trees tall enough, or with the potential to soon grow tall enough, to interfere with the conductors. Clearing in SMZs would be accomplished using handheld equipment or remote-handling equipment, such as a feller-buncher, to limit ground disturbance[3].

TVA has developed guidance and specification documents (listed below) for ROW clearing and construction activities. These documents are provided on TVA's transmission system projects web page and are taken into account when considering the effects of the proposed Action Alternative (TVA 2019c). TVA transmission projects also utilize best management practices (BMPs) to provide guidance for clearing and construction activities (TVA 2017a) and ROW Vegetation Management Guidelines (TVA 2017b).

1. *TVA ROW Clearing Specifications*
2. *Environmental Quality Protection Specifications for Transmission Line Construction*
3. *Transmission Construction Guidelines Near Streams*
4. *Environmental Quality Protection Specifications for Transmission Substation or Communications Construction*

[2] The emission of criteria pollutants or their precursors would not exceed de minimis levels specified in 40 CFR § 93.153(b). Thus, consistent with Section 176(c) of the CAA, project activities would be in conformity with the requirements of Tennessee and Mississippi's state implementation plan for attaining air quality standards.
[3] A feller-buncher is a self-propelled machine with a cutting head that is capable of holding more than one stem at a time. Tracked feller-bunchers are capable of operating on wet and loose soils, have a lower ground-pressure than wheeled equipment, and are less prone to rutting and compaction.

5. *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities* (TVA 2017a)

6. *Transmission Environmental Protection Procedures Right-of-Way Vegetation Management Guidelines*

Following clearing and construction, an appropriate vegetative cover on the ROW would be restored. TVA would utilize appropriate seed mixtures as described in TVA's 2017 BMP manual or work with property owners with impacted cropland to ensure restoration supports or minimize impacts to production. Erosion controls would remain in place until the plant communities become fully established. Streamside areas would be revegetated as described in the above documents. Failure to maintain adequate clearance can result in dangerous situations, including ground faults. As such, native vegetation or plants with favorable growth patterns (slow growth and low mature heights) would be maintained within the ROW following construction per BMPs.

2.2.3 Access Roads

Access roads would be needed to allow vehicular access to each structure and other points along the ROW. Typically, new permanent or temporary access roads used for TLs are located on the ROW wherever possible and are designed and located to avoid severe slope conditions and to minimize environmental resources such as stream crossings. Access roads are typically about 12 to 16 feet wide and are surfaced with dirt, mulch, or gravel.

Culverts and other drainage devices, fences, and gates would be installed as necessary. Culverts installed in any perennial streams would be removed following construction.

However, in ephemeral[4] streams, the culverts would be left or removed, depending on the wishes of the landowner or any permit conditions that might apply. If desired by the property owner, TVA would restore constructed temporary access roads to previous conditions.

Additional applicable ROW clearing and environmental quality protection specifications are listed in *TVA ROW Clearing Specifications, Environmental Quality Protection Specifications for Transmission Line Construction,* and *Transmission Construction Guidelines Near Streams* (TVA 2019c).

2.2.4 Construction Assembly Areas

A construction assembly area (or "laydown" area) would be required for worker assembly, vehicle parking, and material storage. This area may be on existing substation property or may be leased from a private landowner for the duration of the construction period. Properties utilized for laydown yards are typically leased by TVA about a month before construction begins. Properties such as existing parking lots or areas used previously as car lots are ideal laydown areas because site preparation is minimal. Selection criteria used for locating potential laydown areas include areas that are typically five acres in size; relatively flat; well drained; previously cleared; preferably graveled and fenced; preferably with wide access points with appropriate culverts; sufficiently distant from streams, wetlands, or sensitive environmental features; and located adjacent to an existing paved

[4] Ephemeral streams are also known as wet-weather conveyances or streams that run only following sufficient amounts of rainfall.

road near the TL. TVA initially attempts to use or lease properties that require no site preparation. However, at times, the property may require some minor grading and installation of drainage structures such as culverts.

Likewise, the area may require graveling and fencing. Trailers used for material storage and office space would be parked on the site. Following completion of construction activities, all trailers, unused materials, and construction debris would be removed from the site. Removal of TVA-installed fencing and site restoration would be performed by TVA at the discretion of the landowner.

2.2.5 Structures and Conductors

Most of the proposed 11.9 mile TL would utilize single steel-pole structures, with some double pole steel structures. Examples of these structure types are shown in Figure 2-1. Pole structure heights would vary according to the terrain, but would range between 80 and 125 feet above ground.

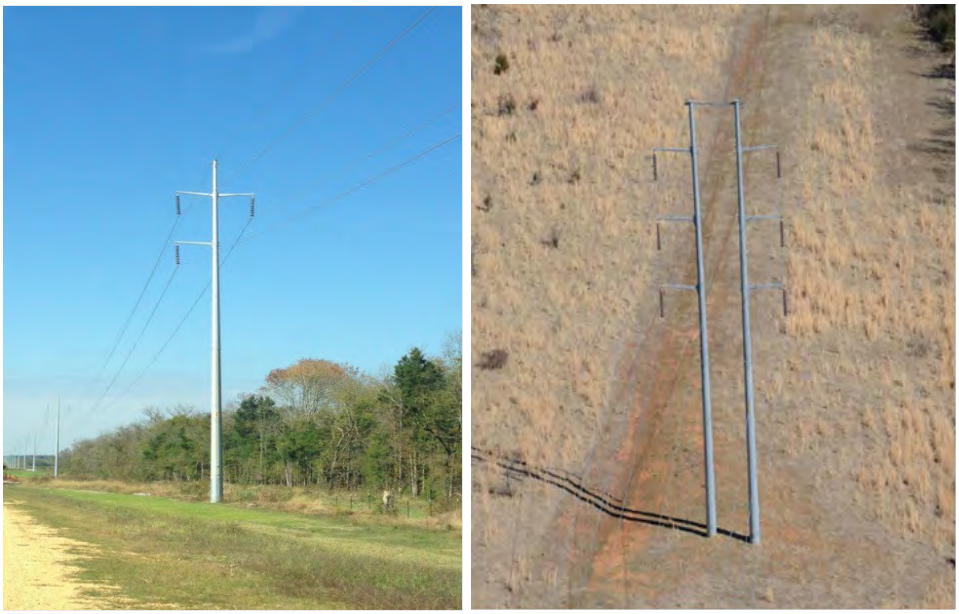

Figure 2-1 Typical Single and Double Steel-Pole Structures

Three conductors (the cables that carry the electrical current) are required to make up a single circuit in alternating current TLs. For a 161-kV TL, each single-cable conductor is attached to glass insulators that are either suspended from the structure cross arms or attached directly to the structure. A smaller overhead ground wire or wires are attached to the top of the structures.

Poles at angles (angle points) in the TL may require supporting screw, rock, concrete, or log anchored guy supports. 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 two feet. Normally, the holes would be backfilled with the excavated material, but, in some cases, gravel or a concrete-and-gravel mixture would be used, depending on local soil conditions.

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

2.2.6 Conductor and Ground Wire Installation

Reels of conductor and ground wire would be delivered to the construction assembly area(s), and temporary clearance poles would be installed at road crossings to reduce interference with traffic. A small rope would be pulled from structure to structure. The rope 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.

2.2.7 Operation and Maintenance of the Proposed Transmission Line

Inspection

Periodic inspections of 161-kV TLs are performed by helicopter aerial surveillance after operation begins. Foot patrols or climbing inspections are performed to locate damaged conductors, insulators, or structures, and to discover any abnormal conditions that might hamper the normal operation of the line or adversely affect the surrounding area. During these inspections, the condition of vegetation within the ROW, as well as that immediately adjoining the ROW, is noted. These observations are then used to plan corrective maintenance and routine vegetation management.

Vegetation Management

Management of vegetation along the ROW would be necessary to ensure access to structures and to maintain an adequate distance between TL conductors and vegetation. Adequate ground clearance is important to account for construction, design, and survey tolerances (e.g., conductor sagging). TVA uses more conservative distances than NESC requirements in order to ensure reliability. TVA uses a minimum ground clearance of 24 feet for a 161-kV TL at the maximum line operating temperature. TVA released the final Transmission System Vegetation Management Programmatic EIS in 2019 which outlines TVA's preferred vegetation management alternative moving forward (TVA 2019b). Current vegetation management practices are prescribed by the court order currently in place in the *Sherwood v. TVA* litigation under which TVA is enjoined from removing woody vegetation except for trees that are an immediate hazard. Upon court approval of the Transmission System Vegetation Management Programmatic EIS, vegetation management along the ROW would consist of two different activities: felling danger trees adjacent to the cleared ROW, and controlling vegetation within the total width of the cleared ROW. These activities would occur periodically as identified by LIDAR inspections.

After tall trees and other tall-growing vegetation are removed from the ROW during construction, routine management of vegetation within the cleared ROW would include an integrated vegetation management approach designed to encourage the low-growing plant species and discourage tall-growing plant species. A vegetation maintenance plan would be developed for each TL sector, based on the results of the periodic inspections described above. Vegetation control methods or tools and their appropriate uses for various TL ROW

conditions have been described in TVA's final Transmission System Vegetation Management Programmatic EIS (TVA 2019b). These methods include manual (chainsaw, machete, brush hooks, axes, bush blades), mechanical cutting or trimming (mower or brush hog, bulldozer, track-hoe, skid steer, shears [e.g., feller-buncher], mulcher/chipper, Hydro-ax [including various other attachments], tracked equipment such as compact track loader, helicopter tree saw, Jarraff & Kershaw line trimmers, or aerial lifts) and herbicide spraying and growth regulators.

Herbicides are normally applied in areas where heavy growth of woody vegetation is occurring on the ROW and mechanical or manual methods are not practical. Herbicides can be applied in a variety of ways; however, all herbicides would be applied under the supervision of a licensed applicator in accordance with applicable state and federal laws and regulations. Additionally, only TVA approved herbicides registered with the U.S. Environmental Protection Agency (USEPA) or those approved by another managing agency as appropriate are used and applied in accordance with manufacturers' label directions. A list of the herbicides currently used by TVA in ROW vegetation control and pre-emergent herbicides TVA currently uses on bare ground areas in TL ROWs is presented in TVA's *Transmission Environmental Protection Procedures Right-Of- Way Vegetation Management Guidelines* (TVA 2017b). This list may change over time as new herbicides are developed or new information on presently becomes available.

2.3 Structure Replacement

TVA would install approximately 12 miles of the 161-KV TL as single/double-circuit on new and existing 100-foot-wide ROW. Steel pole structures make up the TL. After retired, the steel structures would be evaluated for recycling. Any lead pins removed from the retired insulators would be handled according to TVA's transmission environmental protection procedures and guidelines (TVA 2019c).

Other than vegetation management within ROWs, only minor maintenance work is generally required once TL structures and other components (e.g., conductor, insulators, arms) are installed as these items typically last several decades. In the event that a structure needs to be replaced, the structure would normally be lifted out of the ground by crane-like equipment. The replacement structure would be inserted into the same hole or an adjacent hole. Access to the structures would be via existing roads. Replacement of structures may require leveling the area surrounding the replaced structures, but additional area disturbance would be minor compared to the initial installation of the structure.

2.4 Siting Process

The process of siting the proposed TL and switching stations followed the basic steps used by TVA to determine a TL route. These include:

- Determine the potential existing power sources to supply the TL.
- Define the study area.
- Collect data to minimize potential impacts to social, engineering, and environmental (cultural and natural) features.
- Locate potential switching station locations if required (Not required for this proposed transmission line project)

- Identify general route segments producing potential routes.
- Gather public input.
- Redefine general route segments.
- Evaluate alternative routes with the intent of selecting the route with the least overall impact with a consideration on social, engineering, and environmental factors.

2.4.1 Definition of the Study Area

The study area was chosen to meet the following basic objectives: provide necessary TL access to the proposed Infinity Mega site; and allow a reasonable area for multiple candidate corridors to be identified in multiple alignments.

There were several general guidelines used when establishing the alternate route segments in the study area. These included the avoidance of major constraints such as: existing major highway interchanges, commercial and residential developments, barns, Pond-raised catfish aquaculture areas, and known airports (glide paths if possible and if not insuring TL heights are below FAA imaginary surface elevations). It must be noted that due to the location of the Golden Triangle Regional Airport, total avoidance of the glide paths was not possible. Because of this, an emphasis on reviewing the existing ground elevations and the FAA imaginary surface elevations was required. Rivers and streams were to be crossed as close to 90 degrees where possible to reduce the amount clearing of the stream bank vegetative cover. Also, where practicable, rivers and streams were not paralleled at a distance that would require clearing of this vegetated cover as well. Environmental and historic areas were also considered and outlined as constraints. Access to the line for construction and maintenance is typically a consideration as well. Other factors considered were: engineering requirements, following close to existing property lines (where possible), buffering around existing homes, utilizing existing utility and transportation corridors where possible, avoiding schools (where possible), consideration of public comments and working to incorporate landowner requests (where possible) during the final routing of the project.

2.4.2 Description of the Study Area

The Artesia MS. 161-kV TL Project has a fixed starting and end point. The starting point is the TVA West Columbus 161-kV switching station. This switching station is located on the southeast side of U.S. Highway 45 about 0.5 miles from the U.S. Highway 82 exit for Highway 45 South and is almost 5 miles southwest of Columbus MS. The ending point will be TVA's Artesia 161-kV switching station. The Artesia station is located on the Mega site adjacent (west side) to the Golden Triangle Regional Airport on the south side of U.S. Highway 82 between Starkville and Columbus. The town of Artesia is 2.75 miles to the southwest.

The limit of the study was established to ensure that both the starting and end points of the project were adequately captured to the east and west and that it was large enough to the north and south to establish multiple route corridors.

The northern boundary of the study area generally follows U.S. Highway 82. This is approximately .6 miles north of the West Columbus 161-kV switching station.

The southern boundary is approximately 1.25 miles south of Glimer Wilburn Road. This pushes the study area past a barrier of catfish ponds in the southern portion of the study area.

The eastern boundary of the study area parallels the east side of a TVA transmission corridor that connects to the West Columbus switching station.

The western boundary parallels a North to South transportation corridor composed of a railway and a parallel road.

A major railway owned by the Kansas City Southern Railway bisects the study area in a diagonal manner starting near the southwestern corner and extending to the northeastern corner.

The study area contains a total land area of 63 square miles and lies entirely in Lowndes County Mississippi.

The terrain within the study area is not extreme and relatively level with some slight undulating hills. No distinct hill or knoll stands out or is identified as such within the area. Elevations range from about 250 feet in the more elevated areas to 160 feet within drainage bottoms. Some steep elevation changes are present: however, they are typically manmade to support earth bases for roads, railways, catfish ponds, and site grading for other structures.

2.4.3 Data Collection

TVA collected geographic data, such as topography, land use, transportation, environmental features, and cultural resources for the study area. Information sources used in the TL study included design drawings for area TLs, data collected into a geographic information system (GIS), including U.S. Geological Survey (USGS) digital line graphs, National Wetland Inventory (NWI) maps, wetland modelling results, Lowndes County tax maps. Also used were various proprietary data maintained by TVA in a corporate geo-referenced database (i.e., TVA Regional Natural Heritage file data on sensitive plants and animals, natural areas, and archaeological and historical resources).

Additionally, TVA utilized State/Local, NAIP, BING, and World imagery from various years for the study area. This aerial photography was then photo-interpreted to obtain land use and land cover data such as forests, agriculture, wetlands, dwellings, barns, commercial and industrial buildings, churches, and cemeteries. Calculations from aerial photographs, tax maps, and other sources included, but were not limited to, the number of road crossings, stream crossings, and property parcels.

Data were analyzed manually and with GIS. The use of GIS allows substantial flexibility in examining various types of spatially superimposed information. This system allowed the multitude of study area factors to be examined simultaneously for developing and evaluating numerous options and scenarios to select the TL route that would best meet project needs, which included avoiding or reducing potential environmental impacts.

The aerial photography, GIS-based map, and other maps and drawings were supplemented by reconnaissance throughout the study area by TVA personnel.

2.4.4 Establishment and Application of Siting Criteria

TVA uses a set of evaluation criteria that represent opportunities and constraints for development of alternative TL routes. These criteria include social, engineering, and environmental factors such as existing land use, ownership patterns, environmental features, and cultural resources. Cost is also an important factor, with engineering considerations, line length, and ROW area requirements being important elements. Identifying feasible TL routes involves weighing and balancing these criteria.

Specific criteria used to evaluate TL route options are described below. For each feature identified as occurring along a proposed route option, specific considerations related to these features were identified and scored. In the evaluation, a higher score means a bigger constraint or obstacle for locating a TL. For example, a greater number of streams crossed, a longer TL route length, or a greater number of historic resources affected would produce a higher, more unfavorable score.

- **Engineering and Constructability Criteria** include considerations such as terrain (steeper slopes can present major challenges for design and construction), airport approach path closeness to runway), total length of the TL route, number of primary and secondary road crossings, accessibility, the presence of pipeline and TL crossings.

- **Social Criteria** include the total acreage of new ROW, number of affected property parcels, public comments,, and proximity to schools, houses, commercial or industrial buildings, and barns. Positive constraints were included for the re-use of existing TL ROW and paralleling the railroad transportation corridor. These tend to be favorable options historically conveyed by the public.

- **Environmental Criteria** include the number of forested acres within the proposed ROW, the number of open water crossings, the number of floodplain or floodway crossings, the presence of wetlands, rare species habitat, sinkholes, and sensitive stream crossings (i.e., those supporting endangered or threatened species), the number of perennial and intermittent stream crossings, and the presence of archaeological and historic sites, churches, and cemeteries.

A tally of the number of occurrences for each of the individual criteria was calculated for each potential alternative route. Next, a normalized ranking of alternative routes was performed for each individual feature based on each route's value as it related to the other alternative routes. Weights reflecting the severity of potential effects were then developed for each individual criterion. These criterion-specific weights were multiplied by the individual alternative rankings to create a table of weighted rankings. The weighted rankings for each alternative were added to develop overall scores for each alternative route based on engineering, social, and environmental criteria, then summed for an overall total. For each of these criteria, a ranking of each alternative route was calculated based on the relationship between the scores of various routes.

These rankings made it possible to recognize which routes would have the least and the greatest impact on engineering, social, and environmental resources based on the data available at this stage in the siting process. Finally, the scores from each category were combined into an overall score. The alternative route options were then ranked ordered by their overall scores.

2.4.5 Development of General Route Segments and Potential Transmission Line Routes

As described in Section 24.3, the collected data were analyzed to develop possible TL route segments that would best meet the project needs while avoiding or reducing conflict with constraints.
Using the siting criteria identified in Section 2.4.4 and the identified termination points in Section 2.4.2, a total of 24 potential TL route segments were developed and presented at the open house.

2.4.6 Potential Transmission Line Corridors

As a result of the constraints mentioned in the previous section, 24 alternative TL routes were developed, consisting of a combination of 24 constituent segments (Table 2-1).

Table 2-1. Alternative Route Corridors with Constituent Segments

Alternative Routes	Approximate Length in miles to nearest 100th	Alternative Route Segments
1	11.00	.1.2.9.13.14.15.16.24.
2	11.62	.1.2.9.13.14.15.17.18.24.
3	11.80	.1.2.9.13.14.16.19.20.21.24.
4	12.43	.1.2.9.13.14.17.18.19.20.21.24.
5	12.05	.1.2.9.13.14.18.19.20.22.24.
6	12.06	.1.2.9.13.14.16.19.21.23.24.
7	12.68	.1.2.9.13.14.17.18.19.21.23.24.
8	12.30	.1.2.9.13.14.18.19.22.23.24.
9	11.63	.1.3.4.6.7.8.12.13.14.15.16.24.
10	12.25	.1.3.4.6.7.8.12.13.14.15.17.18.24.
11	12.44	.1.3.4.6.7.8.12.13.14.16.19.20.21.24.
12	13.06	.1.3.4.6.7.8.12.13.14.17.18.19.20.21.24.
13	12.68	.1.3.4.6.7.8.12.13.14.18.19.20.22.24.
14	12.70	.1.3.4.6.7.8.12.13.14.16.19.21.23.24.
15	13.31	.1.3.4.6.7.8.12.13.14.17.18.19.21.23.24.
16	12.95	.1.3.4.6.7.8.12.13.14.18.19.22.23.24.
17	12.04	.1.3.10.11.12.13.14.15.16.24.
18	12.66	.1.3.10.11.12.13.14.15.17.18.24.
19	12.85	.1.3.10.11.12.13.14.16.19.20.21.24.
20	13.47	.1.3.10.11.12.13.14.17.18.19.20.21.24.
21	13.09	.1.3.10.11.12.13.14.18.19.20.22.24.
22	13.10	.1.3.10.11.12.13.14.16.19.21.23.24.
23	13.72	.1.3.10.11.12.13.14.17.18.19.21.23.24.
24	13.34	.1.3.10.11.12.13.14.18.19.22.23.24.

2.5 Identification of the Preferred Transmission Line Route

Based on analysis of the potential routes, TVA announced a preferred transmission line route in late spring of 2018. TVA chose alternative route 1, consisting of alternative route segments 1,2,9,13,14,15,16 and 24 as the preferred transmission line route for the proposed project.

Alternative routes 1 and 2 were essentially equal based on the overall score. Alternative route 1 crossed fewer privately owned parcels on the south side of the Kansas City Southern Railroad due to crossing the railroad entering the Infinity Industrial Park earlier than Alternate Route 2. Also, alternate route 2 affected another parcel that was not owned by the Industrial Park on the north side of the railroad as this route entered the Industrial Park. Research indicated that this parcel was owned by the Lowndes County School District and leased for farming. Due to these factors, alternative Route 1 was selected instead of alternative route 2.

Alternate route 1 had the second highest ranking in the environmental category. Some factors that contributed to this was the lower impact associated with floodplain and major and minor stream crossings and non-forested wetlands.

2.5.1 Transmission Line Changes

The preferred route was modified from the original alignment as presented at the open house. Following the announcement by TVA in spring 2018, identifying the preferred transmission line route, affected property owners were mailed information showing the location of the preferred route on their property.

- TVA received some additional comments from property owners that were reviewed and, where practical, changes were made to the preferred route selections during engineering and environmental field surveys.

- A more significant change was requested by the Industrial Park. The managing organization of the park opposed the preferred route within the property and essentially desired utilizing alternative route 2 instead of 1. The entrance into the property was desired further to the west and then north along the planned Charleigh D. Ford Jr Road as followed by alternative routes segments 17 and 18. Based on their current industrial inquiries the preferred route utilizing segment 16 would disrupt facility layouts. Multiple options were proposed by TVA utilizing the same crossing into the Industrial Park but adjusting the route once within the Industrial Park; however, no agreement was reached. The major impediment to the proposed change were two additional landowners affected by the route change. Several parcels to the south of the railroad was property of one landowner. The parcel to the north of the railroad and Artesia Road was 16th section land owned by the Lowndes County School District. Interestingly, the landowner south of the railroad also had a multi-year lease to farm the 16th section land. The change was made after the Industrial Park managing organization negotiated with this owner regarding his farming lease and compensation regarding the Charleigh D. Ford Jr Road development and this owner agreed

with the new route survey. Also, the proposed easement on the 16th section property was approved in the February 2019 School Board meeting.

A list of these modifications and explanations are provided in Table 2-2.

Table 2-2 Explanation of Changes to Preferred Route

Location	Adjustment	Explanation of Adjustment
Alt. Route Segment 1 – West Columbus Switching Station new bay to intersection of alternative route segments 2 and 3.	This segment was extended about 160 feet to allow segment 2 to parallel more closely to the railroad	This adjustment was made at the discretion of the siting engineer to push the TL ROW closer to the railroad and reducing ROW impacts on property.
Alt. Route Segment 2 at US Highway 45 crossing.	This crossing was shifted slightly to move the TL closer to a property line.	This adjustment was made at the request of the property owner to move the TL closer to the properties southern property line. This also allowed the turn on the other side of US Highway 45 to move further southwest away from another owner's home.
Alt. Route Segment 2 at the convergence with the existing West Columbus Switching Station – Severcorr Switching Station TL.	The preferred route in this area was to cross under the West Columbus Switching Station – Severcorr Switching Station TL and then join the TL for rebuild. The adjustment did not require crossing under but simply converging with this TL to existing TL str. 600.	This adjustment was a project decision. In order to do this, the new bay constructed at the West Columbus Switching Station would support the West Columbus Switching Station – Severcorr Switching Station TL. The current bay for the West Columbus Switching Station – Severcorr Switching Station TL would be re-configured to power the new Artesia TL. This would put the Artesia circuit on the rebuilt TL (Alt. route segments 9 and 13) on the southeast side necessary for diverging from the rebuilt TL continuing to the Artesia Station. This also decreased the footprint required by multiple poles and guys on a property owner.
Alt. Route Segments 14 (at end) and segment 15 at its start. Near the Modified Fiber Station.	The preferred route at the start of segment 15 proceeded diagonally (northwest) across a parcel before paralleling a railroad to the southwest. The route was changed to proceed west and then north along the property western boundary to the railroad and then parallel the railroad to the southwest. A slight change was made at the end of segment 14 to turn to the southwest before joining segment 15.	This adjustment was a result of conversations with the property owner's legal representative to lessen what the representative believed was an impact to the property. Segment 14 was adjusted slightly to accommodate this. The segment 14 adjustment was approved by that owner. The segment 14 adjustment also greatly reduced the encroachment on a smaller parcel which was previously intersected by the preferred route.
Alt, Route Segment 15 midway along the section paralleling the railroad	No change but cultural review of an old dilapidated cabin that would be within the ROW classified the cabin as significant.	The environmental field review indicated that the cabin was part of a plantation and deem significant. A project decision was made to remove the cabin but document and preserve archeological artifacts. The

		property owner indicated the presence of the cabin but did not initially indicated any attachment or request to re-route the TL around the cabin.
Alternate Route Segments 15 and 16.	Alternate Route Segment was extended further to the southwest about .5 miles essentially encompassing alternative route segment 17. Alternative route segment 16 was eliminated and alternative route segment 18 was utilized with some adjustment to move it closer to Guerry and the proposed Charleigh D. Ford Jr Road.	Requested by managing organization of the Infinity Industrial Park. Adjustment was made after property owners affected agreed to the change which required some negotiation between owners and the Industrial Park managing organization. Also, School Board Meeting approved the change that would add TL easement on the Lowndes County School District property.
Alternate Route Segment 24	Slight change to allow better approach to the Artesia Station.	This adjustment was made at the discretion of the siting engineer. The change lessen the encroachment into a wooded area and provided better approach to the Artesia Station electrical bay.

2.6 Comparison of Environmental Effects by Alternative

A summary of the anticipated potential effects of implementing the No Action Alternative or the Action Alternative is provided in Table 2-3.

Table 2-3. Summary and Comparison of Alternatives by Resource Area

Resource Area	Impacts From Implementing the No Action Alternative	Impacts From Implementing the Action Alternative
Groundwater and Geology	No effects to local groundwater quality or quantity are expected.	Any direct or indirect short-term and long- term effects to groundwater quality or quantity are anticipated to be insignificant and would be controlled with standard BMPs.
Surface Water	No changes in local surface water quality are anticipated.	Proper implementation of these controls and mitigation measures identified in the permitting process are expected to result in only minor, temporary and insignificant impacts to surface waters.
Aquatic Ecology	Aquatic life in local streams would not be affected.	With the implementation of BMPs, no long-term effects to aquatic life in local surface waters are expected.

Resource Area	Impacts From Implementing the No Action Alternative	Impacts From Implementing the Action Alternative
Vegetation	Local vegetation would not be affected.	Site preparation and clearing of the proposed 161-kV TL ROW and substation expansion would have a minor, temporary effect on most local vegetation. An insignificant direct long-term effect on approximately 54 acres of forested area is anticipated.
Wildlife	Local wildlife would not be affected.	Wildlife inhabiting onsite forest, early successional, and edge habitats along the proposed 161-kV TL ROW and within the substation expansion site would be displaced. Because there are sufficient adjacent local habitats, any effects to wildlife are expected to be temporary and insignificant.
Endangered and Threatened Species	No effects to endangered or threatened species or any designated critical habitats are anticipated.	Tree clearing would remove approximately 3.47 acres of potentially suitable summer roosting habitat for the federally endangered Indiana bet and the federally protected Indiana and northern long-eared bat (NLEB). To remove any potential for direct effects to both bat species, TVA would follow the guidelines in its programmatic biological assessment for bats (Appendix B).
Floodplains	No changes in local floodplains and their functions are affected.	With the implementation of standard mitigation measures, no significant impact on floodplains would occur.
Wetlands	No changes in local wetland extent or function are expected.	Although TVA was able to minimize potential wetland impacts through its routing process, TVA found no practicable alternative that avoids all wetlands. A total of 114.15 acres of wetland are located within the proposed ROW, of which 10.25 would be permanently impacted. With the implementation of identified minimization and mitigation measures, there would be insignificant direct, indirect, and cumulative impacts.

Resource Area	Impacts From Implementing the No Action Alternative	Impacts From Implementing the Action Alternative
Aesthetics	Aesthetic character of the area is expected to remain virtually unchanged.	Minor visual discord and noise above ambient levels would be produced during construction and maintenance activities. The proposed TL would present a minor cumulative visual effect.
Socioeconomics and Environmental Justice	Over time, the lack of reliable power service could have adverse economic effects to local businesses and residents.	There would be a positive impact from continued reliability of service that would benefit the area and help maintain its economic stability and growth. Any adverse social, economic, or environmental justice effects would be minor and would diminish over time.
Archaeological and Historic Resources	No effects to archaeological or historic resources are anticipated.	TVA completed consultation with the MS SHPO and federally-recognized Indian Tribes on all the proposed undertakings. TVA considered 1 site (22LO1066) to be eligible for the National Register of Historic Places (NRHP). TVA entered into a Memorandum of Agreement with the MS SHPO to mitigate the adverse effect. The MS SHPO concurred with TVA's finding. TVA received two concerns from the federally recognized tribes with TVA's planned access roads; TVA agreed not to use access roads of concern.
Recreation, Parks, and Natural Areas	No changes in local recreation opportunities.	There would be no significant direct or indirect impacts to natural areas and parks under this Alternative. Construction of the proposed TL and associated access roads could cause minor and insignificant recreation impacts.

2.7 Identification of Mitigation Measures

TVA employs standard practices when constructing, operating, and maintaining switching stations, TLs, structures, and the associated ROW and access roads. These can be found on TVA's transmission website (TVA 2019c). Some of the more specific routine measures which would be applied to reduce the potential for adverse environmental effects during the construction, operation, and maintenance of the proposed switching stations, TLs and access roads are as follows:

- TVA would utilize standard BMPs, as described in the BMP manual (TVA 2017a), to minimize erosion during construction, operation, and maintenance activities.

- To minimize the introduction and spread of invasive species in the ROW, access roads and adjacent areas, TVA would follow standard operating procedures consistent with EO 13112 as amended by 13751 (Invasive Species) for revegetating with noninvasive plant species as defined in the BMP manual (TVA 2017a).

- Ephemeral streams that could be affected by the proposed construction would be protected by implementing standard BMPs as identified in the BMP manual (TVA 2017a).

- Perennial and intermittent streams would be protected by the implementation of standard stream protection (Category A) as defined in the BMP manual (TVA 2017a).

- TVA would utilize *Environmental Quality Protection Specifications for Transmission Substation or Communications Construction* during the proposed work at the substations (TVA 2019).

- To minimize adverse impacts on natural and beneficial floodplain values, the following standard mitigation measures would be implemented:

    - Standard BMPs would be used during construction activities

    - Road construction would be done in such a manner that upstream flood elevations would not be increased by more than 1.0 foot

    - Construction will adhere to the TVA subclass review criteria for transmission line location in floodplains

- Pesticide/herbicide use as part of construction or maintenance activities would comply with the MDEQ general permits for application of pesticides, which also requires a pesticide discharge management plan. In areas requiring chemical treatment, only USEPA-registered and TVA-approved herbicides would be used in accordance with manufacturer label directions designed in part to restrict applications near receiving waters and to prevent unacceptable aquatic impacts (TVA 2017b).

- Any retired wooden poles would be offered to the local power company or property owners. If any wooden poles remain and require disposal, TVA would follow its environmental protection procedures for reuse and/or disposal (TVA 2019).

- Any lead pins removed from the retired insulators would be handled according to TVA's environmental protection procedures (TVA 2019).

- As part of TVA's Programmatic Agreement (PA) biological assessment for bats, TVA would track and document the removal of potentially suitable summer roost trees and include this information in annual reporting in accordance with ESA Section 7(a)(2) consultation. Additionally, if removal of suitable bat roost tree habitat needs to occur when bats may be present on the landscape, TVA would set aside funding to be applied towards future bat-specific conservation projects in accordance with the PA biological assessment.

- Road construction or improvements would be done in such a manner that upstream flood elevations would not be increased by more than 1.0 foot.

The following non-routine measures would be applied during the construction, operation, and maintenance of the proposed TL and access roads to reduce the potential for adverse environmental effects.

- To compensate for the impacted 10.25 acres of forested and scrub-shrub wetlands to emergent wetlands, TVA would mitigate the loss of trees by purchasing wetland mitigation credits prior to construction of the proposed TL.

- If the one structure in the ROW near Airport Rd must be removed, removal should take place between October 1st and April 14th to prevent impacts to roosting northern long-eared bats. Outside of these dates, a presence absence survey by a TVA biologist is required less than 24 hours prior to disturbance.

2.8 The Preferred Alternative

The Action Alternative — TVA Provides a New Power Supply to Golden Triangle Region of Lowndes County, MS is TVA's preferred alternative for this proposed project. TVA would purchase ROW easements to accommodate the construction of a new 161-kV TL.

TVA's preferred alternative route for the Action Alternative is Alternative Route 1. This approximate 12-mile route.

CHAPTER 3

3.0 AFFECTED ENVIRONMENT

The existing condition of environmental resources that could be affected by the proposed Action Alternative during construction, operation, or maintenance of the proposed 12-mile TL is described in this chapter. The descriptions below of the potentially affected environment are based on field surveys conducted between 2017 and 2019, on published and unpublished reports, and on personal communications with resource experts. This information establishes the baseline conditions against which TVA decision-makers and the public can compare the potential effects of implementing the alternatives under consideration.

The analysis of potential effects to endangered and threatened species and their habitats included records of occurrence within a three-mile radius for terrestrial animals, a five-mile radius for plants, and within a 10-digit hydrologic unit code[5] (HUC) watershed for aquatic animals. The analysis of potential effects to aquatic resources included the local watershed, but was focused on watercourses within or immediately adjacent to the proposed ROW and associated access roads. The area of potential effect (APE) for architectural resources included all areas within a 0.5-mile radius from the proposed TL route and proposed substation construction, as well as any areas where the project would alter existing topography or vegetation in view of a historic resource. The APE with respect to archaeological resources included the entire ROW width as described in Section 2.2 for the proposed route, associated access roads, and substation construction areas.

3.1 Groundwater and Geology

The project area is located in the Coastal Plain Physiographic Province and according to available mapping is underlain by Cretaceous age rock units belonging to the Selma Group These sedimentary units are comprised primarily of irregular bedded fine chalk units which were formed by deposition of marine sediments in the Mississippi embayment. Coastal Plain sedimentary rocks of this age crop out mostly in off-lapping bands that parallel the perimeter of the Mississippi embayment and dip gently southward toward its axis. The entire Coastal Plain sequence thickens greatly toward the axis of the Mississippi Embayment and the Gulf Coast Geosyncline. There are no significant carbonate rock units contained in these sequences therefore the development of karstic features is very remote.

According to available information the project area overlies the Black Warrior River aquifer. These units are components of the Mississippi embayment aquifer system which is the primary water producing aquifer in the region. The water bearing aquifers consists of an interbedded mix of fluvial sand and gravel, deltaic sand, silt and clay, and marginal marine sand, silt, and clay which are confined by a thick sequence of clay and marl of the Selma group. These fine grained sediments effectively separate the water bearing units from the overlying rocks of the Mississippi embayment aquifer system (Renken 1998).

Groundwater is abundant throughout Mississippi. In the project area, public and private wells pump water from several aquifers. Deep wells are used to supply public water systems from deeper aquifers while private wells are usually cased in shallow aquifers.

[5] The United States is divided and subdivided to into hydrologic units by the U.S. Geological Survey. There are six levels of classification. A 10-digit HUC is the fifth (watershed) level of classification.

Contamination of groundwater occurs when contaminants such as pesticides and fertilizers from agriculture runoff seep into the aquifer. Most public water sources are protected from contamination due to the depth of the wells which are naturally protected by overlying clay (confining) layers. Groundwater is the primary source for public water supply on the project area (EPA, 2019). Several Source Water Protection Areas for public supply wells appear to be located near the proposed transmission Line ROW (MDEQ 2019).

3.2 Surface Water

This project area drains within the Lower Chuquatonchee Creek (0316010403), Line Creek (0316010405), Trim Cane Creek (0316010404), Catalpa Creek-Tibbee Creek (0316010406), Magowah Creek (0316010601), and Kincaide Creek-Tombigbee River (0316010603) 10-digit HUC watersheds (TVA 2019).

A total of 78 aquatic feature including: 28 perianal streams, 6 intermediate streams, 42 wet weather conveyances (WWC)/ephemeral streams and 3 ponds were observed during on-site field studies in April 2019 (TVA 2019). Precipitation in the general area of the proposed project averages about 55.19 inches per year. The average annual air temperature is 62 degrees Fahrenheit (usclimatedata.com May 2019). Stream flow varies with rainfall and averages about 20 inches of runoff per year, i.e., approximately 1.48 cubic feet per second, per square mile of drainage area (USGS 2008).

The Clean Water Act (CWA) requires all states to identify all waters where required pollution controls are not sufficient to attain or maintain applicable water quality standards and to establish priorities for the development of limits based on the severity of the pollution and the sensitivity of the established uses of those waters. States are required to submit reports to the EPA. The term “303(d) list” refers to the list of impaired and threatened streams and water bodies identified by the state. Unnamed Tributaries of Gilmer Creek and Catalpa Creek, Sand Creek and Oak Slush Creek are all listed as impaired for biological impairment to aquatic life uses (MDEQ 2018). Please see Table 3.1 (MDEQ 2012) for stream designations.

Table 3-1. Uses for Streams in the Vicinity of the Proposed Artesia-West Columbus Projects (Mississippi)

Stream	Use Classification[1]				
	FW	**REC**	**PWS**	**SH**	**ES**
Tombigbee River/ Tennessee Tombigbee Waterway[2]	X	X	X		
Tributaries of Tombigbee	X				
Gilmer Creek and Tributaries	X				
Catalpa Creek and Tributaries	X				
Sand Creek and Tributaries	X				
Motley Slough	X				
Mayo Slough	X				
Oak Slush Creek	X				

[3] Codes: DOM = Domestic Water Supply; IWS = Industrial Water Supply; FAL = Fish and Aquatic Life; REC = Recreation; LWW = Livestock Watering and Wildlife; IRR = Irrigation, NAV = Navigation
[4] Not in project area, shown for flow network.

3.3 Aquatic Ecology

3.3.1 General Aquatic Habitat and Fauna

A total of 28 streams were found to cross the project footprint, as well as 42 wet-weather conveyances (WWCs) and three ponds (Appendix C). Substrate of streams observed consisted mainly of sand or silt, and occasionally cobble and gravel in high-gradient areas.

3.3.2 Aquatic Threatened and Endangered Species (Animals)

The TVA Regional Natural Heritage Project database (accessed May 16, 2019) and the USFWS IPaC Database (accessed June 5, 2020) indicated that one federally listed endangered aquatic animal is currently known from within the 10-digit HUC watershed encompassing the project area (Table 3-3).

Table 3-3. Records of federal and state-listed aquatic animal species within the Lower Chuquatonchee Creek (0316010403), Line Creek (0316010405), Trim Cane Creek (0316010404), Catalpa Creek-Tibbee Creek (0316010406), Magowah Creek (0316010601), and Kincaide Creek-Tombigbee River (0316010603) 10-digit HUC watersheds.[1]

Common Name	Scientific Name	Element Rank[2]	Federal Status[3]	State Status (rank[4])
FISH				
Crystal Darter	*Crystallaria asprella*	H?		LE (S1)

[1] Source: TVA Natural Heritage Database, queried on 5/16/2019
[2] Heritage Element Occurrence Rank: H? =possibly historical
[3] Status Codes: LE or E = Listed Endangered
[4] State Ranks: S1 = Critically Imperiled
[5] Source: USFWS IPaC Database, queried on 6/5/2020

A brief description of species potentially occurring within the project area can be found below. Habitat requirements are as described in Etnier and Starnes (1993); fish. Crystal darter live in small to medium rivers with expanses of clean sand and gravel in the Cumberland River watershed.

3.4 Vegetation

3.4.1 Terrestrial Ecology (Plants)

The proposed transmission line improvements would mostly occur in the Blackland Prairie Level IV ecoregion with a small segment of the rebuilt line occurring in the Flatwoods/Blackland Prairie Margins IV ecoregion. The Blackland Prairie ecoregion extends from a small portion of west Tennessee, south into northeastern Mississippi, then east to central Alabama. Soils in this distinctive region are characterized by chalk, marl, and calcareous clays. The native natural vegetation is of sweetgum, oak, cedar, and patches of bluestem prairie. Currently, land cover is mostly pasture and cropland with hay, soybeans,

and small patches of mixed hardwoods, cedar, and pine. The Flatwoods/Blackland Prairie Margins is a transitional region between Blackland Prairie and the more forested plains and hills. The Flatwoods are mostly forested lowlands with little relief. Native natural vegetation is predominately oak-hickory pine forest and land cover is mixed forest, pasture, hay, and some cropland (Chapman et al 2004).

April 2019 field surveys of the project area were focused on documenting plant communities, infestations of invasive plants, and to search for possible threatened and endangered plant species. All areas along the proposed new ROW and existing ROWs, were visited during the survey. Using the National Vegetation Classification System (Grossman et al. 1998), vegetation types observed during field surveys can be classified as a combination of deciduous, evergreen, mixed evergreen-deciduous forest, and herbaceous vegetation. No forested areas in the proposed project area had structural characteristics indicative of old growth forest stands (Leverett 1996). The plant communities observed on-site are mostly common and well represented throughout the region, except for some decent quality diminutive calcareous chalk prairie remnants present in the existing and new ROWs. Vegetation in the proposed new and in existing transmission lines are characterized by two main types: forest (10 percent) and herbaceous (90 percent). Portions of the proposed new ROW are forested while the entire existing TL and majority of the new TL are herbaceous.

Deciduous forest, where deciduous trees account for more than 75 percent of total canopy cover, is the most common forest type and constitutes about 90 percent of the forests cover in the proposed project area. Deciduous forests are dominated by a variety of tree species including basswood, blackjack oak, boxelder, eastern cottonwood, eastern red cedar, green ash, honey locust, mockernut hickory, northern hackberry, northern red oak, osage orange, pignut hickory, shagbark hickory, slippery elm, southern hackberry, swamp chestnut oak, sweetgum, water oak and willow oak. The understory consisted of Carolina buckthorn, coralberry, and rough leaf dogwood as well as saplings of many of the trees previously listed. Herbaceous plants and woody vines observed included bloodroot, butterweed, Carolina buttercup, Cherokee sedge, creeping jenny, false garlic, green dragon, hairy buttercup, Japanese honeysuckle, largeseed forget-me-not, poison ivy, roundleaf greenbrier, Swan’s sedge, Virginia creeper, Virginia spring beauty, and white edge sedge. Most deciduous forests in the project area have trees that average between 6 and 18 inches diameter at breast height. Forested wetlands were found in several locations in the proposed ROW and are described in more detail in section 3.7.

Mixed evergreen-deciduous forest, defined as stands where both evergreen and deciduous species contribute between 25-75 percent of total canopy cover, occurs in about 10 percent of the forests observed in the entire proposed project, where work would occur. In general, these forest types are similar to the deciduous forests described above, but contain a greater percentage of eastern red cedar.

Herbaceous vegetation is characterized by greater than 75 percent cover of forbs and grasses and less than 25 percent cover of other types of vegetation. The majority of this habitat type occurs along the existing transmission line ROW, but cropland, hayfields, and heavily grazed pastures also support herbaceous vegetation. Most of these sites are dominated by plants indicative of early successional habitats including many non-native species. Early successional areas with naturalized vegetation contain herbaceous species like Alabama supplejack, alsike clover, beaked corn salad, Brazilian vervain, broomsedge, bushy bluestem, Coastal Plain dewberry, common vetch, eastern bluestar, false garlic, fox

sedge, fuzzy sedge, hairy buttercup, Indian hemp, Japanese honeysuckle, keeled bulrush, Kentucky blue grass, large yellow vetch, little quaking grass, lyreleaf sage, marsh bristle grass, northern dewberry, perennial rye grass, purpletop tridens, sawtooth blackberry, shrubby lespedeza, silver plume grass, Small's ragwort, sugar cane, sweet vernalgrass, tall fescue, tall goldenrod, twoflower dwarf dandelion, velvet panicum, Virginia plantain, Virginia spring beauty, and white clover. The Mississippi state rare Ohio buckeye was found along fence rows, as well as forested edges of existing ROWs in areas with adequate moisture. Fragmented calcareous chalk prairies were also observed in small parts of the existing ROW and proposed new line. Chalk prairie species were comprised mainly of big bluestem, beaked corn salad, bushy bluestem, browneyed Susan, compass plant, groovestem Indian plaintain, little bluestem, pinnate prairie coneflower, prairie rosinweed, prairie verbena, Virginia plantain, and in some areas, the Mississippi rare plant species eastern purple coneflower and white heath aster. Areas of emergent wetlands were present throughout the project area. See the wetland section (3-X) or species indicative of those areas.

EO 13112 directed TVA and other federal agencies to prevent the introduction of invasive species (both plants and animals), control their populations, restore invaded ecosystems and take other related actions. EO 13751 amends EO 13112 and directs actions by federal agencies to continue coordinated federal prevention and control efforts related to invasive species. This order incorporates considerations of human and environmental health, climate change, technological innovation, and other emerging priorities into federal efforts to address invasive species; and strengthens coordinated, cost efficient federal action.

Some invasive plants have been introduced accidentally, but most were brought here as ornamentals or for livestock forage. Because these robust plants arrived without their natural predators (insects and diseases) their populations spread quickly across the landscape displacing native species and degrading ecological communities or ecosystem processes (Miller 2010). No federal-noxious weeds were observed, but many non-native invasive plant species were observed throughout the project area. Invasive species present across significant portions of the landscape include Chinese silvergrass, Chinese privet, creeping jenny, Japanese honeysuckle, shrubby lespedeza, and tall fescue. During field surveys, invasive plants were most prevalent in sections of the herbaceous vegetation types. This likely reflects the frequency and magnitude of disturbance present in areas of herbaceous vegetation. Disturbances associated with agriculture, grazing, and mowing prevent tree species from becoming established, but can also encourage invasion and establishment of weedy plants.

3.4.2 Threatened and Endangered Species (Plants)

Review of the TVA Natural Heritage Database indicates that fifty-nine state and one federally listed plant species have been previously reported within a five-mile vicinity of the project area (Table 3-4). No additional federally listed plant species have been previously reported from Clay, Lowndes, and Oktebbeha Counties, Mississippi. No designated critical habitat for plants occurs in the project area. Field surveys of the proposed project occurred in April 2019. No potential habitat for the federally listed Price's Potato-bean was observed in the project area. During field reviews, three state-listed plant species, one species with three occurrences, were found in the proposed rebuilt and new power line.

Eastern purple coneflower and white heath aster were observed in a chalk prairie remnant about 350 feet southeast of the existing West Columbus Switching Station and east of an

existing TL. About fifteen and ten individual eastern purple coneflower and white heath aster, respectively, were observed at this location.

A second occurrence of white heath aster was found in another chalk prairie remnant within a ROW on the east side of Bent Oak Road about 3 miles southeast of Golden Triangle Regional Airport. Three individual plants were observed.

Around fifty small Ohio buckeye trees were observed scattered along a fence row, as well as forested edges of an existing ROW just south of Artesia Road near Mayo Slough about 4.4 miles east of Golden Triangle Regional Airport.

The third occurrence of white heath aster was found in a medium quality chalk prairie remnant within ROW about 100 feet south Rockhill Road about 5 miles north northeast of Starkville, MS. About 20 individual plants were observed.

Table 3-4. Plant species of conservation concern previously reported from within five miles of the ROWs associated with the proposed Artesia-West Columbus project.[1]

Common Name	Scientific Name	Federal Status[2]	MS State Status[2]	State Rank[3]
PLANTS				
Ohio Buckeye	*Aesculus glabra*	–	SLNS	S2
Earleaf Foxglove	*Agalinis auriculata*	–	SLNS	S2
Ridge-stem False-foxglove	*Agalinis oligophylla*	–	SLNS	S2
Broom-snakeroot	*Amphiachyris dracunculoides*	–	SLNS	S1
Price's Potato-bean	*Apios priceana*	THR	SLNS	S1
Lake-cress	*Armoracia lacustris*	–	SLNS	S1
Canada Wild-ginger	*Asarum canadense*	–	SLNS	S3
Canadian Milkvetch	*Astragalus canadensis*	–	SLNS	S2
Poppy-mallow	*Callirhoe triangulata*	–	SLNS	S1
Wild Hyacinth	*Camassia scilloides*	–	SLNS	S2
Slender Sedge	*Carex gracilescens*	–	SLNS	S1
Asa Gray Sedge	*Carex grayi*	–	SLNS	S2
Sedge	*Carex jamesi*	–	SLNS	S1S2

Small-toothed Sedge	*Carex microdonta*	–	SLNS	S3
Big Shellbark Hickory	*Carya laciniosa*	–	SLNS	S2
Scarlet Indian-paintbrush	*Castilleja coccinea*	–	SLNS	S1
Leather-flower	*Clematis beadlei*	–	SLNS	SNR
Dwarf Larkspur	*Delphinium tricorne*	–	SLNS	S2
Shooting Star	*Dodecatheon meadia*	–	SLNS	S2
Eastern Purple Coneflower	*Echinacea purpurea*	–	SLNS	S3
Bald Spikerush	*Eleocharis erythropoda*	–	SLNS	SNR
White Trout-lily	*Erythronium albidum*	–	SLNS	S2
Wahoo	*Euonymus atropurpureus*	–	SLNS	S2S3
Big-head Evax	*Evax prolifera*	–	SLNS	S1
American Columbo	*Frasera caroliniensis*	–	SLNS	S2S3
Pumpkin Ash	*Fraxinus profunda*	–	SLNS	S2
Crested Coralroot	*Hexastylis spicata*	–	SLNS	S2
Green Violet	*Hybanthus concolor*	–	SLNS	S3
Waterleaf	*Hydrophyllum appendiculatum*	–	SLNS	S1
Butternut	*Juglans cinerea*	–	SLNS	S2
Turk's Cap Lily	*Lilium superbum*	–	SLNS	S3S4
Grooved Yellow Flax	*Linum sulcatum*	–	SLNS	S3
Climbing Milkweed	*Matelea obliqua*	–	SLNS	S2
Canada Moonseed	*Menispermum canadense*	–	SLNS	S3
Prairie Pleatleaf	*Nemastylis geminiflora*	–	SLNS	S2
Sundrops	*Oenothera triloba*	–	SLNS	S1

Limestone Adder's-tongue	*Ophioglossum engelmannii*	–	SLNS	S2
Smoother Sweet-cicely	*Osmorhiza longistylis*	–	SLNS	S3
Small Palafoxia	*Palafoxia callosa*	–	SLNS	S1
American Ginseng	*Panax quinquefolius*	–	SLNS	S3
Beard-tongue	*Penstemon tenuiflorus*	–	SLNS	S3
Beard-tongue	*Penstemon tenuis*	–	SLNS	S2
Perideridia	*Perideridia americana*	–	SLNS	S1S2
Prairie Parsley	*Polytaenia nuttallii*	–	SLNS	S2
Shadow-witch Orchid	*Ponthieva racemosa*	–	SLNS	S2
Rough Rattlesnake-root	*Prenanthes aspera*	–	SLNS	S2
Barbed Rattlesnake-root	*Prenanthes barbata*	–	SLNS	S1
Bur Oak	*Quercus macrocarpa*	–	SLNS	S2
Lance-leaved Buckthorn	*Rhamnus lanceolata*	–	SLNS	S2
Rock Stonecrop	*Sedum pulchellum*	–	SLNS	S1
Great Plains Ladies'-tresses	*Spiranthes magnicamporum*	–	SLNS	S2
Lesser Ladies'-tresses	*Spiranthes ovalis*	–	SLNS	S2S3
White Heath Aster	*Symphyotrichum ericoides*	–	SLNS	S2
Barrens Silky Aster	*Symphyotrichum pratense*	–	SLNS	S1
Yellow Pimpernel	*Taenidia integerrima*	–	SLNS	S1
Southern Meadow-rue	*Thalictrum debile*	–	SLNS	S1S2
Stiff-greenthread	*Thelesperma filifolium*	–	SLNS	S1
Southern Meadow-rue	*Thalictrum debile*	–	SLNS	S1S2
Horse-gentian	*Triosteum angustifolium*	–	SLNS	S3

September Elm	*Ulmus serotina*	–	SLNS	S2

[1] Source: TVA and Mississippi Natural Heritage Database, queried April 2019
[2] Status Codes: SLNS = Mississippi State Listed, no status assigned; THR = Listed as Threatened
[3] State Ranks: S1 = Critically Imperiled; S2 = Imperiled; S3 = Vulnerable; S#S# = Denotes a range of ranks because the exact rarity of the element is uncertain (e.g., S1S2); SNR = State Not Ranked

3.5 Wildlife

3.5.1 Terrestrial Ecology (Animals)

Habitat assessments for terrestrial animal species were conducted in the field on April 11th-17th and November 18th-19th, 2019 for the proposed new 11 mile transmission line (TL) and associated 100' right-of-way (ROW) and access roads (AR) in Lowndes County, Mississippi and rebuild of the 14 mile 161-kV TL L5022 on existing ROW and associated ARs in Clay and Oktibbeha Counties, MS. The total footprint reviewed for both lines was approximately 305.3 acres. Landscape features within and surrounding the project area consist of a variety of fragmented and contiguous forested habitat, wetlands, stream crossings, ponds, early successional habitat (i.e., existing ROW, pasture and agricultural), and residential or otherwise disturbed areas. Approximately 5 acres of forested habitat exist within the project footprint and would be cleared and maintained as early successional habitat. Approximately 3.47 acres of forested habitat within the ROW footprints is suitable bat habitat and would be cleared for the new TL and maintained as early successional habitat. Each of the varying community types offers suitable habitat for species common to the region, both seasonally and year-round.

Forest types present within the project footprint include deciduous and mixed deciduous-evergreen. Deciduous and mixed deciduous-evergreen forests in the project footprint include upland and bottomland hardwood types. Deciduous forests occupy approximately 4.5 acres or 90% of the project footprint and mixed forests occupy approximately 0.5 acres or 10%. Upland deciduous forests within the project footprint contain a mixture of canopy species that include: white oak, blackjack oak, southern red oak, chestnut oak, and shagbark hickory. Deciduous forest types provide habitat for an array of terrestrial animal species. Birds typical of this habitat include white-eyed vireo, red-eyed vireo, yellow-throated vireo, worm-eating warbler, red-bellied woodpecker, pileated woodpecker, wood thrush, wild turkey, red-tailed hawk, blue jay, and eastern towhee (National Geographic 2002, Sibley 2003). This area also provides foraging and roosting habitat for several species of bat, particularly in areas where the forest understory is partially open. Bat species likely found within this habitat include big brown bat, eastern red bat, evening bat, silver-haired bat, and tricolored bat. Eastern chipmunk, eastern woodrat, gray fox, and woodland vole are other mammals likely to occur within this habitat (Kays and Wilson 2002, Whitaker 1996). Eastern box turtle, five-lined skink, broad-headed skink, smooth earth snake, timber rattlesnake, and gray ratsnake are common reptiles of eastern deciduous forests (Conant and Collins 1998, Dorcas and Gibbons 2005). In forests with aquatic features, amphibians likely found in the area include eastern newt, spotted salamander, green treefrog, gray treefrog, and bird-voiced treefrog (Bailey et al. 2006, Petranka 1998).

Approximately 112.0 acres (37%) of wetland were recorded within the project footprint. Emergent, forested, and scrub-shrub wetlands make up 91.3%, 8.3%, and 0.4% of wetland

cover respectively. Sweetgum, sycamore, red maple, sugarberry, Osage orange, overcup oak, water oak, willow oak, are common in this habitat type. Such habitat provides resources for birds including great blue heron, great egret, common yellowthroat, mallard, Canada goose, wood duck, blue-winged teal, red-shouldered hawk, red-winged blackbird, Wilson's snipe, barred owl, and swamp sparrow (National Geographic 2002, Sibley 2003). American beaver, southeastern shrew, golden mouse, muskrat, and mink are common mammals in emergent wetland and aquatic communities (Kays and Wilson 2002, Whitaker 1996). Eastern painted turtle, spiny softshell, pond slider, common garter snake, northern water snake, rough green snake, and copperhead are common reptiles likely present within this habitat along the proposed ROW (Conant and Collins 1998, Dorcas and Gibbons 2005). Amphibians typical of this region found in and around emergent wetlands and open streams include American bullfrog, southern cricket frog, green frog, and southern two-lined salamander (Bailey et al. 2006, Petranka 1998).

Pastures, agricultural fields, and other early successional habitats comprise part of the project footprint. Common inhabitants of this type of habitat include killdeer, mourning dove, brown-headed cowbird, brown thrasher, American goldfinch, indigo bunting, eastern bluebird, blue-winged warbler, and eastern meadowlark (National Geographic 2002, Sibley 2003). Bobcat, white-tailed deer, groundhog, coyote, eastern cottontail, hispid cotton rat, and red fox are mammals typical of fields and cultivated land (Kays and Wilson 2002, Whitaker 1996). Amphibians such as eastern narrow-mouthed toad and reptiles including southern black racer, ring-necked snake, and speckled kingsnake are also known to occur in this habitat type (Bailey et al. 2006, Conant and Collins 1998, Dorcas and Gibbons 2005). Pollinators such as gulf fritillary and painted lady butterflies may be observed in this region (Brock and Kaufman 2003).

Developed areas and areas otherwise previously disturbed by human activity are home to a large number of common species. American robin, American crow, eastern phoebe, Carolina wren, northern cardinal, northern mockingbird, black vulture, and turkey vulture are birds commonly found along ROWs, road edges, and residential neighborhoods (National Geographic 2002, Sibley 2003). Mammals found in this community type include eastern gray squirrel, striped skunk, raccoon, and Virginia opossum (Kays and Wilson 2002, Whitaker 1996). Road-side ditches provide potential habitat for amphibians including American toad, and spring peeper (Bailey et al. 2006). Reptiles potentially present include red-bellied snake, green anole, eastern fence lizard, and brown snake (Conant and Collins 1998, Dorcas and Gibbons 2005).

Phased reviews of the TVA Regional Natural Heritage database were performed from December 2017 through February 2019 and indicated no recorded caves within three miles of the project area. No caves were identified during field review on April 11-17th or November 18th-19th, 2019. No other unique or important terrestrial habitats were identified within the project area. Further, no aggregations of migratory birds or wading bird colonies have been documented within three miles of the project area and none were observed during field surveys.

3.5.2 Threatened and Endangered Species (Animals)

The Endangered Species Act (ESA) requires federal agencies to conserve endangered and threatened species and to determine the effects of proposed actions on endangered and threatened species and Designated Critical Habitat. Endangered species are those determined to be in danger of extinction through all or a significant portion of their range. Threatened species are those determined likely to become endangered within the

foreseeable future. Section 7 of the ESA requires federal agencies to consult with the U.S. Fish and Wildlife Service (USFWS) when proposed actions may affect endangered or threatened species or Designated Critical Habitat.

Reviews of literature and the TVA Regional Heritage database in July 2018 resulted in two state-listed species (Rafinesque's big-eared bat and Bachman's sparrow) and no federally listed species within a three-mile radius of the project area. Within Clay, Lowndes, and Oktibbeha Counties, Mississippi, records exist for three federally listed species (bald eagle, wood stork, and red-cockaded woodpecker). Additionally, the USFWS has determined that the federally threatened northern long-eared bat has the potential to occur throughout the project area and will be included in this assessment (Table 3-5).

Table 3-5. Federally listed terrestrial animal species reported from Clay, Lowndes, and Oktibbeha Counties, Mississippi and other species of conservation concern documented within three miles of TVA's proposed Artesia-West Columbus 161-kV TL EA[1]

Common Name	Scientific Name	Federal Status	State Status[2] (Rank[3])
Bachman's Sparrow	*Peucaea aestivalis*	-	-(S3B,S3S4N)
Red-cockaded Woodpecker[4]	*Picoides borealis*	LE	LE(S1)
Wood Stork[4]	*Mycteria americana*	LT	LE(S2N)
Bald Eagle[4]	*Haliaeetus leucocephalus*	DM	-(S2B,S2N)
Rafinesque's Big-eared Bat	*Corynorhinus rafinesquii*	-	-(S3)
Northern long-eared bat[5]	*Myotis septentrionalis*	LT	-(S1N)

[1] Source: TVA Regional Natural Heritage Database and USFWS Information for Planning and Conservation (https://ecos.fws.gov/ipac/), accessed 7/16/2018.
[2] Status Codes: DM = Delisted and Monitored; LE = Listed Endangered; LT = Listed Threatened.
[3] State Rank: S1 = Critically Imperiled; S2 = Imperiled; S3 = Rare and Uncommon; S4 = Secure; S#B = rank of breeding population; S#N = rank of non-breeding population.
[4] Federally endangered species with known records from Clay, Lowndes, or Oktibbeha County, Mississippi.
[5] Federally threatened species with the potential to occur in the project area, though no records are known to date.

Bachman's Sparrow is a fire dependent species that primarily occupies mature pine woods with an understory of grass, brush, or palmetto. Bachman's sparrow favor relatively open areas where frequent fires limited the amount of brush. As mature forest has become scarce, this species also uses clearcuts, transmission line ROWs, brushy pastures, and abandoned fields. Red-cockaded woodpeckers typically inhabit open, mature pine forests with a dense groundcover consisting of a variety of grass, forb and shrub species. These woodpeckers are thought to be extirpated from most of their habitat. With regard to management, it is extremely important to protect and encourage the development of large, mature pines throughout the landscape. Protection of existing cavity trees and application of frequent fire to both nesting and foraging habitat are all actions meant to accomplish recovery and delisting.

Bald eagles are protected under the Bald and Golden Eagle Protection Act (USFWS 2013) and the Migratory Bird Treaty Act (16 United States Code Section 703–712). This species is associated with large mature trees capable of supporting its massive nests, which are usually found near large waterways where the eagles forage.

Wood storks are highly colonial and require wetland habitat for nesting and foraging. They form large rookeries in upper parts of cypress trees, mangroves, or dead hardwoods over swamps, on islands, and along streams and shallow lakes (Natureserve 2016). Wood storks feed on small fish, crayfish, reptiles, and amphibians in shallow fresh waterbodies and wetlands (Turcotte and Watts 1999). Wood storks breed in Florida, Georgia, South Carolina, and from Mexico to Argentina (Natureserve, 2016). Vagrant individuals are believed to occur statewide in Mississippi during the non-nesting foraging season from May to October.

Rafinesque's big-eared bats roost in hollow trees, abandoned buildings, under bridges, or in culverts, in or near wooded areas in summer. Maternity colonies are formed in caves and mines. Males are usually solitary during summer, roosting in buildings or hollow trees. This species is believed to be non-migratory, moving short distances between summer and winter roosting sites. Different parts of chosen roosts are often used all year. Rafinesque's big-eared bats emerge late in the evening to forage in mature forest in both upland and lowland areas, along permanent water bodies, especially rivers.

The northern long-eared bat predominantly overwinters in large hibernacula such as caves, abandoned mines, and cave-like structures. During the fall and spring they utilize entrances of caves and the surrounding forested areas for swarming and staging. In the summer, northern long-eared bats roost individually or in colonies beneath exfoliating bark or in crevices of both live and dead trees (typically greater than 3 inches in diameter). Roost selection by northern long-eared bat is similar to that of Indiana bat, however northern long-eared bats are thought to be more opportunistic in roost site selection. This species also roosts in abandoned buildings and under bridges. Northern long-eared bats emerge at dusk to forage below the canopy of mature forests on hillsides and roads, and occasionally over forest clearings and along riparian areas (USFWS 2014).

3.6 Floodplains

A floodplain is the relatively level land area along a stream or river that is subjected to periodic flooding. The area subject to a one-percent chance of flooding in any given year is normally called the 100-year floodplain. It is necessary to evaluate development in the 100-year floodplain to ensure that the project is consistent with the requirements of EO 11988. The proposed transmission line would involve floodplain areas associated with several streams in Lowndes County, Mississippi.

3.7 Wetlands

Wetlands are those areas inundated or saturated by surface or groundwater such that vegetation adapted to saturated soil conditions are prevalent. Examples include bottomland forests, swamps, wet meadows, isolated depressions, and fringe wetland along the edges of watercourses and impoundments. Wetlands provide many societal benefits such as toxin absorption and sediment retention for improved downstream water quality, storm water impediment and attenuation for flood control, shoreline buffering for erosion protection, and provision of fish and wildlife habitat for commercial, recreational, and conservation

purposes. Therefore, a wetland assessment was performed to ascertain wetland presence, condition, and extent to which wetland functions are provided within the proposed project area. Field surveys were conducted in April 2019 to delineate wetland areas potentially affected by the proposed Action Alternative.

Wetland determinations were performed according to the USACE standards, which require documentation of hydrophytic (wet-site) vegetation, hydric soil, and wetland hydrology (Environmental Laboratory 1987; Lichvar et al. 2016; USACE 2010). Using a TVA-developed modification of the Ohio Rapid Assessment Method (Mack 2001) specific to the TVA region (TVA Rapid Assessment Method or "TVARAM") wetlands were evaluated by their functions and classified into three categories: low quality, moderate quality, and superior quality. Low quality wetlands are degraded aquatic resources which may exhibit low species diversity, minimal hydrologic input and connectivity, recent or on-going disturbance regimes, and/or predominance of non-native species. These wetlands provide low functionality and are considered of low value. Moderate quality wetlands provide functions at a greater value due to a lesser degree of degradation and/or due to their habitat, landscape position, or hydrologic input. Moderate quality wetlands are considered healthy water resources of value. Disturbance to hydrology, substrate and/or vegetation may be present to a degree at which valuable functional capacity is sustained and there is reasonable potential for restoration. High quality wetlands include those wetlands offering superior functions and values within a watershed or are of regional/statewide concern. High quality wetlands may exhibit little, if any, recent disturbance, provide essential and/or large scale stormwater storage, sediment retention, and toxin absorption, contain mature vegetation communities, and/or offer habitat to rare species. Conditions found in high quality wetlands often represent restoration goals for wetlands functioning at a lower capacity.

Wetlands within the existing West Point-Starkville (L5022) transmission line ROW proposed for rebuild are already maintained as emergent wetland habitat. Either private or commercial land use, such as farming, or ROW vegetation management practices deter woody vegetation growth resulting in maintenance of a meadow-like wetland habitat within the conductor spans. Emergent habitat is the desired objective of ROW wetland management to accommodate overhead wire clearance. Thirty-three emergent wetland areas were field delineated within this ROW corridor, totaling 72.32 acre within the transmission line rebuild footprint associated with this project (Appendix D).

The proposed new Artesia-West Columbus transmission line route traverses a rural landscape, dominated by pastureland, agricultural fields, and forested uplands and bottomlands in Lowndes County, Mississippi. The proposed new transmission line is entirely located within the Middle Tombigbee-Lubbub sub-basin (8-HUC), across the Kincaide Creek and Magonak Creek watersheds (10-HUC). Thirty wetland areas were identified within the selected ROW corridor for the new Artesia-West Columbus transmission line, totaling 41.83 acres (Appendix D).

Land-use practices and landscape position in combination dictate wetland habitat type, wetland functional capacity, and wetland value. Wetlands located along the new Artesia-West Columbus transmission line proposed ROW corridor consisted of emergent, scrub-shrub (sapling dominated), and forested wetland habitat of varying levels of condition, thus providing a range of wetland function and value to the surrounding landscape (Appendix D, Table D-1 and D2). The delineated wetlands were generally identified in association with smaller to medium sized drainage features and larger floodplain bottoms. Table 3-7a and 3-

7b identifies the wetland acreage and wetland types by watershed within the project footprint.

Table 3-7a Acreage of Low, Moderate, and High Quality Wetlands by Watershed Within the Action Alternative Footprint for the New Artesia-West Columbus Transmission Line Corridor.

Watershed (10-HUC)	NWI Estimated Total Wetland Acres in Watershed*	Delineated Wetland Acreage in Project Area			
		Low	Moderate	High	TOTAL
Kincaide Creek (0316010603)	**44,494**	0.27	0.40	0	**0.67**
Magowac Creek (0316010601)	**9,283**	13.66	27.50	0	**41.16**
TOTAL		**13.93**	**27.90**	**0**	**41.83**

Table 3-7b Acreage of Wetland Habitat Type by Watershed Within the Action Alternative Footprint for the New Artesia-West Columbus Transmission Line Corridor.

Watershed (10-HUC)	NWI Estimated Total Wetland Acres in Watershed*	Delineated Total Wetland Acreage in Proposed Project			
		Emergent	Scrub-Shrub	Forested	TOTAL
Kincaide Creek (0316010603)	**44,494**	0.36	0.07	0.24	**0.67**
Magonac Creek (0316010601)	**9,283**	31.19	0.58	9.39	**41.16**
TOTAL		**31.55**	**0.65**	**9.63**	**41.83**

*National Wetland Inventory (USFWS 1982)

Emergent wetland area within the proposed new Artesia-West Columbus transmission line corridor and access roads total 31.75 acre across 22 delineated wetland areas (Appendix D, Table D-2). Much of this emergent wetland area is located within the 4-mile section of the proposed new ROW that already comprises an existing ROW. Emergent wetlands are generally devoid of woody vegetation with predominant cover by non-woody species across areas periodically saturated and/or inundated. The emergent wetland habitat encountered within the project footprints were either maintained as emergent habitat by current land use

practices, such as farmland or pasture, or through ROW vegetation management with the objective to maintain a meadow like habitat and deter woody growth that has the potential to interfere with overhead conductor clearance. This was evident within all existing ROW portions of the proposed project footprint wherever vegetation management would be required by TVA to ensure adequate conductor clearance. All other emergent wetlands were identified in agricultural fields or pastureland. All of these wetland areas contained indicators of wetland hydrology influencing soil physiology such that coloration indicative of wetland conditions was evident in the soil profile. Typical emergent wetland vegetation dominated these habitats. This included wetland grasses, sedges, pathrushes, bulrushes, and forbs. Condition and functional capacity of these wetlands ranged from low to moderate in quality, largely due to or dependent on size, landscape position, hydrologic influence, and degree of impacts evident (e.g. grazing, farming, woody vegetation control, soil compaction, mowing, etc.)

Scrub-shrub wetlands are dominated by woody vegetation generally less than 15 feet tall and three inches diameter (Cowardin et al. 1979). This habitat type totaled 0.65 acre across three delineated wetland areas within the proposed new Artesia-West Columbus ROW (Table 3-7c). This habitat type within the project footprint is comprised of young saplings in early successional forest (scrubby). Due to their landscape position, size, disturbance regime, hydrologic influence, these wetlands were assessed as providing low to moderate wetland value within the surrounding landscape. All delineated scrub-shrub wetland areas exhibited wetland hydrology indicators and hydric soil coloration within the soil profile. Hydrophygic saplings, such as sweetgum, sycamore, black willow, and green ash, were dominant across these wetlands.

Table 3-7c Acreage of Low, Moderate, and High Quality Scrub-Shrub Wetlands by Watershed within the Action Alternative Footprint for the New Artesia-West Columbus Transmission Line Corridor.

Watershed (10-HUC)	**NWI Estimated Scrub-shrub Wetland Acres in Watershed***	**Delineated Scrub-Shrub Wetland Acreage In Proposed Project Area**			
		Low	**Moderate**	**High**	**TOTAL**
Kincaide Creek (0316010603)	**5,297**	0.07	0	0	**0.07**
Magowac Creek (0316010601)	**748**	0	0.58	0	**0.58**
TOTAL		**0.07**	**0.58**	**0**	**0.65**

*National Wetland Inventory (USFWS 1982)

Forested wetlands in general have deeper root systems and contain greater biomass (quantity of living matter) per acre than do emergent and scrub-shrub wetlands, which do not grow as tall. As a result, forested wetlands provide higher levels of wetland functions, such as sediment retention, carbon storage, and pollutant retention and transformation (detoxification), storm water storage, and flood attenuation, all of which support better water quality and protection of downstream infrastructure (Ainslie et al. 1999; Scott et al. 1990;

Wilder and Roberts 2002). 9.63 acres of forested wetland were delineated across nine wetland areas within the proposed Artesia-West Columbus ROW (Appendix D, Table D-3). Due to landscape position, buffer composition, hydrologic influence, disturbance history, and habitat features, these forested wetlands varied in condition and associated value provided to the surrounding watershed from low to moderate. Moderate quality forested wetland totaled 8.02 acres, providing adequate and healthy function and value. The remaining 1.37 acre was assessed as having low value, offering less than desirable wetland function (Appendix D and Table 3-7d).

Table 3-7d Acreage of Low, Moderate, and High Quality Forested Wetlands by Watershed within the Action Alternative Footprint for the New Artesia-West Columbus Transmission Line.

Watershed (10-HUC)	**NWI Estimated Forested Wetland Acres in Watershed***	**Delineated Forested Wetland Acreage In Proposed Project Area**			
		Low	**Moderate**	**High**	**TOTAL**
Kincaide Creek (0316010603)	**39,197**	0	0.24	0	**0.24**
Magowac Creek (0316010601)	**7,769**	1.37	8.02	0	**9.39**
TOTAL		**1.37**	**8.26**	**0**	**9.63**

*National Wetland Inventory (USFWS 1982)

Forested wetlands encountered within the proposed new Artesia-West Columbus transmission line route and access roads consisted of bottomland floodplain areas associated with large creeks and their tributaries. W003a is tributary to the vast floodplain complex associated with the Tombigbee Waterway. W004a consists of young forested wetland in a disturbed ravine adjacent to man-made ponds. The remaining forested wetland areas, W001b-AR, W018a(a), W019a, W020a, W021a, W022a, W023a, W024a, and W026a(b) all represent floodplain wetland habitat along tributaries to the floodplain wetland complex associated with Gilmer Creek. All forested wetlands exhibited hydrologic indicators which have resulted in hydric soil coloration. Forested hydrophytic vegetation across these communities was dominated sweetgum, sycamore, sugarberry, willow oak, or cherrybark oak.

3.8 Aesthetic Resources

3.8.1 Visual Resources

This assessment provides a review and classification of the visual attributes of existing scenery, along with the anticipated attributes resulting from the proposed action. The classification criteria used in this analysis are adapted from a scenic management system developed by the U.S. Forest Service (USFS) and integrated with planning methods used by TVA (USFS 1995). Potential visual impacts to cultural and historic resources are not included in this analysis as they are assessed separately in Section 3.10.

The visual landscape of an area is formed by physical, biological, and man-made features that combine to influence both landscape identifiability and uniqueness. The scenic value of a particular landscape is evaluated based on several factors that include scenic attractiveness, scenic integrity, and visibility. Scenic attractiveness is a measure of scenic quality based on human perceptions of intrinsic beauty as expressed in the forms, colors, textures, and visual composition of each landscape. Scenic attractiveness is expressed as one of the following three categories: distinctive, common, or minimal. Scenic integrity is a measure of scenic importance based on the degree of visual unity and wholeness of the natural landscape character. The scenic integrity of a site is classified as high, moderate, low, or very low. The subjective perceptions of a landscape's aesthetic quality and sense of place are dependent on where and how it is viewed.

Views of the landscape are described in terms of what is seen in the foreground, middleground, and background distances. In the foreground, an area within 0.5 mile of the observer, details of objects are easily distinguished. In the middleground, from 0.5 mile to 4 miles from the observer, objects may be distinguishable, but their details are weak and tend to merge into larger patterns. In the distant part of the landscape, the background, details and colors of objects are not normally discernible unless they are especially large, standing alone, or have a substantial color contrast. In this assessment, the background is measured as 4 to 10 miles from the observer. Visual and aesthetic impacts associated with an action may occur as a result of the introduction of a feature that is not consistent with the existing viewshed. Consequently, the visual character of an existing site is an important factor in evaluating potential visual impacts.

For the purposes of this visual assessment, the project area is defined as the area encompassing the proposed Artesia Switching Station and the approximately 12-mile 161-kV TL that would connect it to TVA's existing West Columbus Switching Station. Related project actions include conductor replacement on two existing TVA lines, the CMF – Carbonic 161-kV TL and the Starkville – West Point 161-kV TL. However, as conductor replacement would entail only minor modifications to these existing TLs and would not alter the existing aesthetic or visibility, there would be no notable impacts to visual resources in association with these actions. For this reason, the focus of the visual assessment is limited to the project area associated with the proposed Artesia Switching Station and new 161-kV TL.

The project area is located in Lowndes County, near the eastern border of Mississippi, and is comprised of relatively level terrain with some slight undulating hills. The landscape is characterized by forested areas fragmented by rural and industrial features including agricultural fields and pastures, catfish pond systems, roadways, existing utility corridors, industrial facilities, and scattered residences. There are existing high voltage TLs present along the eastern portion of the project area, including the West Columbus Switching Station – Severcorr Switching Station 161-kV TL, of which approximately 4 miles will be rebuilt as a double circuit within the existing 100-foot ROW and incorporated into the proposed TL. Additionally, the West Columbus Switching Station – Columbus No. 2 161-kV TL parallels the eastern end of the proposed TL as it terminates at the existing West Columbus Switching Station. The proposed TL route also parallels several miles of existing transportation corridors, including US Highway 45, Artesia Road, and the Kansas City Southern Railroad. In contrast to these existing utility and transportation corridors, the location of the proposed Artesia Switching Station and westernmost portion of the TL, north of Artesia Road, are currently open agricultural fields with little other development. Thus, the project area combines natural elements, such as rolling fields and forested areas, with

human development, such as utility and transportation corridors, creating a somewhat disjointed visual landscape.

The composition and patterns of vegetation are the prominent natural features of the landscape within the project area. Land cover within the project area consists of agricultural fields and pastures as well as a variety of deciduous and evergreen trees. The forms, colors, and textures of the natural features of the project area are not considered to have distinctive visual quality. Therefore, scenic attractiveness of the project area is considered common, due to the ordinary or common visual quality in the foreground, middleground, and background (Table 3-8). The scenic integrity in the foreground of the Artesia Switching Station and portions of the new TL in which the 100-foot ROW would be newly acquired is considered moderate due to slight human alteration, including agricultural and residential uses. Along the rebuild segment of the proposed TL that utilizes existing TL ROW, the scenic integrity in the foreground is considered low, as the visual alterations associated with the existing 161-kV TL (transmission structures, lines, and clear-cut ROW corridors that disrupt the tree canopy) are dominate features on the landscape. However, in the middleground and background of both the new and rebuild portions of the corridor, the existing human alterations are not substantive enough to dominate the view. The scenic value class of a landscape is determined by combining the levels of scenic attractiveness, scenic integrity, and visibility and can be excellent, good, fair, or poor. Based on the criteria used for this analysis, the overall scenic value class for the project area is fair (in the foreground of the existing TL) to good (in the foreground of the new ROW segments and at middle and background viewing distances).

Table 3-8. Visual Assessment Ratings for Project Area

	Exiting Landscape	
View Distance	**Scenic Attractiveness**	**Scenic Integrity**
Foreground	Common	Moderate to Low
Middleground	Common	Moderate
Background	Common	Moderate

In a visual impact assessment, sensitive receptors generally include any scenic vistas, scenic highways, residential viewers, and public recreational facilities located in the project's viewshed. The proposed TL would be visible to passing motorists from US Highway 45, Artesia Road, and several other local and farm roads along the route. Other sensitive visual receptors within the foreground include scattered farmsteads and residences. In addition, as shown in Figure 3-1, there are a number of churches, cemeteries, schools, parks, and recreational areas within the viewshed of the proposed TL. The majority of these facilities occur within the middleground of the project area, at distances between 0.5 and 4 miles. Two churches and three cemeteries occur within the foreground. The closest of these is a small private/family cemetery, located approximately 900 feet from the proposed TL ROW.

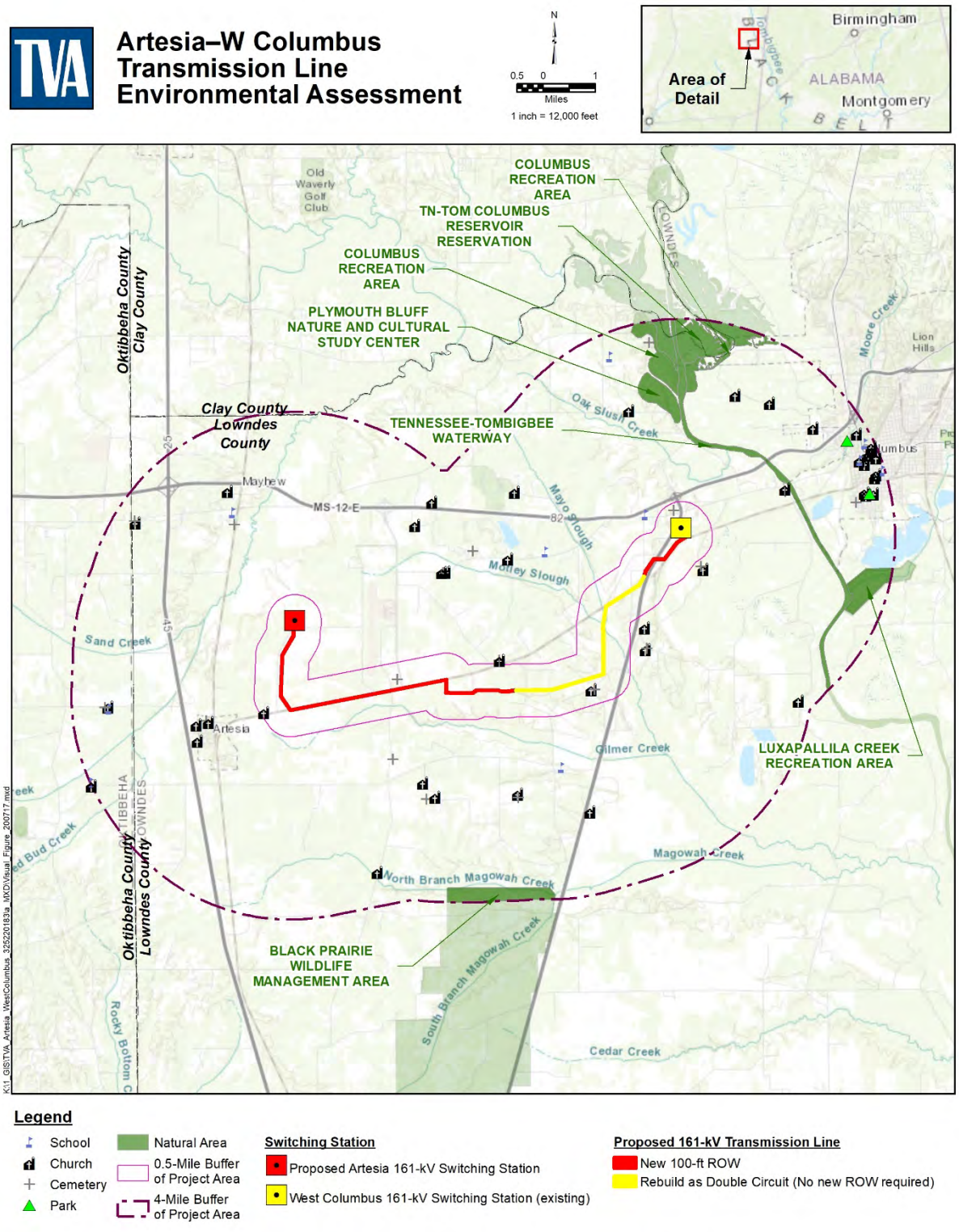

Figure 3-1 Sensitive Visual Receptors within Foreground and Middleground of the Project Area

3.8.2 Noise and Odors

Golden Triangle Regional Airport is located in close proximity to the proposed TL route. Also, some traffic noise is generated along State Route 45 and 82, and from the towns of Artesia and Columbus, which are in close proximity to the proposed TL route. The traffic noise has become part of the ambient noise.

There are no known major sources of objectionable odors along the route or in the vicinity of the proposed TL.

3.9 Socioeconomics and Environmental Justice

The proposed 161-kV TL would extend approximately 12 miles from TVA's existing West Columbus Switching Station, in central Lowndes County, to the Artesia Switching Station in western Lowndes County. Related project actions include conductor replacement on two existing TVA lines, the CMF –Carbonic 161-kV TL, also in Lowndes County, and the Starkville – West Point 161-kV TL in adjacent Clay and Oktibbeha counties. However, as conductor replacement would entail only minor modifications to these existing TLs, there would be no notable impacts to socioeconomic conditions or environmental justice communities in association with these actions. For this reason, the study area for socioeconomic and environmental justice analysis is limited to the two census block groups encompassing the proposed 12-mile 161-kV TL and the modified Artesia Switching Station, Block Groups 1 and 2 of Census Tract 10. Lowndes County and the state of Mississippi are included as appropriate secondary geographic areas of reference. Comparisons at multiple spatial scales provide a more detailed characterization of populations that may be affected by the proposed actions, including any environmental justice populations (e.g., minority and low-income). Demographic and economic characteristics of populations within the study area were assessed using the 2014-2018 American Community Survey 5-year estimates provided by the U.S. Census Bureau (USCB) (USCB 2020a).

Demographic and Socioeconomic Conditions

Demographic characteristics of the study area and of the secondary reference geographies are summarized in Table 3-10. The two block groups that make up the study area have a combined resident population of 2,603, which accounts for only 4.4 percent of the total population of Lowndes County. The study area is located west of the city of Columbus, the county's population center, and encompasses the small town of Artesia, as well as the unincorporated community of Mayhew. It is predominantly characterized by agriculture, low-density rural residential development and scattered subdivisions, and a large industrial presence including multiple industrial parks. Since 2010, the study area has experienced a notable increase in population (10.7 percent), with a slight population decline in Block Group 1 offset by substantial growth in Block Group 2. In comparison, during the same period, the population of Lowndes County decreased by 0.6 percent while the population of the state of Mississippi increased by only 0.7 percent.

Just over half of the study area population is white, with a higher percentage of minority individuals in Block Group 2 (62 percent) than in Block Group 1 (36 percent). The largest minority group in the study area is Black or African American; there are also small numbers of residents that are Asian, Hispanic or Latino, and persons who identify as two or more races. The county and state have total minority population percentages falling between

those of the two study area block groups, at approximately 48 and 43 percent minority, respectively (Table 3-10).

The median household income in the study area varies from $65,000 in Block Group 1 to $48,538 in Block Group 2. However, both are higher than the median household income in Lowndes County ($45,355) and the state of Mississippi ($43,567) (Table 3-10). Block Group 1 also has a low percentage of the population living below the poverty level (8.7 percent) compared to the county and state (22.1 and 20.8 percent, respectively), whereas 36.8 percent of the population of Block Group 2 lives below the poverty level.

Table 3-10. Demographic and Socioeconomic Characteristics of Study Area and Secondary Reference Geographies

	Block Group 1, Census Tract 10, Lowndes County, Mississippi	Block Group 2, Census Tract 10, Lowndes County, Mississippi	Lowndes County, Mississippi	State of Mississippi
Population[1, 2]				
Population, 2018 estimate	1,386	1,217	59,437	2,988,762
Population, 2010	1,468	883	59,779	2,967,297
Percent Change 2010-2018	-5.6%	37.8%	-0.6%	0.7%
Persons under 18 years, 2018	16.3%	23.3%	23.9%	24.1%
Persons 65 years and over, 2018	20.6%	14.2%	15.0%	15.0%
Racial Characteristics[1]				
Not Hispanic or Latino				
White alone, 2018 (a)	63.9%	38.0%	51.9%	56.8%
Black or African American, 2018 (a)	32.6%	57.6%	43.6%	37.5%
American Indian and Alaska Native, 2018 (a)	0.0%	0.0%	0.2%	0.4%
Asian, 2018 (a)	2.2%	0.0%	0.9%	0.9%
Native Hawaiian and Other Pacific Islander, 2018 (a)	0.0%	0.0%	0.0%	0.0%
Some Other Race alone, 2018 (a)	0.0%	0.0%	0.1%	0.1%
Two or More Races, 2018	0.5%	0.0%	1.2%	1.2%
Hispanic or Latino, 2018	0.9%	4.4%	2.0%	3.0%
Housing and Income[1]				
Housing units, 2018	746	495	27,272	1,316,108
Median household income, 2014-2018	$ 65,000	$ 48,538	$ 45,355	$ 43,567
Persons below poverty level, 2014-2018	8.7%	36.8%	22.1%	20.8%
Persons below low-income threshold, 2014-2018 (b)	21.4%	58.9%	42.2%	43.1%

(a) Includes persons reporting only one race.

(b) Low-income threshold is defined as two times the poverty level

Sources: [1]USCB 2020a; [2]USCB 2011

Community Facilities and Services

Community facilities and services include public or publicly funded facilities such as police

protection and other emergency services (ambulance/fire protection), schools, hospitals and other health care facilities, libraries, day care centers, churches, and community centers. To identify facilities and emergency services that could be potentially impacted by proposed project activities or emergency incidents along the length of the TL, the study area is identified as the service area of various providers, where applicable, or the area within a 5-mile radius along the entirety of the TL corridor.

Based on a review of aerial imagery and online information including the U.S. Geological Survey (USGS) Geographic Names Information System database (USGS 2020), community facilities and services available within a 5-mile radius of the proposed project area include schools, churches, cemeteries, libraries, health care facilities, police and emergency services, and an airport. The highest concentrations of these facilities are found at the easternmost end of the study area near the city of Columbus. Two churches, three cemeteries, a volunteer fire station, and a Lowndes County School District administration building are located within 0.5 mile of the proposed TL. The closest of these is a small private/family cemetery, located approximately 900 feet from the proposed TL ROW. No community facilities are within 0.5 mile of the proposed Atresia Switching Station.

Environmental Justice

On February 11, 1994, President Clinton signed EO 12898 Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. EO 12898 mandates some federal-executive agencies to consider environmental justice as part of NEPA. Environmental justice has been defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income (EPA 2018) and ensures that minority and low-income populations do not bear disproportionately high and adverse human health or environmental effects from federal programs, policies, and activities. Although TVA is not one of the agencies subject to this order, TVA routinely considers environmental justice impacts as part of the project decision-making process.

Guidance for addressing environmental justice is provided by the Council on Environmental Quality's (CEQ) Environmental Justice Guidance under the National Environmental Policy Act (CEQ 1997). The CEQ defines minority as any race and ethnicity, as classified by the USCB, that is: Black or African American; American Indian or Alaska Native; Asian; Native Hawaiian and Other Pacific Islander; some other race (not mentioned above); two or more races; or a race whose ethnicity is Hispanic or Latino (CEQ 1997).

Identification of minority populations requires analysis of individual race and ethnicity classifications as well as comparisons of all minority populations in the region. Minority populations exist if either of the following conditions is met:

- The minority population of the impacted area exceeds 50 percent of the total population.
- The ratio of minority population is meaningfully greater (i.e., greater than or equal to 20 percent) than the minority population percentage in the general population or other appropriate unit of geographic analysis (CEQ 1997).

The nationwide poverty level is determined annually by the USCB and varies by the size of family and number of related children under 18 years of age. The 2019 USCB Poverty Threshold for an individual is an annual income of $13,300, and for a family of four it is an annual household income of $26,370 (USCB 2020b). For the purposes of this assessment,

low-income individuals are those whose annual household income is less than two times the poverty level. More encompassing than the base poverty level, this low-income threshold, also used by the EPA in their delineation of low-income populations, is an appropriate measure for environmental justice consideration because current poverty thresholds are often too low to adequately capture the populations adversely affected by low-income levels, especially in high-cost areas (EPA 2017). According to EPA, the effects of income on baseline health and other aspects of susceptibility are not limited to those below the poverty thresholds. For example, populations having an income level from one to two times the poverty level also have worse health overall than those with higher incomes (Centers for Disease Control and Prevention 2011). A low-income environmental justice population exists if either of the following two conditions is met:

- The low-income population exceeds 50 percent of the total population.
- The ratio of low-income population significantly exceeds (i.e., greater than or equal to 20 percent) the appropriate geographic areas of analysis.

Based on a preliminary review of the EPA's EJSCREEN tool, the project area consists of a mixture of communities that meet the criteria for consideration as minority and/or low-income populations and those that do not. A more detailed evaluation was completed using the 2014-2018 American Community Survey data to identify specific block groups within the project area that exceed environmental justice thresholds. Figure 3-10 identifies the block groups that meet the specified criteria as environmental justice minority populations or low-income populations.

Total minority populations (i.e., all non-white and Hispanic or Latino racial groups combined) comprise 43.2 percent of the population of Mississippi and 48.1 percent of Lowndes County. The study area as a whole has a total minority percentage of 48.2 percent, nearly equal to that of the county, with percentages for the two individual block groups at 36.1 and 62.0 percent. As Block Group 2 has a minority population that exceeds 50 percent of the total population, it was determined to meet the criterion for consideration as a minority population group subject to environmental justice considerations (Figure 3-10).

The percentage of the population of Mississippi living below the low-income threshold is 43.1 percent, while Lowndes County is just slightly lower at 42.2 percent. Again, while the study area is relatively similar to the county, with 38.7 percent of people below the low-income threshold, there is a notable difference between the two block groups. Approximately 21.4 percent of the population in Block Group 1 are considered low-income, whereas the percentage in Block Group 2 is much higher, at 58.9 percent. As Block Group 2 has a low-income population that exceeds 50 percent of the total population, it was determined to meet the criterion for consideration as a low-income population group subject to environmental justice considerations (Figure 3-10).

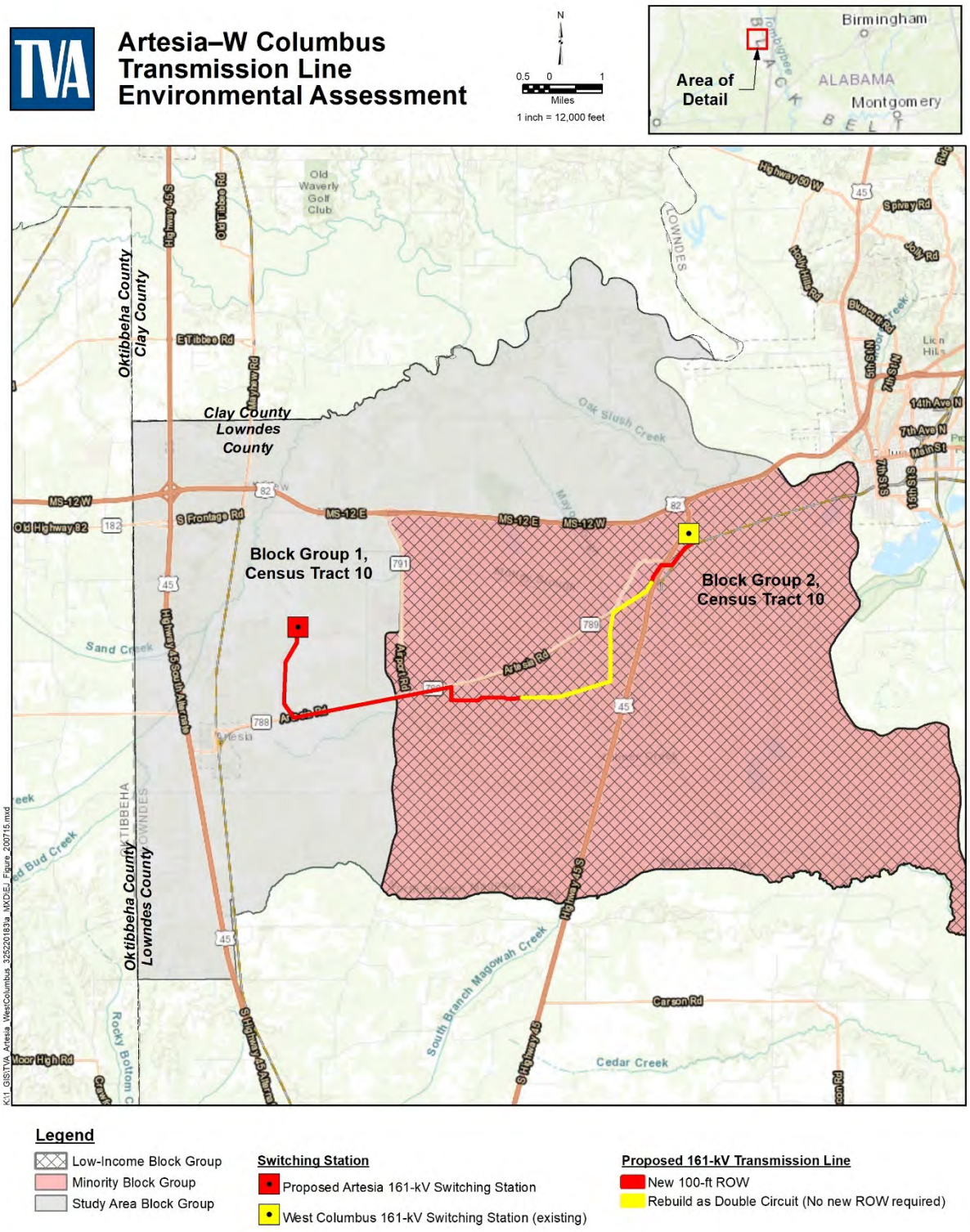

Figure 3-10. Environmental Justice Populations within the Study Area

3.10 Cultural Resources

Cultural resources are properties and places that illustrate aspects of prehistory or history or have long-standing cultural associations with established communities and/or social groups. Cultural resources may include archaeological sites, unmodified landscapes and discrete natural features, modified landscapes, human-made objects, structures such as bridges or buildings, and groups of any of these resources, sometimes referred to as districts.

Section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended (54 U.S.C. Section 300101 et seq.), is specifically designed to address the effects of federal and/or federally funded projects on tangible cultural resources – that is, physically concrete properties – of historic value. The NHPA provided for a national program to support both public and private efforts to identify, evaluate, and protect the nation's important cultural resources. Once identified, these resources are evaluated for inclusion in the NRHP maintained by the National Park Service. Tangible cultural resources may qualify for inclusion in the NRHP if they are 50 years of age or older (unless in exceptional cases) and if found to embody one or more of four different types of values, or criteria, in accordance with 36 CFR Section 60.4:

- Criterion A: association with events that have made a significant contribution to the broad patterns of our history. Such events may include a specific occurrence or pattern of occurrences, cultural traditions, or historic trends important at a local, regional, or national level. To be considered in association with a cultural resource, events must be important within the particular context being assessed.
- Criterion B: association with the lives of persons significant in our past. People considered may be important locally, regionally, or nationally, and the cultural resources considered are limited to properties illustrating a person's achievements rather than commemorating them.
- Criterion C: embodiment of the distinctive characteristics of a type, period, or method of construction; representative of the work of a master; possessing high artistic values; or representative of a significant and distinguishable entity whose components may lack individual distinction. Cultural resources considered generally include architectural resources such as buildings, objects, districts, and designed landscapes.
- Criterion D: cultural resources that have yielded, or may be likely to yield, information important in prehistory or history. Considered cultural resources typically include archaeological sites but may also include buildings, structures, and objects if they are the principal source of important information not contained elsewhere.

Cultural resources that are listed or considered eligible for listing in the NRHP are called "historic properties." Federal agencies are required by the NHPA to consider the possible effects of their undertakings on historic properties and take measures to avoid, minimize, or mitigate any adverse effects. NEPA requires federal agencies to consider how their undertakings may affect the quality of the human environment, including both cultural resources and those defined as historic properties, so that the nation may "preserve important historic, cultural, and natural aspects of our national heritage." "Undertaking" includes any project, activity, or program that has the potential to have an effect on a

historic property and that is under the direct or indirect jurisdiction of a federal agency or is licensed or assisted by a federal agency.

Considering an undertaking's possible effects on historic properties is accomplished through a four-step review process outlined in Section 106 of the NHPA (36 CFR § 800). These steps are:

- Initiation (defining the undertaking and the area of potential effect [APE] and identifying the parties to be consulted in the process);
- Identification (studies to determine whether cultural resources are present in the APE and whether they qualify as historic properties);
- Assessment of adverse effects (determining whether the undertaking would affect the qualities that make the property eligible for the NRHP); and
- Resolution of any adverse effects (by avoidance, minimization, or mitigation).

A project may have effects on a historic property that are not adverse. However, if the agency determines that the undertaking's effect on a historic property within the APE would diminish any of the qualities that make the property eligible for the National Register (based on the criteria for evaluation at 36 CFR part 60.4), the effect is said to be adverse. Examples of adverse effects would be ground disturbing activity in an archaeological site, or erecting tall buildings or structures within the Viewshed of a historic building in such a way as to diminish the structure's integrity of feeling or setting and its ability to convey its historic and/or architectural significance. Adverse effects must be resolved. Resolution may consist of avoidance (such as redesigning a project to avoid impacts or choosing a project alternative that does not result in adverse effects), minimization (such as redesigning a project to lessen the effects or installing visual screenings), or mitigation. Adverse effects to archaeological sites are typically mitigated by means of excavation to recover the important scientific information contained within the site. Mitigation of adverse effects to historic buildings and structures sometimes involves thorough documentation of the resource by compiling historic records, studies, and photographs.

Agencies are required to consult with the appropriate state historic preservation officer(s) (SHPOs), federally recognized Indian tribes that have an interest in the undertaking, and any other party with a vested interest in the undertaking. Through various regulations and guidelines, federal agencies are encouraged to coordinate Section 106 and NEPA review to improve efficiency and allow for more informed decisions. Under NEPA, impacts to cultural resources that are part of the affected human environment but not necessarily eligible for the NRHP must also be considered by federal agencies. Generally these considerations as well as those of NRHP-eligible traditional cultural resources (also called traditional cultural properties; see Parker and King 1998) are accomplished through consultation with parties having a vested interest in the undertaking, as described above.

The region has been an area of human occupation for the last 12,000 years. This includes five broad cultural periods: Paleo-Indian (11,000-8,000 BC), Archaic (8000-1600 BC), Woodland (1600 BC-AD 1000), Mississippian (AD 1000-1700), and Historic (AD 1700-present). Prehistoric land use and settlement patterns vary during each period, but short- and long-term habitation sites are generally located on flood plains and alluvial terraces along rivers and tributaries. Specialized campsites tend to be located on older alluvial terraces and in the uplands.

During the late eighteenth century, Chickasaw territory encompassed portions of southwestern Kentucky, western Tennessee, northwestern Alabama, and northeastern Mississippi. The traditional Choctaw homeland is located in the headwaters region of the Pearl, Sucarnoochee, and Chickasawhay-Leaf-Pascagoula drainages in east-central Mississippi. By the early 1800's European presence in Mississippi swelled with an influx of traders and settlers. After forced Indian removal, more Euro Americans and enslaved African Americans began to settle in the region that would encompass the project area. Located immediately north of the project area, is a plantation residence Billups Gate. Federal slave schedules from 1850 show Billups owned 54 slaves, who ranged in age from 1 to 60. The city of West Point in Clay County became an important hub for the shipment of cotton. The region was heavily effected but the Civil War. On February 20, 1864, Union General Sooey Smith entered West Point and burned several civic buildings. In response, Confederate General Nathan Bedford Forrest retaliated against the Union the next day during the Battle of West Point, eventually driving the Union north to Memphis. A sharecropping economy arose in the postbellum period, lasting from about 1870 to the 1930s. During this period, former enslaved individuals from Billups Plantation remained on the property and settled in the town that became known as Billups. Although commercial and industrial enterprises expanded, the area remained largely agricultural into the twentieth century (de Gregory et al. 2019).

TVA determined the APE to be the 11 miles of new transmission line and 14 miles of rebuilt transmission line, both with a ROW width of 100-ft and areas within a one-half mile radius of the proposed project area that would also have unobstructed lines of sight to the new TL ROW as well as any associated access roads.

A number of previous archaeological surveys overlap the current survey area. TVA contracted with Tennessee Valley Archaeological Research (TVAR) to perform a cultural resource survey of the remaining portion of the APE that had not been previously subjected to an archaeological survey (de Gregory et al., 2019). Two previously recorded architectural resources (087-CBS-5010-NR-ML are 087-CBS-5018) are located within the APE. Property 087-CBS-5010-NR-ML, Motley Slough Bridge, is currently listed as both a Mississippi Landmark and part of a multi-property, statewide listing on the National Register of Historic Places (NRHP). The bridge remains extant but has deteriorated significantly since the time of its listing on the NRHP. TVAR recommends its continued listing but the proposed project would not have an adverse effect. Resource 087-CBS-5018, the Shaeffer's Chapel Methodist Church, was previously surveyed by the MDAH and remains extant. The early church building dates to the Civil War and possesses historical significance. However, the building was rebuilt in the 1880s and underwent interior renovations in the mid- twentieth century causing its loss of both architectural and historical integrity. The field survey documented 36 new resources (IS-1 through 36), including three cemeteries. TVAR recommends that all of these newly recorded properties are not eligible for NRHP listing based upon a lack of architectural merit, as well as an inability to associate the properties and/or their original owner(s) with an important historical event or series of events, and further recommends no additional above-ground investigations of the project APE.

TVAR's investigations included revisits to previously-identified archaeological sites 22CL506, 22CL668, 22CL113, and 22LO898, and the identification of two new sites (22LO1065 and 22LO1066). Shovel tests excavated within the mapped boundaries of 22CL668 and 22LO898 did not produce any artifacts. Considering that neither site was relocated within the survey during the investigation, TVAR recommends that the investigated portions of 22CL668 and 22LO898 do not contribute to their respective

resource's eligibility for listing on the NRHP. Site 22CL113, a segment of the Columbus and Greenville Railway (CAGY), was relocated within the survey area during the investigation. No artifacts were identified as a result of shovel testing and the resource no longer retains integrity. TVAR recommends that the investigated portion of 22CL113 lacks research potential and does not contribute to the linear resource's overall NRHP eligibility. One shovel test excavated within the mapped boundary of previously recorded site 22CL506 produced a single piece of debitage. Given the paucity of artifacts recovered from the portion of the site within the survey area, in combination with its shallow deposition, it is the opinion of TVAR that the investigated portion of the site demonstrates limited potential for containing any subsurface features and would not contribute to the site's overall eligibility for listing in the NRHP. No further investigation of 22CL506, 22CL668, 22CL113, or 22LO898 within the survey area is recommended in connection with the proposed project.

The two new sites recorded during the investigation, 22LO1065 and 22LO1066, represent the occupations of tenant houses associated with the Billups Gate plantation complex between the late nineteenth and early twentieth century and the early to mid-twentieth century, respectively. Although the assemblages from both sites were recovered from shallow deposits, TVAR recommends that the identified portions of both sites are potentially eligible for inclusion in the NRHP.

During the Phase I survey of the proposed access routes, portions of seven archaeological resources recorded or purported to be within the project area, including two previously recorded sites (22CL506 and 22CL1008) and five newly documented sites (22OK1221, 22OK1222, 22OK1223, 22OK1224, and 22OK1225). A 1,040-ft long segment of AR #7 investigated during the current survey traverses the central portion of the original boundaries of site 22CL506. Based on the density of artifacts within the positive shovel tests and depth of recovery, TVA finds that the NRHP eligibility for the portion of site 22CL506 within AR #7 should remain undetermined.

Previously identified site 22CL1008 was recorded as a potential Mississippian site. The site was recommend ineligible in 1992. No artifacts were identified during pedestrian survey and exploratory shovel testing. TVA finds that the investigated portion of site 22CL1008 does not contribute to the resource's eligibility. Sites 22OK1221, 22OK1222, 22OK1223, 22OK1224, and 22OK1225 were determined not eligible for the NRHP.

3.11 Recreation

There are no developed parks or outdoor recreation areas adjacent to or within this TL right of way. However, some informal dispersed outdoor recreation activity such as walking for pleasure or wildlife observation may occur within the ROW corridor.

3.12 Managed and Natural Areas

Natural areas include ecologically significant sites; federal, state, or local park lands; national or state forests; wilderness areas; scenic areas; wildlife management areas; recreational areas; greenways; trails; Nationwide Rivers Inventory (NRI) streams; and Wild and Scenic Rivers. This section addresses natural areas that are on, immediately adjacent to (within 0.5-mi), or within the region of the proposed Artesia-West Columbus 161-kV TL project (3 mile radius).

A review of data from the TVA Regional Natural Heritage database here are no natural areas within the proposed project footprint. There is one natural area within three miles of the proposed project:

- Plymouth Bluff Environmental Study Center is located 2.22-miles north of the proposed project. Managed by Mississippi University for Women, the center is a 190-acre environmental educational and recreational facility.

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CHAPTER 4

4.0 ENVIRONMENTAL CONSEQUENCES

The potential effects of adopting and implementing the No Action Alternative and the Action Alternative on the various resources described in Chapter 3 were analyzed, and the findings are documented in this chapter. The potential effects are presented below by resource in the same order as in Chapter 3. Cumulative effects are discussed, as appropriate and necessary, under the respective resource areas.

4.1 No Action Alternative

As stated in section 2.1.1, under the No Action Alternative, TVA would not construct the proposed TL or substation to improve the existing power supply in an area of northern MS. As a result, no property easements for locating the proposed TL would be purchased by TVA, and the proposed transmission facilities would not be built. TVA would continue to supply power to the power service area of northern MS under the current conditions. TVA would also not to complete the related project associated activities.

Because the proposed construction, operation, and maintenance of the new TL facilities and substation would not occur under the No Action Alternative, no direct effects to those environmental resources listed in Chapter 3 are anticipated. However, changes to the project area and resources in this area may occur over time, independently of TVA's actions, due to factors such as population increases, changes in land use, and development in the area. These changes are not expected to be the result of implementing the No Action Alternative.

Under the No Action Alternative, a future decline in the reliability of electric service for some customers would be likely. Service problems and interruptions likely would gradually become more frequent and more severe. These outages would have negative impacts on the ability of businesses in the area to operate. Residents of the area would also incur negative impacts from outages, such as more frequent loss of power for household heating or cooling, as well as other activities such as cooking or clothes washing. These conditions would clearly diminish the quality of life for residents in the area and would likely have negative impacts on property values in the area. Any such impacts would negatively affect all populations in the region.

4.2 Action Alternative

4.3 Groundwater and Geology

Part of the proposed ROW is located near State Designated Source Water Protection Areas for public water supply. A majority of project area is underlain by an aquitard which acts as a confining unit by separating the surface area from the aquifers below. This confining unit should provide adequate protection from potential groundwater contamination. However, during revegetation and maintenance activities, herbicides with groundwater contamination warnings would not be used and the use of fertilizers and herbicides would be considered with caution before application and applied according to the manufacturer's label. Best Management Practices (BMPs) as described in A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority (Muncy 2012) will be used to avoid contamination of groundwater in the project area. BMPs for herbicide and fertilizer application will be used and would prevent impacts to groundwater. BMPs will be used to

control sediment infiltration from stormwater runoff. With the use of BMPs, impacts to groundwater from the proposed action would be insignificant.

4.4 Surface Water

4.4.1 Surface Runoff

Construction activities have the potential to temporarily affect surface water via storm water runoff. Soil erosion and sedimentation can clog small streams and threaten aquatic life. Impacts associated with the relocation or diversion of a stream could include the previously mentioned sedimentation, soil erosion, alteration of habitat, which can lead to adverse impacts to aquatic life and vegetation. TVA would comply with all appropriate state and federal permit requirements. Appropriate BMPs would be followed, and all proposed project activities would be conducted in a manner to ensure that waste materials are contained, and the introduction of pollution materials to the receiving waters would be minimized. Coverage under the small or large construction storm water general permit would be required in Mississippi if the project disturbs more than 1 acre (small) or more than 5 acres (large). This permit would also require the development and implementation of a SWPPP. This SWPPP would identify specific BMPs to address construction-related activities that would be adopted to minimize storm water impacts. Additionally, BMPs, as described in A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority (TVA 2017), would be used to avoid contamination of surface water in the project area. Additionally an USACE Section 404 and State 401 Water Quality Certification would be required for stream crossings/impacts. Additionally, BMPs, as described in A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority (TVA, 2017), would be used to avoid contamination of surface water in the project area. See the Aquatics Section 4.5 for buffer zone sizes and additional stream crossing details.

4.4.2 Domestic Sewage

Portable toilets would be provided for the construction workforce as needed. These toilets would be pumped out regularly, and the sewage would be transported by tanker truck to a publicly-owned wastewater treatment works that accepts pump out.

4.4.3 Equipment Washing and Dust Control

Equipment washing and dust control discharges would be handled in accordance with BMPs described in the SWPPP for water-only cleaning.

4.4.4 Transmission Line Maintenance

ROW maintenance would take place periodically to ensure that vegetation does not become a fire hazard nor does it have the potential to interrupt electrical service. This maintenance could incorporate various manual, mechanical or chemical means of controlling vegetative growth. Primarily this work is done on the surface, were vegetation is cut and stumps left in place and does not include earthwork, so impacts to surface waters would be expected to be minor and temporary.

Improper use of herbicides to control vegetation could result in runoff to streams and subsequent aquatic impacts. Therefore any pesticide/herbicide use as part of construction or maintenance activities would have to comply with the MDEQ General Permit for Application of Pesticides, which also requires a pesticide discharge management plan. In areas requiring chemical treatment, only USEPA-registered and TVA approved herbicides

would be used in accordance with label directions designed in part to restrict applications near receiving waters and to prevent unacceptable aquatic impacts. Proper implementation and application of these products would be expected to have no significant impacts to surface waters.

4.5 Aquatic Ecology

Under the Action Alternative, TVA would proceed with the proposed action. In order to protect the streams and WWCs found within the project footprint, any potential ground disturbance would be minimized and all work would be conducted in accordance to BMPs as outlined in TVA 2017. These BMPs are designed in part to minimize erosion and subsequent sedimentation. Therefore, with proper implementation of BMPs, no long term impacts from the associated action are anticipated to water flow, stream channels, or stream banks.

4.5.1 Aquatic Threatened and Endangered Species

Under the Action Alternative, TVA would proceed with the proposed action. To minimize impacts, any potential ground disturbance would be minimized and all work would be conducted in accordance to BMPs as outlined in TVA 2017. These BMPs are designed in part to minimize erosion and subsequent sedimentation. Therefore, with proper implementation of BMPs, no long term impacts from the associated action are anticipated to water flow, stream channels, or stream banks.

4.6 Vegetation

4.6.1 Terrestrial Ecology (Plants)

Adoption of the Action Alternative would not significantly affect the terrestrial ecology of the region. Converting forest land to construction of the proposed transmission line would be long-term in duration, but insignificant. Adoption of this alternative would require clearing of approximately 37 acres of forest. Virtually all of the forest in the project area has been previously cleared and the plant communities found there are mostly common and well represented throughout the region. As of 2017, there were well over 2,000,000 acres of forest land in Clay, Lowndes, Oktibbeha, and the surrounding Mississippi counties. As of 2018, there were well over 800,000 acres of forest land in Lamar and Pickens County, Alabama, counties that surround the project area to the east. There was a total of about 2,800,000 acres of forest land for the project area counties and surrounding Alabama and Mississippi counties (U.S. Forest Service 2019). Cumulatively, project-related effects to forest resources would be negligible when compared to the total amount of forest land occurring in the region. Also, project-related work would temporarily affect herbaceous plant communities, but these areas would likely recover to their pre-project condition in less than one year.

Nearly the entire project area currently has a substantial component of invasive terrestrial plants and adoption of the Action Alternative would not significantly affect the extent or abundance of these species at the county, regional, or state level. The use of TVA standard operating procedure of vegetating with noninvasive species (TVA 2017) would serve to minimize the potential introduction and spread of invasive species in the project area.

4.6.2 Endangered, Threatened, and Rare Species (Plants)

Adoption of the Action alternative would not affect federally listed plant species or designated critical habitat because neither occurs in the existing ROW, proposed ROW, or

along proposed access roads. However, adoption of the Action Alternative would negatively impact Ohio buckeye. Purple coneflower and white heath aster would not be negatively impacted with implementation of the commitments below.

Ohio buckeye has been previously documented from five counties across Mississippi. The TVA Natural Heritage Database contains 13 records from three of the Mississippi counties where the species is known to occur. One population last observed in 2005 had about 2,400 trees, but most observations were below fifty trees. Ohio buckeye requires rich, moist stream banks and bottomland forests but can also be found in moist, herbaceous openings. Even though the trees can grow in the open ROW habitat, tall adult trees are incompatible with transmission line operation because they can interfere with the conductor and pose a safety hazard. Individuals not removed during construction would be removed during subsequent vegetation management along the ROW. Additional Ohio buckeyes likely occur in suitable off-ROW habitat that was observed, but not searched, during field surveys. Implementation of the Action Alternative would require the removal of all trees in the ROW. This effect would be permanent, but insignificant, because of the relatively small size of the population compared to other extant sites in the state.

Eastern purple coneflower has been previously documented from twenty-one counties in Mississippi. The TVA Natural Heritage Database contains 28 records from twelve counties where the species is known to occur. White heath aster has been previously reported from five counties in Mississippi. The TVA Natural Database contains 18 records from six counties where the species is known to occur. Both species prefer open, calcareous prairie and similar herbaceous habitat.

Both the eastern purple coneflower and the white heath aster were found in existing, maintained ROWs. With the commitments listed below, adoption of the Action Alternative would not significantly impact both eastern purple coneflower and white heath aster.

ROW Forester or Environmental Technician would contact TVA botanist before construction to coordinate avoidance measures and access in these portions of the ROW.

Sites would be added to the O-SAR database so the species can be protected, to the extent practicable, during future vegetation management activities.

4.7 Wildlife

4.7.1 Terrestrial Ecology (Animals)

Under the Action Alternative, TVA would clear some or all of the early-successional, herbaceous habitat (pastures, cultivated fields, residential areas) and 5 acres of forest and permanently maintain it as early successional habitat. In many areas, the transmission line would span across agricultural and developed areas. Impacts to wildlife habitat would thus be limited to locations where the structures would be established. Ground disturbance would occur in these areas. Any wildlife (primarily common, habituated species) currently using these heavily disturbed areas may be displaced by increased levels of disturbance during construction actions, but it is expected that they would return to the project area upon completion of actions.

Areas of forest would be removed and permanently maintained as early successional habitat. Direct effects to some individuals that may be immobile during the time of construction may occur, particularly if construction activities took place during

breeding/nesting seasons. However, the actions are not likely to affect populations of species common to the area, as similar forested and herbaceous habitat exists in the surrounding landscape.

Construction-associated disturbances and habitat removal would likely disperse wildlife into surrounding areas in an attempt to find new food and shelter sources and to reestablish territories, potentially resulting in added stress or energy use to these individuals. In the event that surrounding areas are already overpopulated, further stress to wildlife populations could occur to those individuals presently utilizing these areas, as well as those attempting to relocate. The landscape on which the project occurs is already highly fragmented and impacted by human activity (i.e. forestry practices, agricultural fields, residential homes, farm ponds and roads). Thus it is unlikely that species currently occupying adjacent habitat would be negatively impacted by the influx of new residents. Further, it is expected that over time those species utilizing early successional habitat would return to the project area upon completion of actions.

Cumulative effects of the project on common wildlife species are expected to be negligible. Most of the proposed project footprint has previously been heavily impacted by agriculture and other development, leaving only small areas of natural, undisturbed vegetation. Proposed actions across the transmission line would permanently remove existing forested habitat for common wildlife. Following completion of the project, the ROW would be maintained as early successional herbaceous fields which would provide habitat for several common wildlife species that utilize early successional fields and agricultural/developed areas.

Several local species benefit from disturbance. Construction of the ROW could create habitat for several mammals and birds. American robin, Carolina chickadee, blue jay, eastern towhee, gray catbird, house finch, house sparrow, northern cardinal, northern mockingbird, raccoon, song sparrow, tufted titmouse, eastern cottontail, Virginia opossum, white-tailed deer, and white throated sparrow are just a few of the species known to thrive in highly disturbed areas.

4.7.2 Threatened and Endangered Species (Animals)

Under the Action Alternative, TVA would clear some or all of the of the early-successional, herbaceous habitat (pastures, cultivated fields, residential areas) and 5 acres of forest and permanently maintain it as early successional habitat. In many areas, the transmission line would span across agricultural and developed areas. Impacts to wildlife habitat would thus be limited to locations where the structures would be established. Ground disturbance would occur in these areas. Any wildlife (primarily common, habituated species) currently using these heavily disturbed areas may be displaced by increased levels of disturbance during construction actions, but it is expected that they would return to the project area upon completion of actions.

Two state-listed terrestrial animal species (Rafinesque’s big-eared bat and Bachman’s sparrow) were documented within three miles of the project footprint. No federally listed species were documented within three miles of the project footprint, however, four federally listed terrestrial animal species (Red-cockaded woodpecker, bald eagle, wood stork, and northern long-eared bat were assessed based on county occurrence records or the potential for species to occur in the project area.

Bachman's sparrow and red-cockaded woodpecker both require mature pines with an understory of grass, brush, and shrub species maintained by frequent fires. The nearest record of Bachman's sparrow is approximately 0.7 miles from the project footprint. The nearest record of red-cockaded woodpecker is approximately 10.5 miles from TL L5022 (existing ROW). Suitable mature forest and fire-maintained understory habitat is not present within the project footprint and RCW would not be affected by the proposed actions. Clearing of the ROW may benefit Bachman's sparrow by creating suitable habitat.

Bald eagle nest in large trees, typically near a large waterbody. The nearest bald eagle nesting record is 4.8 miles from the project footprint. No additional nests or individuals were observed during field surveys in April or November 2019. No large waterways are present in the project footprint and bald eagles would not be affected by the proposed actions.

One record of wood stork is known from Oktibbeha County, although the exact location is unknown (Turcotte and Watts 1999). Ponds, streams, wetlands and other suitable foraging habitat for wood stork were observed within the project footprint. Because TVA implements BMPS (TVA 2017), emergent wetlands would only receive temporary impacts from the proposed activities. Proposed actions would remove trees from forested wetlands within the proposed ROW, therefore, the USFWS has determined the proposed project "may affect, but is not likely to adversely affect" the wood stork.

Rafinesque's big-eared bats roost in hollow trees, buildings, bridges, or culverts in summer. Maternity colonies are formed in caves and mines. The nearest record of Rafinesque's big-eared bat is approximately 1,200-feet from the project footprint. Suitable roosting and foraging habitat exists within the project footprint but similar suitable habitat is common in the surrounding area. Juvenile bats would not be impacted because no caves or mines are present in the action area. This species would not be affected by the proposed actions.

There are no known northern long-eared bat records within 5 miles or within Clay, Lowndes, or Oktibbeha Counties. No caves have been documented within three miles of the project. No additional winter habitat was found within the project area. Foraging habitat exists throughout the proposed project area in forest fragments, along fence rows, and seasonally over ephemeral streams. Suitable summer roosting habitat for northern long-eared bat exists throughout forested areas of the project footprint. There is one structure in the ROW near Airport Rd. If this structure must be removed, removal should take place between October 1st and April 14th to prevent impacts to roosting northern long-eared bats. Outside of winter, a presence absence survey by a TVA biologist is required less than 24 hours prior to disturbance.

Assessment of the project area for presence of summer roosting habitat for northern long-eared bat followed federal guidance (USFWS 2014, 2015, 2018). Field surveys resulted in the identification of 36 suitable roost trees scattered throughout the 3.47 acres of suitable forested habitat within the ROW and AR footprints. Habitat quality was moderate, based on the presence of trees with exfoliating bark (i.e., 12 snags, 16 shagbark hickories), and live hollow or crevice trees (7 oak, ash, hackberry, and other species) within the proposed ROW. Solar exposure and proximity to water sources was also considered. Suitable summer roosting areas included both upland and wetland forests.

A number of activities associated with the proposed project were addressed in TVA's programmatic consultation with the U.S. Fish and Wildlife Service on routine actions and federally listed bats in accordance with ESA Section 7(a) (2) and completed in April, 2018.

For those activities with potential to affect bats, TVA committed to implementing specific conservation measures. These activities and associated conservation measures are identified on page 5 of the TVA Bat Strategy Project Screening Form (Appendix B) and need to be reviewed/implemented as part of the proposed project.

4.8 Floodplains

As a federal agency, TVA adheres to the requirements of EO 11988, Floodplain Management. The objective of EO 11988 is "…to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative." The EO is not intended to prohibit floodplain development in all cases, but rather to create a consistent government policy against such development under most circumstances (U.S. Water Resources Council 1978). The EO requires that agencies avoid the 100-year floodplain unless there is no practicable alternative.

Under the Action Alternative, the TL would cross several streams in Lowndes County, Mississippi, and is shown in Figure 4-8.

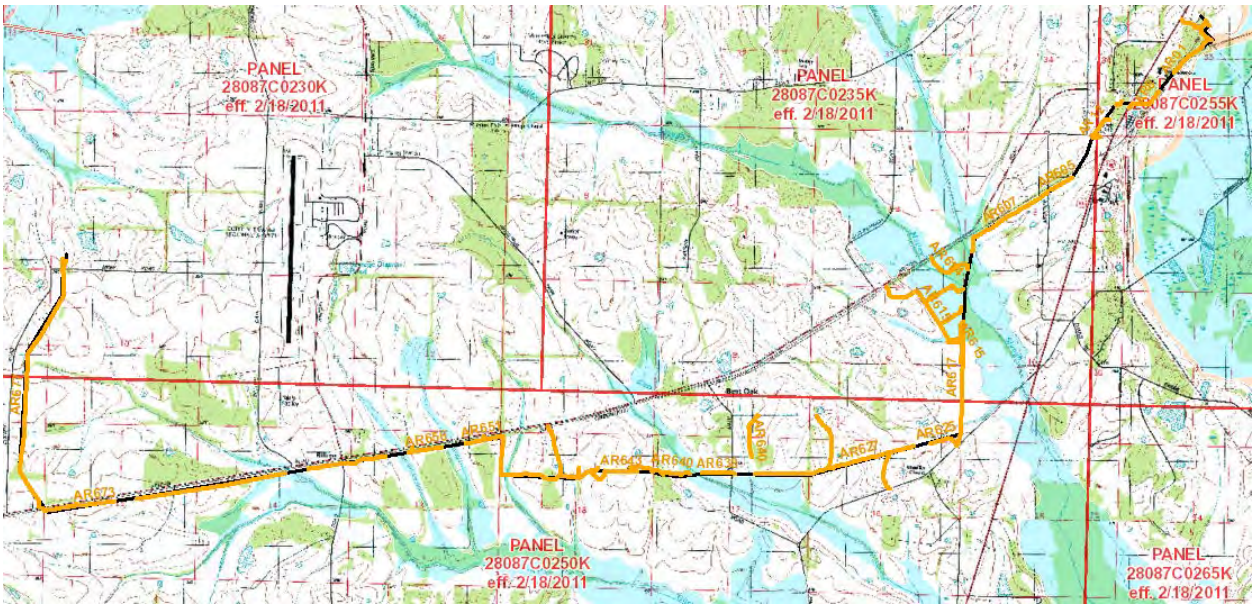

Figure 4-8. TL route and access roads with floodplains

The support structures for the transmission line would not be expected to result in any increase in flood hazard, either as a result of increased flood elevations or changes in flow-carrying capacity of the streams being crossed. Construction in the floodplain would be consistent with EO 11988 provided the TVA subclass review criteria for transmission line location in floodplains are followed.

Based upon a review of Lowndes County, Mississippi, FIRMs, portions of access roads AR607, AR614, AR615, AR617, AR638, AR640, AR651, and the access road crossing unnamed tributaries of Gilmer Creek would be located within 100-year floodplains. To minimize adverse impacts, any road improvements would be done in such a manner that upstream flood elevations would not be increased by more than 1.0 foot.

By adhering to the mitigation measures listed in Section 2.7, the proposed project would have no significant impact on floodplains and their natural and beneficial values.

4.9 Wetlands

Activities in wetlands are regulated by state and federal agencies to ensure no net loss of wetland resources. Under the CWA Section 404, activities resulting in the discharge of dredge, fill, and associated secondary impacts to waters of the U. S., including wetlands, must be authorized by the USACE through a Nationwide, Regional, or Individual Permit. This project is located in the Mobile District USACE. CWA Section 401 mandates state water quality certification for projects requiring USACE approval. In Mississippi, MDEQ is responsible for certifying CWA Section 404 permits are compliant with state water quality regulations. Lastly, EO 11990 requires federal agencies to minimize wetland destruction, loss, or degradation, avoid new construction in wetlands wherever there is a practicable alternative.

Efforts were made during project planning and siting to avoid wetlands to the extent practicable. However, because of project and topographic constraints, and because of the goal of minimizing impacts to other resources, no practicable alternative was available that would allow complete avoidance of wetlands. The process for avoiding mapped wetland resources is described in Section 2.1. In compliance with the CWA and EO 11990, TVA has considered all options to avoid and minimize wetland impacts, resulting in the least wetland disturbance practicable. TVA has deemed the proposed action to most practicable minimization to wetland impacts in order to facilitate TL construction and long term maintenance in this vicinity.

Under the Action Alternative, of the total of 114.15 acres of wetland within the rebuild and new transmission line corridor, 10.25 acre would be permanently altered by the proposed activities (Appendix D).

Wetlands on existing TVA TL ROWs are maintained as emergent/low growing habitat through TVA's ROW management practices to ensure adequate conductor clearance. All 72.32 acre of wetland on the West Point-Starkville (L5022) rebuild line are currently maintained as emergent wetland habitat. Access across most of these wetlands would be necessary to accommodate the proposed rebuild activities. BMPs would be in place during all rebuild activities to ensure all wetland impacts remain minimal (TVA 2017).

As described in Section 1.1, establishing a TL corridor requires vegetation clearing within the full extent of the ROW, and future maintenance of low stature vegetation to accommodate clearance and abate interference with overhead wires. Therefore, the 10.25 acre of woody wetland located in the proposed new ROW footprint and along access roads would be cleared and converted to emergent wetland habitat and maintained at that stature for the perpetuity of the TL asset.

Wooded wetland conversion to emergent habitat results in reduction in wetland function. Due to the rate of water uptake, extensive root system, and structural integrity of trees and shrubs relative to herbaceous plants, wooded wetlands function at a greater capacity to impede and hold storm water, absorb toxins, retain sediment, and provide the shaded forage and spawning habitat necessary for its aquatic and terrestrial inhabitants to exist. Therefore, conversion of this community type to a habitat devoid of woody vegetation would result in a reduction of existing functional capacity.

Forested wetland conversion to accommodate structure locations and spans is considered a secondary impact resulting from typically nominal wetland fill necessary for transmission line construction. Section 404b of the CWA directs agencies to consider secondary impacts, such as loss of wetland functions from forested and scrub-shrub wetland clearing. The proposed project requires wetland fill associated with structure placement, with the secondary impact of loss of wetland function due to wooded wetland clearing to accommodate conductor spans. Therefore, forested wetland loss is subject to the authority of the regulatory agencies to ensure no net loss of wetland functions and values, per the directive of the CWA and the federal no net loss of wetland policy (EPA 1990). The CWA authorizes regulatory oversight for these impacts. The USACE and states exert this oversight through an established permit process that ensures maintenance of the physical, biological, and chemical integrity of the nation's waters, including wetlands, and the objectives of the CWA are upheld. The permitting process involves a demonstration of wetland avoidance, minimization of disturbance, and compensation for loss of wetland functions and values. TVA would obtain the necessary Section 404/401 CWA permits and required compensatory mitigation to ensure the proposed wetland impacts are compensated to the extent deemed appropriate such that wetland functions and values remain at the current capacity within larger affected basins. Required compensatory mitigation would be purchased through an approved wetland mitigation bank per the directive of the USACE and states to ensure no more than minimal impacts to the aquatic environment result and the objectives of the CWA are upheld.

Wetland habitat located in areas proposed for heavy equipment travel could experience minor and temporary impacts during TL construction, fiber optic overhead ground wire installation, or long term asset and vegetation management. TVA would minimize wetland disturbance through adherence to wetland best management practices for any and all work necessary within the delineated wetland boundaries (TVA 2017). This includes the use of low ground pressure vehicles, mats, or other wetland crossings to minimize rutting to less than 12 inches, erosion control techniques to deter indirect impacts through siltation into adjacent wetland area, dry season work, etc. Vehicular traffic would be limited to narrowed access corridors along the ROWs for structure and conductor placement, fiber installation, and long term maintenance.

Cumulative impact analysis of wetland effects takes into account wetland loss and habitat conversion at a watershed scale currently and within the reasonable and foreseeable future. Loss of wetland habitat due to wetland fill and loss of wetland functions and values due to forested wetland conversion would be compensated through wetland mitigation banking, resulting in no cumulative wetland impacts. Similarly, general trends in wetland impacts resulting from development within the watershed would be subject to CWA, EPA, USACE, and MDEQ mandates. The wetland mandates enforced by agency permit requirements are in place to ensure wetland impacts do not result in cumulative loss. Therefore, the proposed wetland impacts would be minimal on a cumulative scale due to the avoidance, minimization, and compliance measures in place. In compliance and accordance with the CWA and the directives of USACE and MDEQ ensuring no more than minimal adverse effects on the aquatic environment, the Action Alternative's impacts to wetlands would be insignificant.

4.10 Aesthetic Resources

4.10.1 Visual Resources

The potential impacts to the visual environment from a given action are assessed by evaluating the potential for changes in the scenic value class ratings based upon landscape scenic attractiveness, integrity, and visibility. Sensitivity of viewing points available to the general public, their viewing distances, and visibility of the proposed action are also considered during the analysis. These measures help identify changes in visual character based on commonly held perceptions of landscape beauty and the aesthetic sense of place. The extent and magnitude of visual changes that could result from the proposed alternatives were evaluated based on the process and criteria outlined in the scenic management system as part of the environmental review required under NEPA.

Under the Action Alternative, construction of the proposed 161-kV TL would result in both short-term and long-term impacts to visual resources. During the approximately 8-month construction period, there would be some visual discord from existing conditions due to an increase in personnel and equipment coupled with disturbances of the current site characteristics. However, this would be contained within the immediate vicinity of the construction activities and would only last until all project activities have been completed and the disturbed areas have been seeded and restored through the use of TVA's standard BMPs (TVA 2017). Because of their temporary nature, construction-related impacts to local visual resources are expected to be minor.

Long-term impacts consist of the visible alterations associated with new transmission structures, overhead wires, ROW clearing, and access road development. The most visible elements of the electric transmission system are the transmission structures and the permanent removal of woody vegetation within the new TL ROW which creates a visible corridor. The addition of lines on or near existing structures or within existing ROW increases compatibility with the landscape and minimizes visual impacts. Therefore, where the proposed project would rebuild approximately four miles of an existing single circuit TL as double circuit, changes in the viewshed would be minimal and overall aesthetics would remain similar to current conditions. The new double circuit transmission structures would be an average height of 95 feet above grade, compared to the current single circuit heights of 85 to 90 feet above grade. The small increase in the height of the new structures would only minimally increase the distance from which the structures are visible and would not notably impact the viewshed. In addition, much like the existing single circuit TL currently in place, the majority of this 4-mile rebuild segment of the proposed TL would not be visible to the public due to the distance from developed areas and presence of forested buffers. For the few residents and passing motorists that do have views of the existing TL, the presence of more double circuit structures along this segment would add another element that is discordant with the natural environment, but that is consistent with the existing single circuit TL, resulting in minor changes to perceptions of the landscape's aesthetic.

The construction of the Artesia Switching Station and the portions of the proposed TL in which the 100-foot ROW would be newly acquired would add discordantly contrasting elements and colors to the environment that would be visible in the foreground to a small number of residences, as well as motorists along several miles of Artesia Road that would parallel the TL, and on US Highway 45 south of the Artesia Road intersection where the TL would cross. However, the viewshed of both of these roads already include rail, industrial, and utility elements and views from the residences would be from a distance of 300 feet or more, over expanses of crop land and/or obscured by vegetated buffers or outbuildings.

While the proposed TL and switching station would add some discordant visual elements to the existing landscape, the view of the these elements would be limited by the minimal number of residential receptors in the foreground and would be somewhat absorbed into the overall landscape character along the transportation corridors in this developing industrial area.

In addition to nearby residents and motorists, sensitive visual receptors, including two churches and three cemeteries, were identified in the foreground of the proposed 161-kV TL (Figure 3-1). The Beulah Grove Church, approximately 0.5 miles west of the westernmost point of the corridor, is separated from the proposed TL by a mature tree line. At this distance, views of the TL through the vegetation would be largely obstructed and inconspicuous. The Lawrence-Randle Cemetery, a small family cemetery, is the closest sensitive visual receptor to the TL, approximately 900 feet north of the proposed ROW. However, as it is located in a wooded area and separated by dense vegetation, is expected that views of the TL would be completely obstructed from this facility. The Shaeffer Chapel and associated cemetery are located approximately 1,000 feet south of the existing single circuit TL that would be rebuilt as double circuit for the project. Thus, views from these receptors would remain very similar to the current view. Lastly, the Memorial Gardens of Columbus is a large public cemetery located approximately 0.3 miles north of the eastern terminus of the proposed TL. The proposed TL is unlikely to be visible from this location due to intervening buildings and vegetation and would also be nearly indistinguishable from the existing structures associated with the West Columbus Switching Station and other TLs that connect there. For visual receptors located at further distances, in the middleground and background, the proposed TL and switching station would be less visible and obtrusive as they would largely fall into an observer's view where objects are less distinguishable.

The existing human alterations already in place within the project area, including transportation corridors, existing TLs, and the West Columbus Switching Station, currently contribute some visual discord with the natural landscape. These elements contribute to the landscape's ability to absorb negative visual change. Therefore, while the forms, colors, and textures of the landscape that make up the scenic attractiveness would be affected by the construction of the TL, it would still remain common or ordinary along both the new and rebuild portions of the proposed TL (Table 4-10). Impacts to scenic integrity are anticipated to be greatest in the foreground of the Artesia Switching Station and portions of the proposed TL in which the 100-foot ROW would be newly acquired. In this area, scenic integrity would be reduced from moderate to low, as the towers and cleared ROW would be introduced into the landscape. Along the remainder of the proposed TL, the scenic integrity would remain low, as the rebuild of an existing single circuit TL as double circuit would result in minimal changes to the landscape character. There would be no change in the viewshed of the middleground and background as the addition of the proposed TL would not be substantive enough to dominate the view from these distances (Table 4-10). Based on the criteria used for this analysis, the scenic value class for the affected environment after the proposed modifications would be reduced to fair in the foreground along the entire length of the proposed TL but remain classified as good in the middleground. While the Action Alternative would contribute to a minor decrease in visual integrity of the landscape, the existing scenic class would not be reduced by two or more levels, which is the threshold of significance of impact to the visual environment. Therefore, visual impacts resulting from the implementation of the Action Alternative would be minor.

Table 4-10. Visual Assessment Ratings for Project Area Resulting from Action Alternative

	Resulting Landscape	
View Distance	**Scenic Attractiveness**	**Scenic Integrity**
Foreground	Common	Low
Middleground	Common	Moderate
Background	Common	Moderate

4.10.2 Noise and Odors

During construction of the proposed TL and switching stations, equipment could generate noise above ambient levels. Because of the short construction period, noise-related effects are expected to be temporary and minor. For similar reasons, noise related to periodic TL maintenance is also expected to be insignificant. TLs may produce minor noise during operation under certain atmospheric conditions. Off the ROW, this noise is below the level that would interfere with speech.

There are no known major sources of objectionable odors along the route or in the vicinity of the proposed TL.

4.11 Socioeconomics and Environmental Justice

4.11.1 Demographic and Socioeconomic Impacts

Under the Action Alternative, proposed construction activities would occur over approximately 8 months and would entail the use of mobile crews comprised of contractors and/or full-time TVA staff. Due to the linear nature of the project, the construction workforce, totaling between 20 and 24 workers at a given time, would be transient as work progresses along the TL and at the new switching station. Similarly, in the long term, there would be work crews present in the study area for occasional operation and maintenance activities. In both cases, there would be no notable effects on local demographics due to the relatively small workforce and short-term presence of work crews in any given location.

Potential economic impacts associated with the proposed project relate to direct and indirect effects of property acquisition, construction, and operations. Under the Action Alternative, TVA would purchase approximately 94 acres of ROW easements, across 26 parcels, from private landowners. Those easements would give TVA the right to construct, operate, and maintain the TL across the property owner's land. New temporary or permanent access roads on privately-owned land may also be required to access the ROW. In each case, current landowners would be compensated for the value of such rights or properties. Additionally, no residential or commercial displacements would be required; only one structure, a vacant dilapidated cabin, would be removed. Given the relatively minor acquisitions, the direct local economic effect from the purchase of additional property or ROW easements would be minor relative to the total regional economy. Construction and maintenance activities would also result in minor but beneficial impacts to the local economy through the purchases of materials and supplies, potential procurement of

contract workers or additional services, and expenditure of the wages earned by the transient workforce in the local communities.

In addition, the implementation of the proposed Action Alternative would provide power for the future load associated with the Infinity Mega site and increase reliability in the service area. The Infinity Mega site, a developing industrial park near Artesia, has received multiple inquiries in recent years from industries looking to build new facilities. However, serving these facilities without upgrading the TVA transmission system would result in low voltage and thermal violations during the summer peak and spring maintenance seasons, worsening overloading issues that already occur when local generating facilities are offline during summer. Implementation of the Action Alternative would alleviate these issues, increasing the reliability of the transmission system and supporting economic development at the Mega site which could result in long-term indirect economic benefits to the area.

There is also the potential for a decrease in property value for those parcels intersected by or adjacent to the new switching station or TL ROW. However, the vast majority of the new construction would take place in forested or agricultural areas or along existing transportation corridors; residential properties have been avoided to the greatest extent possible. As most homes in the area are located a considerable distance from the proposed TL ROW and/or are separated from the TL by a vegetated buffer, any effects to local property values would be minor.

4.11.2 Community Facilities and Services

Direct impacts to community facilities occur when a community facility is displaced or access to the facility is altered. Construction of the proposed Artesia Switching Station and 12-mile 161-kV TL would not result in the displacement of any community facilities nor impede access to the facilities. Therefore, there would be no direct impacts to community facilities or services under the Action Alternative.

Indirect impacts occur when a proposed action or project results in a population increase that would generate greater demands for services and/or affect the delivery of such services. As the TL construction and maintenance would not result in notable impacts to local demographics, increased demands for services such as schools, churches, and healthcare facilities are not anticipated. However, in the event of an emergency at the proposed switching station or along the TL ROW, local law enforcement, fire, and/or EMS response would likely be required. Due to the rural nature of much of the study area, emergency services in the immediate vicinity are limited. The project area is served by District 5 of the Lowndes County Fire Department which operates multiple volunteer fire stations that could respond in the event of an emergency. Any additional emergency services required would likely be provided by the Columbus, Mississippi Fire and Rescue Department. However, as the need for emergency services at the switching station and along the TL is anticipated to be a rare occurrence, implementation of the Action Alternative would not have a notable impact on the demand for emergency services in the area.

4.11.3 Environmental Justice

Block Group 2 of Census Tract 10, encompassing the eastern portion of the proposed TL project area, was determined to meet the criteria for consideration as a minority and low-income population group subject to environmental justice considerations (Figure 3-10). Under the Action Alternative, impacts to nearby residents may include temporary impacts such as increased noise, fugitive dust, and air emissions during the construction period, as well as long-term visual impacts, land use limitations, and the potential for decreased

property values. However, construction activities would be temporary and would typically have minimal impact on area residents due to the distance between residences and the proposed ROW. Long-term impacts such as decreased property value and land use limitations have been minimized through community and landowner involvement in the selection of the proposed TL route, and the rebuild of approximately four miles of the TL utilizing existing ROW. In addition, the proposed TL would not result in any substantial long-term emissions or releases of air pollutants, noise, or hazardous materials that would have a direct impact on human health or welfare. Therefore, impacts to environmental justice populations associated with the proposed project would be minor, and would not be disproportionate as impacts would be consistent across all communities (i.e., environmental justice and non-environmental justice) along the TL corridor.

4.12 Cultural Resources

Under the Action Alternative, for site 22LO1065, project effects would be limited to traversing the ROW with equipment (such as bucket trucks). In order to avoid any possible adverse effects on this site, TVA will require that any work vehicles crossing the site would be low ground pressure type, or that wetland mats be placed over the site prior to the work (mats would be removed upon completion of the project). Furthermore, matting/equipment requirement for this location will be added to design sheets that are used by construction and maintenance groups. These drawings are consulted each time TVA is considering any type of physical work on a transmission line. TVA finds that with these conditions in place, the undertaking would not adversely effect 22LO1065.

A portion of the extant homestead associated with 22LO1066 is located within the proposed ROW. Due to construction requirements the TL structure requires dismantling. Based on TVAR's assessment, the structure itself does not retain enough integrity to be considered eligible for the NRHP. However, deconstruction activities have the potential to affect the archaeological deposits that are directly surrounding and possibly underneath the structure, potentially resulting in an adverse effect on 22LO1066 should the site be determined eligible. TVA considered relocating the proposed TL ROW outside the site boundaries, but other engineering constraints such as the adjacent Columbus and Greenville railroad ROW made relocating the ROW impracticable. For the purpose of the undertaking, TVA is considering 22LO1066 eligible for the NRHP and finds that the proposed undertaking would result in an adverse effect on archaeological site 22LO1066. TVA consulted with the MS SHPO and federally recognized Indian tribes regarding TVA's eligibility determinations and findings of effect and in a letter dated July 29.2019, the MS SHPO concurred. Pursuant to 36 CFR Part 800.6(c), TVA entered into a Memorandum of Agreement with the MS SHPO to mitigate the adverse effects to 20LO1066. TVA received one response from the Choctaw Nation with concerns about the proximity of a proposed access road to Robinson Road. This road will not be utilized as part of the project. During consultation of the proposed access routes, the Muscogee (Creek) Nation requested that TVA not utilize AR#7 within the site boundaries of 22CL506, TVA agreed with this request and AR#7 will not be used as part of the project. The Choctaw Nation Historic Preservation Department stated that they could not concur with the undertaking due to partial site recommendations. TVA replied to their concerns in a letter dated June 8, 2020 (Appendix A).

4.13 Recreation

Under the action alternative, the project would be implemented. Because there are no developed parks or recreation areas located near the project, the proposed action would

have no impacts on developed recreation areas. The project could cause some minor shifts in dispersed outdoor recreation activity such as hunting or wildlife observation that occurs in the immediate vicinity of the transmission line pathway. However, any such shifts in use patterns during or after completion of the transmission line work should be minor and insignificant.

4.14 Managed and Natural Areas

There is one natural area (Plymouth Bluff Environmental Center) located 2.22-miles from the proposed project area. This is of sufficient distance such that there will be no direct, indirect, or cumulative impacts to natural areas as the result of this project.

4.15 Post-construction Effects

Transmission lines, like all other types of electrical wiring, generate both electric and magnetic fields (EMF). The voltage on the conductors of a TL generates an electric field that occupies the space between the conductors and other conducting objects such as the ground, TL structures, or vegetation. A magnetic field is generated by the current (i.e., the movement of electrons) in the conductors. The strength of the magnetic field depends on the current, the design of the TL, and the distance from the TL. The fields from a TL are reduced by mutual interference of the electrons that flow around and along the conductors and between the conductors. The result is even greater dissipation of the low energy. Most of this energy is dissipated on the ROW, and the very low amount of residual energy is reduced to background levels near the ROW or energized equipment.

Magnetic fields can induce currents in conducting objects. Electric fields can create static charges in ungrounded conducting materials. The strength of the induced current or charge under a TL varies with: (1) the strength of the electric or magnetic field; (2) the size and shape of the conducting object; and (3) whether the conducting object is grounded. Induced currents and charges can cause shocks under certain conditions by making contact with objects in an electric or magnetic field.

The proposed TL has been designed to minimize the potential for such shocks. This is done, in part, by maintaining sufficient clearance between the conductors and objects on the ground. Stationary conducting objects, such as metal fences, pipelines, and highway guardrails that are near enough to the TL to develop a charge (typically these would be objects located within the ROW) would be grounded by TVA to prevent them from being sources of shocks.

Under certain weather conditions, high-voltage TLs, such as the proposed 161-kV TL, may produce an audible low-volume hissing or crackling noise (Appendix E). This noise is generated by the corona resulting from the dissipation of energy and heat as high voltage is applied to a small area. Under normal conditions, corona-generated noise is not audible.

The noise may be audible under some wet conditions, but the resulting noise level away from the ROW would be well below the levels that can produce interference with speech. Corona-generated noise is not associated with any adverse health effects in humans or livestock.

Other public interests and concerns related to EMFs include potential interference with A.M.-band radio reception, television reception, satellite television, and implanted medical

devices. Older implanted medical devices historically had a potential for power equipment strong- field interference when they came within the influence of low-frequency, high-energy workplace exposure. However, these older devices and designs (i.e., those beyond five to ten years old) have been replaced with different designs and different shielding that prevent potential for interference from external field sources up to and including the most powerful magnetic resonance imaging medical scanners. Unlike high-energy radio frequency devices that can still interfere with implanted medical devices, low-frequency and low- energy powered electric or magnetic devices, such as the proposed TL, no longer interfere (Journal of the American Medical Association 2007).

Research has been done on the effects of EMFs on animal and plant behavior, growth, breeding, development, reproduction, and production. Research has been conducted in the laboratory and under environmental conditions, and no such adverse effects have been reported for the low-energy power frequency fields (World Health Organization [WHO] 2007a). Effects associated with ungrounded, metallic objects' static charge accumulation and with discharges in dairy facilities have been found when the connections from a distribution line meter have not been properly installed on the consumer's side of a distribution circuit.

There is some public concern as to the potential for adverse health effects that may be related to long-term exposure to EMF. A few studies of this topic have raised questions about cancer and reproductive effects on the basis of biological responses observed in cells or in laboratory animals or on associations between surrogate measures of power line fields and certain types of cancer. Research has been ongoing for several decades.

The consensus of scientific panels reviewing this research is that the evidence does not support a cause-and-effect relationship between EMFs and any adverse health outcomes (American Medical Association [AMA] 1994; National Research Council 1997; National Institute of Environmental Health Sciences [NIEHS] 2002). Some research continues on the statistical association between magnetic field exposure and a rare form of childhood leukemia known as acute lymphocytic leukemia. A recent review of this topic by the WHO concluded that this association is very weak, and there is inadequate evidence to support any other type of excess cancer risk associated with exposure to EMFs (International Association for Research on Cancer 2002).

TVA follows medical and health research related to EMFs, and thus far, no controlled laboratory research has demonstrated a cause-and-effect relationship between low-frequency electric or magnetic fields and health effects or adverse health effects even when using field strengths many times higher than those generated by power TLs. Statistical studies of overall populations and increased use of low-frequency electric power have found no associations (WHO 2007b).

TVA also follows media reports which suggest such associations, but these reports do not undergo the same scientific or medical peer review that medical research does. Neither medical specialists nor physicists have been able to form a testable concept of how these low-frequency, low-energy power fields could cause health effects in the human body where natural processes produce much higher fields. To date, there is no agreement in the scientific or medical research communities as to what, if any, electric or magnetic field parameters might be associated with a potential health effect in a human or animal. There are no scientifically or medically defined safe or unsafe field strengths for low-frequency, low-energy power substation or line fields.

The current and continuing position of the scientific and medical communities regarding the research and any potential for health effects from low-frequency power equipment or line fields is that there are no reproducible or conclusive data demonstrating an effect or an adverse health effect from such fields (WHO 2007c). In the United States, national organizations of scientists and medical personnel have recommended no further research on the potential for adverse health effects from such fields (AMA 1994; U.S. Department of Energy 1996; NIEHS 1998).

Although no federal standards exist for maximum EMF strengths for TLs, two states (New York and Florida) do have such regulations. Florida's regulation is the more restrictive of the two, with field levels limited to 150 milligauss at the edge of the ROW for TLs of 230-kV and less. The expected magnetic field strengths at the edge of the proposed ROW would fall well within these standards. Consequently, the construction and operation of the proposed TL connectors are not anticipated to cause any significant impacts related to EMFs.

Under this alternative, EMFs would be produced along the length of the proposed TL. The strength of the fields within and near the ROW varies with the electric load on the TL and with the terrain. Nevertheless, EMF strength attenuates rapidly with distance from the TL and is usually equal to local ambient levels at the edge of the ROW. Thus, public exposure to EMFs would be minimal, and no significant impacts from EMFs are anticipated.

Lightning Strike Hazard

TVA TLs are built with overhead ground wires that lead a lightning strike into the ground for dissipation. Thus, a safety zone is created under the ground wires at the tops of structures and along the TL, for at least the width of the ROW. NESC standards are strictly followed when installing, repairing, or upgrading TVA TLs or equipment. TL structures are well grounded, and the conductors are insulated from the structure. Therefore, touching a structure supporting a TL poses no inherent shock hazard.

Transmission Structure Stability

The structures that would be used on the proposed TL are similar to those shown in Section 2.2.5 and are the result of detailed engineering design. They have been used by TVA, with minor technological upgrades over time, for over 70 years with an exceptional safety record. They are not prone to rot or crack like wooden poles, nor are they subject to substantial storm damage due to their low cross-section in the wind.

Additionally, all TVA transmission structures are examined visually at least once a year. Thus, the proposed structures do not pose any significant physical danger. For this reason, TVA does not typically construct barricades or fences around structures.

4.16 Long Term and Cumulative Impacts

The presence of the TL would present long-term visual effects to the mostly rural/undeveloped character of the local areas. However, because the route of the proposed TL would traverse mainly rural portions of Lowndes County, MS, the TL would not be especially prominent in the local landscape. Likewise, the establishment of easements for the proposed ROW with local landowners would not pose a long-term encumbrance on

the affected properties. Various agricultural land uses could be practiced within the ROW, but any timber production within the ROW would be foregone for the life of the TL.

The increase in power supply is one factor in improving the overall infrastructure in the local area, which over time could attract future commercial and residential development, benefitting the local area in an economic capacity. However, the extent and degree of such development depends on a variety of factors and cannot be predicted. Therefore, residential and commercial growth in this predominantly rural area would be minor, long-term, and a cumulative consequence of the proposed transmission system improvements.

4.17 Unavoidable Adverse Environmental Impacts

The following unavoidable effects would result from implementing the proposed actions as described under the Action Alternative in Section 2.1.2.

- Clearing associated with construction of the proposed TL could result in a small amount of localized siltation; however, with BMPs any impact would be minor and temporary.
- Clearing and construction would result in the removal of trees, but due to the amount of acres of forested land in the surrounding area, the impact on forest resources is minimal.
- No incompatible, tall-growing trees would be permitted to grow within the TL ROW and only low-growing vegetation would be permitted to grow adjacent to the ROW. In areas where the ROW would traverse forested areas, this would cause a change in the visual character of the immediate area and would segment some forested areas.
- Clearing and construction would result in the disruption and/or loss of some plants and wildlife, and the loss of about 121 acres of forested habitat for the life of the TL.
- Any burning of cleared material would result in some short-term air pollution.
- The proposed TL would result in minor long-term visual effects on the landscape in the immediate local area.

4.18 Relationship of Short-Term Uses and Long-Term Productivity

Land within the ROW of the proposed TL would be committed to use for electrical system needs for the foreseeable future. Some of the ROW would be converted from its current use as pasture, agricultural fields, and forest to use as an ROW (as described in Sections 1.1 and 2.2.1). The proposed ROW would support the 161-kV TL (see Figure 1-1), with use of existing access roads outside the ROW. Agricultural uses of the ROW could and would likely continue. However, routine vegetation management along the ROW would preclude forest management within or adjacent to (e.g., danger trees) the ROW for the operational life of the TL. These losses of long-term productivity with respect to timber production and as wildlife habitat are minor both locally and regionally.

4.19 Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those uses of resources that cannot be undone. An example of an irreversible commitment is the mining and use of an ore, which once mined, cannot be replaced. Irretrievable commitments of resources are those that may occur

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CHAPTER 5

5.0 LIST OF PREPARERS

5.1 NEPA Project Management

J. Taylor Cates

Position:	NEPA Project Manager
Education:	M.S., Environmental Science; B.S., Biochemistry
Experience:	5 years NEPA Compliance and Project Management
Involvement:	Project Manager, NEPA Coordination, NEPA Compliance, Document Preparation

Caitlin Fitzpatrick

Position:	NEPA Project Manager/ Environmental Program Manager
Education:	B.S., Environmental Science
Experience:	11 years in Environmental Compliance; Preparation of Environmental Review Documents
Involvement:	Project Coordination, Document Preparation

5.2 Other Contributors

Adam Dattilo

Position:	Biologist, Botany
Education:	M.S., Forestry; B.S., Natural Resource Conservation Management
Experience:	20 years of experience in ecological restoration and plant ecology and 15 years in botany
Involvement:	Vegetation, Threatened and Endangered Species (Plants)

Michaelyn Harle

Position:	Archaeologist
Education:	Ph.D., Anthropology; M.A., and B.A., Anthropology
Experience:	15 years in Cultural Resources Management
Involvement:	Cultural Resources Compliance

Britta P. Lees

Position:	Biologist, Wetlands
Education:	M.S., Botany-Wetlands Ecology Emphasis; B.A., Biology
Experience:	14 years in Wetlands Assessments, Botanical Surveys, Wetlands Regulations, and/or NEPA Compliance
Involvement:	Wetlands

Robert A. Marker

Position:	Contract Recreation Representative
Education:	B.S., Outdoor Recreation Resources Management
Experience:	40 years in Recreation Planning and Management
Involvement:	Recreation

Craig L. Phillips

Position:	Biologist, Aquatic Community Ecology
Education:	M.S., and B.S., Wildlife and Fisheries Science
Experience:	10 years Sampling and Hydrologic Determinations for Streams and Wet-Weather Conveyances; 9 years in Environmental Reviews
Involvement:	Aquatic Ecology; Threatened and Endangered Aquatic Animals

Kim Pilarski-Hall

Position:	Specialist, Wetlands and Natural Areas
Education:	M.S. and B.S., Geography, Minor in Ecology
Experience:	21 years in Wetlands Assessment and Delineation
Involvement:	Wetlands and Natural Areas

Amos L. Smith, PG

Position:	Geology and Groundwater
Education:	B.S., Geology
Experience:	29 years in Environmental Analyses and Groundwater Evaluations
Involvement:	Geology and Groundwater

Jesse C. Troxler

Position:	Biologist, Zoology
Education:	M.S. and B.S., Wildlife Science
Experience:	7 years in Biological Data Collection
Involvement:	Wildlife; Threatened and Endangered Terrestrial Animals

Carrie C. Williamson, P.E., CFM

Position:	Civil Engineer, Flood Risk
Education:	M.S. and B.S., Civil Engineering
Experience:	6 years in Floodplains and Flood Risk; 11 years in Compliance Monitoring; 3 years in River Forecasting
Involvement:	Floodplains

Chevales Williams

Position:	Water Specialist
Education:	B.S., Environmental Engineering
Experience:	15 years of experience in water quality monitoring and compliance; 13 years in NEPA planning and environmental services
Involvement:	Surface Water and Soil Erosion

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CHAPTER 6

6.0 ENVIRONMENTAL ASSESSMENT RECIPIENTS

6.1 Federal Agencies

U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
USDA, Natural Resources Conservation Service
USDA, U.S. Forest Service

6.2 Federally Recognized Tribes

Absentee Shawnee Tribe of Oklahoma
Alabama-Coushatta Tribe of Texas
Alabama-Quassarte Tribal Town
Cherokee Nation
Coushatta Tribe of Louisiana
Eastern Shawnee Tribe of Oklahoma
Jena Band of Choctaw Indians
Kialegee Tribal Town
Mississippi Band of Choctaw Indians
Shawnee Tribe
The Chickasaw Nation
The Choctaw Nation of Oklahoma
The Muscogee (Creek) Nation
Thlopthlocco Tribal Town
United Keetoowah Band of Cherokee Indians in Oklahoma

6.3 State Agencies

Mississippi Department of Environmental Quality
Mississippi Department of Transportation
Mississippi State Historic Preservation Office

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CHAPTER 7

7.0 LITERATURE CITED

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Appendix A – Correspondence

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MEMORANDUM OF AGREEMENT
BETWEEN THE TENNESSEE VALLEY AUTHORITY, THE
MISSISIPPI STATE HISTORIC PRESERVATION OFFICER, REGARDING THE RESOLUTION OF ADVERSE EFFECTS ON HISTORIC PROPERTIES ASSOCIATED WITH THE ARTESIA - WEST COLUMBUS 161-KILOVOLT (kV) TRANSMISSION LINE (TL) PROJECT IN CLAY, LOWNDES, AND OKTIBBEHA COUNTIES, MISSISSIPPI

WHEREAS, the Tennessee Valley Authority (TVA) proposes to build 11 miles of new TL in Lowndes County, Mississippi and rebuild 14 miles of the West Point- Starkville 161-kV TL in Clay and Oktibbeha Counties, Mississippi; and

WHEREAS, TVA finds that the proposed activity constitutes an undertaking (as defined at 36 CFR § 800.16(y)) that has the potential to cause effects to historic properties; and

WHEREAS, TVA determined that the area of potential effects (APE) for the undertaking to be the 11 miles of new TL and 14 miles of rebuilt TL, both with a right-of-way (ROW) width of 30 meters (100 feet) and areas within a one-half mile radius of the proposed project area that would be visible to the new TL ROW; and

WHEREAS, Pursuant to 36 C.F.R. Part 800.3(f)(2), TVA consulted with the following federally recognized Indian tribes ("Tribes") regarding historic properties within the proposed project's APE that may be of religious and cultural significance and are eligible for the NRHP: Absentee Shawnee Tribe of Indians of Oklahoma, Alabama-Coushatta Tribe of Texas, Alabama-Quassarte Tribal Town, The Chickasaw Nation, The Choctaw Nation of Oklahoma, Coushatta Tribe of Louisiana, Eastern Shawnee Tribe of Oklahoma, Jena Band of Choctaw Indians, Kialegee Tribal Town, Mississippi Band of Choctaw Indians, The Muscogee (Creek) Nation, Shawnee Tribe and the Thlopthlocco Tribal Town, and that after consultation with these federally recognized tribes there were no objections to the proposed project; and

WHEREAS, TVA determined that the undertaking will have an adverse effect on 22LO1066, a historic homestead, and consulted with the Mississippi State Historic Preservation Officer (MS SHPO) pursuant to 36 CFR Part 800, the regulations implementing Section 106 of the National Historic Preservation Act (54 U.S.C. §306108); and

WHEREAS, in accordance with 36 CFR Par 800.6(a)(1), TVA has notified the Advisory Council on Historic Preservation (the Council) of the adverse effect finding by providing documentation specified in 36 CFR § 800.11(e), notified the Council of TVA's proposal to develop this Memorandum of Agreement (MOA), and invited the Council to participate in the development of the MOA and the Council has elected not to participate pursuant to 36 CFR Part 800.6(a)(1)(iii); and

NOW, THEREFORE, TVA and the MS SHPO (individually "Signatory" and collectively "Signatories") agree that the undertaking shall be implemented in accordance with the following stipulations in order to take into account the adverse effect of the undertaking on historic properties.

STIPULATIONS

TVA shall ensure that the following stipulations are carried out:

I. SECTION 106 REVIEW COORDINATION AND QUALIFICATIONS

A TVA Cultural Compliance staff shall be TVA's point of contact with MS SHPO for all matters pertaining to the implementation of this MOA. TVA will ensure that consultants performing work supporting this MOA meet or exceed the Secretary of the Interior's Professional Qualification Standards for the appropriate discipline (archaeology, history, historic architecture, or architectural history).

II. TREATMENT OF HISTORIC PROPERTIES

TVA and the MS SHPO agree that site 22LO1066 will be treated in the manner listed below.

A. IMPLEMENTATION OF THE DATA RECOVERY PLAN

TVA shall conduct an archaeological data recovery investigation at site 22LO1066. The Data Recovery Plan, developed in consultation with the MS SHPO, is included in Appendix A of this MOA and made a part of it by reference. TVA shall ensure that data recovery of site 22LO1066 is conducted in accordance with this Data Recovery Plan.

The Data Recovery Plan will be implemented consistent with the Secretary's Standards and Guidelines for Identification (48 FR 44720-44724), the Secretary's Professional Qualification Standards (48 FR 22716), and the *Guidelines for Archaeological Investigations and Reports in Mississippi*

B. MANAGEMENT OF THE DATA RECOVERY PLAN

TVA shall ensure that the implementation of the Data Recovery Plan meets the following standards and requirements:

1) TVA will ensure that the Archaeological Contractor for the Data Recovery Plan will submit weekly updates/progress reports to TVA through the duration of the data recovery effort.
2) TVA shall submit a management summary of the data recovery effort to the MS SHPO within (45) days of completing such data recovery effort. The management summary will include, at a minimum, the number and location of excavation units and cultural features, a discussion of the cultural deposits, and maps showing all units, and cultural features.
3) TVA shall submit a draft archaeological report of the results of the data recovery effort to the MS SHPO.
4) TVA shall provide a final archaeological report resulting from the data recovery to the MS SHPO. This Report shall conform to referenced professional standards, and to the Secretary's *Format Standards for Final Reports of Data Recovery Programs* (42 FR 5377-79); the final archaeological report will include, at a minimum, *in situ* photographs, presented in an archival stable format.

5) TVA will make provisions for professional, independent review by a third party, in the event that unusual or complex issues arise during the execution of the Data Recovery Plan that are beyond the expertise of archaeologists involved in implementing this MOA.

III. POST REVIEW DISCOVERY

Pursuant to 36 CFR § 800.13(b), TVA, in consultation with the MS SHPO, shall make a reasonable and good faith effort to avoid or minimize any adverse effects to NRHP-eligible archaeological resources that may be discovered after the completion of the Section 106 process. In the event that the TVA cannot avoid or minimize adverse effects to previously undiscovered NRHP-eligible archaeological resources, TVA shall consult with the MS SHPO and consulting parties to resolve these adverse effects through the execution of an amendment to this MOA as detailed in Stipulation VIII

IV. SCHEDULE FOR IMPLEMENTING DATA RECOVERY

A. The fieldwork portion of the data recovery shall be completed prior to submittal of the management summary to TVA.

B. TVA shall provide the management summary to the MS SHPO within 45 days of the completion of the fieldwork.

C. The MS SHPO shall provide comments on the management summary to TVA no later than 30 days from receipt of the management summary from TVA. If the reviewing parties do not respond within the 30-day period, TVA may presume their concurrence with the contents of the management summary. TVA shall not begin any construction related to the undertaking within the 30-meter (100-foot) buffers of site 22LO1066 prior to receiving the comments on the detailed management summary, or the end of the 30-day review period, whichever comes first.

D. TVA shall provide copies of the draft data recovery report to the MS SHPO within two years of the date of completion of the fieldwork. The MS SHPO shall have 30 days after receipt to provide comments. TVA will provide a final report that incorporates any changes resulting from MS SHPO comments within 3 years.

V. PUBLIC OUTREACH

TVA, in consultation with the MS SHPO, will prepare a plan to involve the public as discussed in the Data Recovery Plan.

VI. DURATION

This MOA will expire either upon completion of the undertaking and the terms and conditions of this MOA, or five years from the date of its execution, whichever occurs prior. Prior to such time, TVA may consult with the MS SHPO to reconsider the terms of the MOA and/or extend the duration, and amend it in accordance with Stipulation VIII below.

VII. DISPUTE RESOLUTION

Should either Signatory to this MOA object at any time to any actions proposed or manner in which the terms of this MOA are implemented, TVA shall consult with the MS SHPO to resolve the objection. If objection cannot be resolved, TVA or the MS SHPO may seek guidance from the Council pursuant to 36 CFR § 800.2(b)(2). TVA will take into account ACHP comments in resolving the objection with reference to the subject in dispute. The Signatories are responsible

for implementing all terms and conditions of this MOA unless they become the subject of dispute.

VIII. AMENDMENTS

This MOA may be amended when such an amendment is agreed to in writing by both Signatories. Agreement will be memorialized through Signatory execution of the amended MOA. The amended MOA will be effective on the date a copy signed by both Signatories is filed with the Council.

IX. TERMINATION

If, for any reason, either Signatory to this MOA determines that they will not or cannot carry out the MOA's terms and conditions, that party shall immediately consult with the other Signatory to attempt to develop an amendment per Stipulation VII, above. If an amended MOA cannot be reached within 30 days, either Signatory may terminate the MOA upon written notification to the other signatories.

Once the MOA is terminated, and prior to work continuing on the undertaking, TVA must either (a) execute an MOA pursuant to 36 CFR § 800.6 or (b) request, take into account, and respond to the comments of the ACHP under 36 CFR § 800.7. TVA shall notify the MS SHPO as to the course of action it will pursue.

EXECUTION of this Agreement by TVA and the MS SHPO, the filing of this MOA with the Council, and implementation of its terms, evidence that TVA has, in accordance with Section 106 of the NHPA, taken into account the effects of this undertaking on historic properties and afforded the Council an opportunity to comment. TVA will submit a copy of the executed MOA, along with the documentation that is specified in 36 CFR § 800.11(f), to the Council. This MOA shall govern the Undertaking and all of its parts.

Signatory

TENNESSEE VALLEY AUTHORITY

By: _____ Date: 10-24-2019

Mr. Clinton E. Jones
Deputy Federal Historic Preservation Officer

MISSISSIPPI STATE HISTORIC PRESERVATION OFFICER

By: _____ Date: 11-18-19

FOR: Ms. Katherine Blount
Mississippi State Historic Preservation Officer

Appendix A: Data Recovery Plan

MISSISSIPPI DEPARTMENT of ARCHIVES AND HISTORY

MDAH

HISTORIC PRESERVATION DIVISION
P. O. BOX 571
Jackson, MS 39205-0571
Phone 601-576-6940 Fax 601-576-6955
Website: mdah.ms.gov

July 19, 2019

Dr. Michaelyn Harle
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, Tennessee 37902

RE: A Phase I Cultural Resources Survey of the TVA's Artesia-West Columbus and West Point-Starkville-Montpelier Transmission Line Project, (TVA) MDAH Project Log #07-017-19, Report #19-0192, Clay, Lowndes and Oktibbeha Counties

Dear Dr. Harle:

We have reviewed the May, 2019, cultural resources survey report by J. Rocco de Gregory, Principal Investigator, with Tennessee Valley Archaeological Research, received on July 2, 2019, for the above referenced undertaking, pursuant to our responsibilities under Section 106 of the National Historic Preservation Act and 36 CFR Part 800. After review, we concur with the eligibility determinations to sites 22Cl113, 22Cl506, 22Cl668, 22Lo898, 22Lo1065, and 22Lo1066. Additionally we concur with the adverse effect findings and plan of action for sites 22Lo1065 and 22Lo1066 to protect the sites. With those conditions, we have no objections to the project.

In addition, please be aware that according to 36 CFR Part 800, Sect. 800.1(2)(iii), appropriate tribal authorities must be afforded the opportunity to comment. We will be happy to provide a list of *Native American Tribes With Cultural Interests in Mississippi* upon request.

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

Please provide a copy of this letter to Mr. de Gregory. If you need further information, please let us know.

Sincerely,

Hal Bell
Review and Compliance Officer

FOR: Katie Blount
State Historic Preservation Officer

MISSISSIPPI DEPARTMENT of ARCHIVES AND HISTORY

MDAH

HISTORIC PRESERVATION DIVISION
P. O. BOX 571
Jackson, MS 39205-0571
Phone 601-576-6940 Fax 601-576-6955
Website: mdah.ms.gov

September 24, 2019

Mr. Clinton E. Jones
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, Tennessee 37902

RE: MOA Between the TVA, MS SHPO, Regarding the Resolution of Adverse Effects on Historic Properties Associated with the Artesia-West Columbus 161-Kilovolt Transmission Line Project, (TVA) MDAH Project Log #09-059-19, Lowndes County

Dear Mr. Jones:

We have reviewed the MOA, received September 10, 2019, in accordance with our responsibilities under Section 106 of the National Historic Preservation Act and 36 CFR Part 800. After reviewing the information provided, we offer the following comments:

The research design contained in Appendix B should contain more detail regarding the treatment of the two tenant farmsteads. We need floorplans and elevations done for each of the structures, and the structures should be amply documented through the use of digital photography. The goal should be to document these structures comprehensively prior to demolition. If you have any questions or need more information, please let me know.

Sincerely,

Hal Bell

Hal Bell
Review and Compliance Officer

FOR: Katie Blount
State Historic Preservation Officer

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

March 24, 2020

Mr. Jim Woodrick
Director
Mississippi Department of Archives and History
Historic Preservation Division
Post Office Box 571
Jackson, Mississippi 39205-0521

Dear Mr. Woodrick:

TENNESSEE VALLEY AUTHORITY (TVA), ARTESIA - WEST COLUMBUS 161-KILOVOLT (KV) TRANSMISSION LINE (TL) PROJECT PROPOSED ACCESS ROADS, CLAY, LOWNDES, AND OKTIBBEHA COUNTIES, MISSISSIPPI **(**MDAH LOG NUMBER 07-017-19)

In our letter dated July 1, 2019, TVA consulted with your office regarding the proposed 11 miles of new TL in Lowndes County, Mississippi (start 33.47498, -88.48858; end 33.44942, -88.61697) and 14 miles rebuild of the existing West Point-Starkville 161-kV TL (start 33.63613, -88.65173; end 33.50524, -88.80238). At the time of our consultation, TVA had not yet identified the location of access routes (ARs) associated with the project. TVA is modifying the area of potential effects (APE) for the project to include the 4.6 miles by 20 feet access routes.

TVA contracted with Tennessee Valley Archaeological Research (TVAR) to conduct a Phase I Archaeological survey of the modified APE. The results of this survey can be found in Appendix A (page 203) in the report titled *A Phase I Archaeological Survey of Access Routes Associated with Tennessee Valley Authority's West Point-Starkville-Montpelier Transmission Line Project in Clay and Oktibbeha Counties, Mississippi* and downloaded at http://tvaresearch.com/download/TVA_Artesia_W_Columbus_Starkville_Update_Report_high_res.pdf

As a result of the survey, TVAR evaluated portions of seven archaeological resources recorded or purported to be within the project area, including two previously recorded sites (22CL506 and 22CL1008) and five newly documented sites (22CL506, 22CL668, 22CL113, and 22LO898). A portion of the previously recorded boundaries of site 22CL506, the W.R. Procter Village site, was identified during the associated TL right-of-way (ROW) survey. Of the 22 shovel tests that were excavated during TVAR's investigation within the transmission line ROW, only one produced a single piece of debitage, shallowly deposited within the plowzone. As stated in our July 1, 2019 letter, TVA determined the portion of the site within the TL ROW is noncontributing to the eligibility of the site. A 317-meter long segment of AR #7 investigated during the current survey traverses the central portion of the original boundaries of site 22CL506. Shovel testing within the current APE identified a cluster of positive shovel tests with a relatively dense assemblage. Artifacts were recovered from 5 centimeters below surface (cmbs) to 35 cmbs and

the pottery type suggests a Woodland Period occupation. Based on the density of artifacts within the positive shovel tests and depth of recovery, TVA finds that the National Register of Historic Places (NRHP) eligibility for the portion of site 22CL506 within AR #7 should remain undetermined. All of the positive shovel tests during TVAR's investigation of AR 7 were clustered together near the center of the site's recorded boundary at the highest portion of the landform (Figure 1). This area will be physically flagged and TVA will either avoid this location completely by accessing the structures via the TL ROW or by matting the area where the cluster of positive shovel tests were identified including a 20 meter buffer (total of approximately 82 meters). TVA will require that any work vehicles crossing the site be of the low ground pressure type, or that wetland mats be placed over the site prior to the work (mats would be removed upon completion of the project). Furthermore, matting/equipment requirement for this location will be added to design sheets that are used by construction and maintenance groups. These drawings are consulted each time TVA is considering any type of physical work on a TL. TVA finds that with these conditions in place, the undertaking would not affect site 22CL506.

Previously identified site 22CL1008 was recorded as a potential Mississippian site. The site was recommend ineligible in 1992. No artifacts were identified during pedestrian survey and exploratory shovel testing. TVA finds that the investigated portion of site 22CL1008 does not contribute to the resource's eligibility. Sites 22CL506, 22CL668, 22CL113, and 22LO898 are historic artifact scatters. Based on artifact scarcity and/or lack of integrity, that the investigated portion of sites 22CL506, 22CL668, 22CL113, and 22LO898 does not contribute to the resources' eligibility.

Pursuant to 36 CFR Part 800.4(d)(1) we are notifying you of TVA's finding of no historic properties affected for this portion of the project; providing the documentation specified in § 800.11(d); and inviting you to review the finding. Also, we are seeking your agreement with TVA's eligibility determinations and finding that the undertaking as currently planned will have no effects on historic properties.

Pursuant to 36 CFR Part 800.3(f)(2), TVA is consulting with federally recognized Indian tribes within the proposed project's APE that may be of religious and cultural significance and eligible for the NRHP.

If you have any questions or comments, please contact Michaelyn Harle at mharle@tva.gov or (865) 632-2248.

Sincerely,

Clinton E. Jones
Manager
Cultural Compliance

Enclosures

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

June 8, 2020

Ms. Lindsey Bilyeu
Senior Section 106 Reviewer
Choctaw Nation of Oklahoma
Post Office Drawer 1210
Durant, Oklahoma 74702

Dear Ms. Bilyeu:

RE: TENNESSEE VALLEY AUTHORITY (TVA), ARTESIA - WEST COLUMBUS 161-KILOVOLT (KV) TRANSMISSION LINE (TL) PROJECT PROPOSED ACCESS ROADS, CLAY, LOWNDES, AND OKTIBBEHA COUNTIES, MISSISSIPPI (X(start 33.47498, -88.48858; end 33.44942, -88.61697) (start 33.63613, -88.65173; end 33.50524, -88.80238)

Thank you for your comments regarding our March 25, 2020 letter concerning the above-mentioned project. In your email, you indicated that the Choctaw Nation Historic Preservation Department did not concur with TVA's approach for evaluation of an eligible site; only a portion of which is within the area of potential effects (APE). We wanted to provide you a little more information about this approach.

Per our last letter dated March 2020, seven archaeological resources are recorded or purported to be within the project area, including two previously recorded sites (22CL506 and 22CL1008) and five newly documented sites (22OK1221, 22OK1222, 22OK1223, 22OK1224, and 22OK1225). As you know, the access road previously proposed would have crossed site 22CL506. TVA initially proposed protection measures to avoid effects to site 22CL506; however, due to concerns raised by tribes during consultation, the access road that crosses site 22CL506 has been removed and is no longer part of the undertaking. Site 22CL1008 was recorded as a potential Mississippian site. The site was recommend ineligible in 1992. No artifacts were identified during pedestrian survey and exploratory shovel testing. Sites (22OK1221, 22OK1222, 22OK1223, 22OK1224, and 22OK1225) are historic artifact scatters that are disturbed and lack integrity. Thus, TVA maintains that the proposed undertaking as currently planned would have no effects on historic properties.

We understand your concerns about partial site recommendations, which could be an issue in future undertakings. For undertakings that are considered "critical infrastructure" projects (e.g., transmission lines and associated access routes), it is TVA's practice to limit its archaeological survey and archaeological area of potential effect (APE) to the project footprint. TVA determines whether the portion of the site within the APE contributes to the eligibility of the site, based on the same factors one would use when reviewing the entire site: whether that portion has stratigraphic integrity, its artifact density, likely presence of features, depth of deposits, age, etc. If the portion of the site in our APE lacks research potential, then our finding would be that

it is non-contributing to site's eligibility, and therefore the undertaking would not have an adverse effect on the site. Conversely, if the portion of the site were likely to contain intact deposits, then we would determine that portion of the site is contributing and would assess effects accordingly.

We hope this provides you some reassurance that our approach for evaluating sites when only a portion is within the APE, is a reasonable one. We understand that your concern about partial site evaluations goes beyond this particular undertaking and we plan to provide further discussion regarding TVA's practices for critical infrastructure projects in the near future.

Per your request, TVA shall ensure that if there is a post-review discovery, all ground-disturbing work within a 328-foot-radius of the discovery will be immediately stopped and the discovery location secured against further disturbance, pending completion of the consultation with the appropriate State Historic Preservation Officer and federally recognized Indian tribes.

As always, we appreciate your concerns and we look forward to continue working with The Choctaw Nation to preserve and protect Native American resources in the Tennessee Valley. Please let me know if you have any questions, please contact me by email, mmshuler@tva.gov or by phone (865) 253-1265,.

Sincerely,

Marianne Shuler
Senior Specialist, Archaeologist and Tribal Liaison
Cultural Compliance

MSH:ABM

Appendix B – Bat Strategy Project Screening Form

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Project Review Form - TVA Bat Strategy *(12/2018)*

*This form should **only** be completed if project includes activities in Tables 2 or 3 (STEP 2 below). This form is not required if project activities are limited to Table 1 (STEP 2) or otherwise determined to have no effect on federally listed bats. If so, include the following statement in your environmental compliance document (e.g., add as a comment in the project CEC): "Project activities limited to Bat Strategy Table 1 or otherwise determined to have no effect on federally listed bats. Bat Strategy Project Review Form NOT required." This form is to assist in determining required conservation measures per TVA's ESA Section 7 programmatic consultation for routine actions and federally listed bats.*[1]

Project Name: Artesia- West Columbus 161KV TL & West Point Starkville reconductor **Date:** Mar 1, 2019

Contact(s): Emily Willard **CEC#:** **Project ID:** 33379

Project Location (City, County, State): Clay, Lowndes, Oktibbeha Counties, Mississippi

Project Description:

To supply power to the Infinity Megasite near Artesia, MS TVA proposes to construct a new 12-mile TL on 100' ROW. To support the project TVA must also reconductor and partially rebuild the 14.2 mile West Point-Starkville 161-KV TL. Clearing will be required for both the new construction and the rebuild/reconductor. This project is an EA-level review.

SECTION 1: PROJECT INFORMATION - ACTION AND ACTIVITIES

STEP 1) Select TVA Action. If none are applicable, contact environmental staff or Terrestrial Zoologist to discuss whether form (i.e., application of Bat Programmatic Consultation) is appropriate for project:

- ☐ 1 Manage Biological Resources for Biodiversity and Public Use on TVA Reservoir Lands
- ☐ 2 Protect Cultural Resources on TVA-Retained Land
- ☐ 3 Manage Land Use and Disposal of TVA-Retained Land
- ☐ 4 Manage Permitting under Section 26a of the TVA Act
- ☐ 5 Operate, Maintain, Retire, Expand, Construct Power Plants
- ☐ 6 Maintain Existing Electric Transmission Assets
- ☐ 7 Convey Property associated with Electric Transmission
- ■ 8 Expand or Construct New Electric Transmission Assets
- ☐ 9 Promote Economic Development
- ☐ 10 Promote Mid-Scale Solar Generation

STEP 2) Select all activities from Tables 1, 2, and 3 below that are included in the proposed project.

TABLE 1. Activities with no effect to bats. Conservation measures & completion of bat strategy project review form NOT required.

☐ 1. Loans and/or grant awards	☐ 8. Sale of TVA property	☐ 19. Site-specific enhancements in streams and reservoirs for aquatic animals
☐ 2. Purchase of property	☐ 9. Lease of TVA property	☐ 20. Nesting platforms
☐ 3. Purchase of equipment for industrial facilities	☐ 10. Deed modification associated with TVA rights or TVA property	☐ 41. Minor water-based structures (this does not include boat docks, boat slips or piers)
☐ 4. Environmental education	☐ 11. Abandonment of TVA retained rights	☐ 42. Internal renovation or internal expansion of an existing facility
☐ 5. Transfer of ROW easement and/or ROW equipment	☐ 12. Sufferance agreement	■ 43. Replacement or removal of TL poles
☐ 6. Property and/or equipment transfer	☐ 13. Engineering or environmental planning or studies	■ 44. Conductor and overhead ground wire installation and replacement
☐ 7. Easement on TVA property	☐ 14. Harbor limits	☐ 49. Non-navigable houseboats

TABLE 2. Activities not likely to adversely affect bats with implementation of conservation measures. Conservation measures and completion of bat strategy project review form REQUIRED; review of bat records in proximity to project NOT required.

■ 18. Erosion control, minor	☐ 57. Water intake - non-industrial	☐ 79. Swimming pools/associated equipment
☐ 24. Tree planting	☐ 58. Wastewater outfalls	☐ 81. Water intakes – industrial
☐ 30. Dredging and excavation; recessed harbor areas	☐ 59. Marine fueling facilities	☐ 84. On-site/off-site public utility relocation or construction or extension
☐ 39. Berm development	☐ 60. Commercial water-use facilities (e.g., marinas)	☐ 85. Playground equipment - land-based
☐ 40. Closed loop heat exchangers (heat pumps)	☐ 61. Septic fields	☐ 87. Aboveground storage tanks
☐ 45. Stream monitoring equipment - placement and use	☐ 66. Private, residential docks, piers, boathouses	☐ 88. Underground storage tanks
☐ 46. Floating boat slips within approved harbor limits	☐ 67. Siting of temporary office trailers	☐ 90. Pond closure
☐ 48. Laydown areas	☐ 68. Financing for speculative building construction	☐ 93. Standard License
☐ 50. Minor land based structures	☐ 72. Ferry landings/service operations	☐ 94. Special Use License
☐ 51. Signage installation	☐ 74. Recreational vehicle campsites	☐ 95. Recreation License
☐ 53. Mooring buoys or posts	☐ 75. Utility lines/light poles	☐ 96. Land Use Permit
☐ 56. Culverts	☐ 76. Concrete sidewalks	

Table 3: Activities that may adversely affect federally listed bats. Conservation measures AND completion of bat strategy project review form REQUIRED; review of bat records in proximity of project REQUIRED by OSAR/Heritage eMap reviewer or Terrestrial Zoologist.

■ 15. Windshield and ground surveys for archaeological resources	■ 34. Mechanical vegetation removal, includes trees or tree branches > 3 inches in diameter	☐ 69. Renovation of existing structures
☐ 16. Drilling	☐ 35. Stabilization (major erosion control)	☐ 70. Lock maintenance/ construction
☐ 17. Mechanical vegetation removal, does not include trees or branches > 3" in diameter (in Table 3 due to potential for woody burn piles)	☐ 36. Grading	☐ 71. Concrete dam modification
☐ 21. Herbicide use	☐ 37. Installation of soil improvements	☐ 73. Boat launching ramps
☐ 22. Grubbing	☐ 38. Drain installations for ponds	☐ 77. Construction or expansion of land-based buildings
☐ 23. Prescribed burns	☐ 47. Conduit installation	☐ 78. Wastewater treatment plants
☐ 25. Maintenance, improvement or construction of pedestrian or vehicular access corridors	☐ 52. Floating buildings	☐ 80. Barge fleeting areas
☐ 26. Maintenance/construction of access control measures	☐ 54. Maintenance of water control structures (dewatering units, spillways, levees)	☐ 82. Construction of dam/weirs/ levees
☐ 27. Restoration of sites following human use and abuse	☐ 55. Solar panels	☐ 83. Submarine pipeline, directional boring operations
☐ 28. Removal of debris (e.g., dump sites, hazardous material, unauthorized structures)	☐ 62. Blasting	☐ 86. Landfill construction
☐ 29. Acquisition and use of fill/borrow material	■ 63. Foundation installation for transmission support	☐ 89. Structure demolition
■ 31. Stream/wetland crossings	☐ 64. Installation of steel structure, overhead bus, equipment, etc.	☐ 91. Bridge replacement
☐ 32. Clean-up following storm damage	■ 65. Pole and/or tower installation and/or extension	☐ 92. Return of archaeological remains to former burial sites
■ 33. Removal of hazardous trees/tree branches		

STEP 3) Project includes one or more activities in Table 3? ◉ **YES (Go to Step 4)** ○ **NO (Go to Step 13)**

STEP 4) Answer questions a through e below (applies to projects with activities from Table 3 ONLY)

a) Will project project involve continuous noise (i.e., ≥ 24 hrs) that is greater than 75 decibels measured on the A scale (e.g., loud machinery)?

- (●) **NO** (NV2 does not apply)
- ( ) **YES** (NV2 applies, subject to records review)

b) Will project involve entry into/survey of cave, bridge, other structure (potential bat roost)?

- (●) **NO** (HP1/HP2 do not apply)
- ( ) **YES** (HP1/HP2 applies, subject to review of bat records)

c) If conducting **prescribed burning** (**activity 23)**, estimated acreage**:** [ ] and timeframe(s) below; [■] **N/A**

STATE	SWARMING	WINTER	NON-WINTER	PUP
GA, KY, TN	[ ] Oct 15 - Nov 14	[ ] Nov 15 - Mar 31	[ ] Apr 1 - May 31, Aug 1- Oct 14	[ ] Jun 1 - Jul 31
VA	[ ] Sep 16 - Nov 15	[ ] Nov 16 - Apr 14	[ ] Apr 15 - May 31, Aug 1 – Sept 15	[ ] Jun 1 - Jul 31
AL	[ ] Oct 15 - Nov 14	[ ] Nov 15 - Mar 15	[ ] Mar 16 - May 31, Aug 1 - Oct 14	[ ] Jun 1 - Jul 31
NC	[ ] Oct 15 - Nov 14	[ ] Nov 15 - Apr 15	[ ] Apr 16 - May 31, Aug 1 - Oct 14	[ ] Jun 1 - Jul 31
MS	[ ] Oct 1 - Nov 14	[ ] Nov 15 - Apr 14	[ ] Apr 15 - May 31, Aug 1 – Sept 30	[ ] Jun 1 - Jul 31

d) Will the project involve vegetation piling/burning?

- (●) **NO** (SSPC4/ SHF7/SHF8 do not apply)
- ( ) **YES** (SSPC4/SHF7/SHF8 applies, subject to review of bat records)

e) If **tree removal (activity 33 or 34)**, estimated amount: [5] (●)**ac** ( )**trees** ( )**N/A**

STATE	SWARMING	WINTER	NON-WINTER	PUP
GA, KY, TN	[ ] Oct 15 - Nov 14	[ ] Nov 15 - Mar 31	[ ] Apr 1 - May 31, Aug 1- Oct 14	[ ] Jun 1 - Jul 31
VA	[ ] Sep 16 - Nov 15	[ ] Nov 16 - Apr 14	[ ] Apr 15 - May 31, Aug 1 – Sept 15	[ ] Jun 1 - Jul 31
AL	[ ] Oct 15 - Nov 14	[ ] Nov 15 - Mar 15	[ ] Mar 16 - May 31, Aug 1 - Oct 14	[ ] Jun 1 - Jul 31
NC	[ ] Oct 15 - Nov 14	[ ] Nov 15 - Apr 15	[ ] Apr 16 - May 31, Aug 1 - Oct 14	[ ] Jun 1 - Jul 31
MS	[ ] Oct 1 - Nov 14	[ ] Nov 15 - Apr 14	[■] Apr 15 - May 31, Aug 1 – Sept 30	[■] Jun 1 - Jul 31

If warranted, does project have flexibility for bat surveys (May 15-Aug 15): (●) **MAYBE** ( ) **YES** ( ) **NO**

SECTION 2: REVIEW OF BAT RECORDS (applies to projects with activities from Table 3 ONLY)

STEP 5) Review of bat/cave records conducted by Heritage/OSAR reviewer?

( ) **YES** (●) **NO** (If NO and includes Table 3 activities, submit project / relevant information [e.g., maps] for review by Terrestrial Zoologist.)

Info below completed by:

		(name)		Date	
[ ]	**Heritage Reviewer**			Date	
[ ]	**OSAR Reviewer**			Date	
[■]	**Terrestrial Zoologist**	(name)	Jesse Troxler	Date	Dec 17, 2019

Gray bat records: [☒] None [ ] Within 3 miles* [ ] Within a cave* [ ] Within the County

Indiana bat records: [☒] None [ ] Within 10 miles* [ ] Within a cave* [ ] Capture/roost tree* [ ] Within the County

Northern long-eared bat records: [☒] None [ ] Within 5 miles* [ ] Within a cave* [ ] Capture/roost tree* [ ] Within the County

Virginia big-eared bat records: [☒] None [ ] Within 10 miles* [ ] Within the County

Caves: [☒] None within 3 mi [ ] Within 3 miles but > 0.5 mi [ ] Within 0.5 mi but > 0.25 mi* [ ] Within 0.25 mi but > 200 feet* [ ] Within 200 feet*

Bat Habitat Inspection Sheet completed? (●) **NO** ( ) **YES**

Amount of SUITABLE habitat to be removed/burned (may differ from STEP 4e): [3.47] **(**(●)**ac** ( )**trees)*** ( )**N/A**

STEP 6) If reviewed by Heritage/OSAR reviewer, does records review trigger need for additional review by Terrestrial Zoologist (noted by * in Step 5)?

○ **NO (Go to Step 13)** ◉ **YES (Submit for Terrestrial Zoology review)** ○ **YES, however, based on Heritage Data review guidelines (or discussion with Terrestrial Zoology), project does not need to be submitted to Terrestrial Zoology for review. (Go to Step 13)**

Notes (additional information from field review or explanation of no impact):

Suitable habitat within new ROW:23 trees totaling 2.07 acres and a woody wetland (1.16 acres) w/8 suitable trees. AR 614: 5 trees 0.24ac.

STEPS 7-12 To be Completed by Terrestrial Zoologist (if warranted):

STEP 7) Project will involve:

☐ Removal of suitable trees within 0.5 mile of P1-P2 Indiana bat hibernacula or 0.25 mile of P3-P4 Indiana bat hibernacula or any NLEB hibernacula.

☐ Removal of suitable trees within 10 miles of documented Indiana bat (or within 5 miles of NLEB) hibernacula.

☒ Removal of suitable trees > 10 miles from documented Indiana bat (> 5 miles from NLEB) hibernacula.

☐ Removal of trees within 150 feet of a documented Indiana bat or northern long-eared bat maternity roost tree.

☐ Removal of suitable trees within 2.5 miles of Indiana bat roost trees or within 5 miles of Indiana bat capture sites.

☒ Removal of suitable trees > 2.5 miles from Indiana bat roost trees or > 5 miles from Indiana bat capture sites.

☐ Removal of documented Indiana bat or NLEB roost tree, if still suitable.

☐ N/A

STEP 8) Presence/absence surveys were/will be conducted: ○ **YES** ○ **NO** ◉ **TBD**

STEP 9) Presence/absence survey results, on [ ] ○ **NEGATIVE** ○ **POSITIVE** ◉ **N/A**

STEP 10) Project ◉ **WILL** ○ **WILL NOT** require use of Incidental Take in the amount of [3.47] ◉ **acres or** ○ **trees** proposed to be used during the ○ **WINTER** ○ **VOLANT SEASON** ◉ **NON-VOLANT SEASON** ○ **N/A**

STEP 11) Available Incidental Take (prior to accounting for this project) as of [May 21, 2019]

TVA Action	Total 20-year	Winter	Volant Season	Non-Volant Season
8 Expand or Construct New Electric Transmission Assets	11,900	7,027.92	2,359.47	2,379.83

STEP 12) Amount contributed to TVA's Bat Conservation Fund upon activity completion: $ [2,602] OR ○ **N/A**

SECTION 3: REQUIRED CONSERVATION MEASURES

STEP 13a) **If answer to STEP 3 is NO**, (*Project Lead* or *OSAR/Heritage Reviewer*) is to review Conservation Measures in Table 4 and ensure these selected Conservation Measures are relevant to project. If not manually override and uncheck. **Go to Step 14**

STEP 13b) **If answer to STEP 3 is YES, and answer to STEP 6 is NO**, *OSAR/Heritage Reviewer* is to review Conservation Measures in Table 4 that and ensure these selected Conservation Measures are relevant to project. If not manually override and uncheck. **Go to Step 14**

STEP 13c) **If answer to STEP 3 is YES, and answer to STEP 6 is YES**, *Terrestrial Zoologist* is to review Conservation Measures in Table 4 and ensure these selected Conservation Measures are relevant to project. If not manually override and uncheck. **Go to Step 15**

Table 4. TVA's ESA Section 7 Programmatic Bat Consultation Required Conservation Measures

The Conservation Measures in Table 4 are automatically selected based on your choices in Tables 2 and 3 but can be manually overridden, if necessary. To Manually override, press the button and enter your name.

Manual Override

Name: Jesse Troxler

Check if applies to Project	Activities Subject to Conservation Measure	Conservation Measure Description
■	15, 16, 17, 18, 22, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 45, 47, 48, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 90, 91, 92, 93, 94, 95, 96	**NV1** - Noise will be short-term, transient, and not significantly different from urban interface or natural events (i.e., thunderstorms) that bats are frequently exposed to when present on the landscape.
■	33, 34	**TR1*** - Removal of potentially suitable summer roosting habitat during time of potential occupancy has been quantified and minimized programmatically. TVA will track and document alignment of activities that include tree removal (i.e., hazard trees, mechanical vegetation removal) with the programmatic quantitative cumulative estimate of seasonal removal of potential summer roost trees for Indiana bat and northern long-eared bat. Project will therefore communicate completion of tree removal to appropriate TVA staff.
■	33, 34	**TR4*** - Removal of suitable summer roosting habitat within potential habitat for Indiana bat or northern long-eared bat will be tracked, documented, and included in annual reporting. Project will therefore communicate completion of tree removal to appropriate TVA staff.
■	33, 34	**TR9** - If removal of suitable summer roosting habitat occurs when bats are present on the landscape, a funding contribution (based on amount of habitat removed) towards future conservation and recovery efforts for federally listed bats would be carried out. Project can consider seasonal bat presence/absence surveys (mist netting or emergence counts) that allow for positive detections without resulting in increased constraints in cost and project schedule. This will enable TVA to contribute to increased knowledge of bat presence on the landscape while carrying out TVA's broad mission and responsibilities.

Project Review Form - TVA Bat Strategy *(12/2018)*

Check if applies to Project	Activities Subject to Conservation Measure	Conservation Measure Description
☑	16, 17, 18, 21, 22, 24, 25, 26, 27, 28, 29, 31, 32, 33, 34, 35, 36, 37, 38, 39, 48, 50, 51, 56, 61, 62, 63, 64, 65, 67, 69, 84, 89	**SSPC1** (**Transmission only**) - Transmission actions and activities will continue to Implement A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities. This focuses on control of sediment and pollutants, including herbicides. Following are key measures: o BMPs minimize erosion and prevent/control water pollution in accordance with state-specific construction storm water permits. BMPS are designed to keep soil in place and aid in reducing risk of other pollutants reaching surface waters, wetlands and ground water. BMPs will undertake the following principles: • Plan clearing, grading, and construction to minimize area and duration of soil exposure. • Maintain existing vegetation wherever and whenever possible. • Minimize disturbance of natural contours and drains. • As much as practicable, operate on dry soils when they are least susceptible to structural damage and erosion. • Limit vehicular and equipment traffic in disturbed areas. Keep equipment paths dispersed or designate single traffic flow paths with appropriate road BMPs to manage runoff. • Divert runoff away from disturbed areas. • Provide for dispersal of surface flow that carries sediment into undisturbed surface zones with high infiltration capacity and ground cover conditions. • Prepare drainage ways and outlets to handle concentrated/increased runoff. • Minimize length and steepness of slopes. Interrupt long slopes frequently. • Keep runoff velocities low and/or check flows. • Trap sediment on-site. • Inspect/maintain control measures regularly & after significant rain. • Re-vegetate and mulch disturbed areas as soon as practical. o Specific guidelines regarding sensitive resources and buffer zones: • Extra precaution (wider buffers) within SMZs is taken to protect stream banks and water quality for streams, springs, sinkholes, and surrounding habitat. • BMPs are implemented to protect and enhance wetlands. Select use of equipment and seasonal clearing is conducted when needed for rare plants; construction activities are restricted in areas with identified rare plants. • Standard requirements exist to avoid adverse impacts to caves, protected animals, unique/ important habitat (e.g., cave buffers, restricted herbicide use, seasonal clearing of suitable habitat).
☑	16, 17, 18, 21, 22, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 48, 50, 51, 52, 53, 54, 55, 58, 59, 60, 61, 62, 63, 64, 65, 67, 70, 71, 73, 76, 77, 78, 80, 81, 82, 83, 86, 87, 88, 89, 90	**SSPC2** - Operations involving chemical/fuel storage or resupply and vehicle servicing will be handled outside of riparian zones (streamside management zones) in a manner to prevent these items from reaching a watercourse. Earthen berms or other effective means are installed to protect stream channel from direct surface runoff. Servicing will be done with care to avoid leakage, spillage, and subsequent stream, wetland, or ground water contamination. Oil waste, filters, other litter will be collected and disposed of properly. Equipment servicing and chemical/fuel storage will be limited to locations greater than 300-ft from sinkholes, fissures, or areas draining into known sinkholes, fissures, or other karst features.

[1]Bats addressed in consultation (02/2018), which includes gray bat (listed in 1976), Indiana bat (listed in 1967), northern long-eared bat (listed in 2015), and Virginia big-eared bat (listed in 1979).

Hide All Unchecked Conservation Measures

◉ HIDE

○ UNHIDE

STEP 14) Save completed form in project environmental documentation (e.g., CEC, Appendix to EA) AND send a copy of form to **batstrategy@tva.gov.** Submission of this form indicates that Project Lead/Applicant:

Caitlin Fitzpatrick (name) is (or will be made) aware of the requirements below.

- Implementation of conservation measures identified in Table 4 is required to comply with TVA's Endangered Species Act programmatic bat consultation.
- TVA may conduct post-project monitoring to determine if conservation measures were effective in minimizing or avoiding impacts to federally listed bats.

STEP 15) ***For Use by Terrestrial Zoologist if Project and Form are Submitted for Review***

☒ Terrestrial Zoologist acknowledges that Project Lead/Contact (name) Caitlin Fitzpatrick has been informed on Dec 17, 2019 (date) of any relevant conservation measures and/or provided a copy of this form.

☐ For projects that require use of Take and/or contribution to TVA's Bat Conservation Fund, Terrestrial Zoologist acknowledges that Project Lead/Contact has been informed that project will result in use of Incidental Take 3.47 ◉ ac ○ trees and that use of Take will require 2,602 contribution to TVA's Conservation Fund upon completion of activity (amount entered should be $0 if cleared in winter).

Finalize and Print to Noneditable PDF. Changes to form cannot be made after this button is selected.

Appendix C – Stream Crossings Along the Proposed Transmission Line Right-of-Way

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Table C-1: Stream Crossings Along the Proposed Artesia - West Columbus 161-kV TL in Clay, Oktibbeha, and Lowndes Counties, Mississippi

Stream ID	Sequence ID	Stream Type	Streamside Management Zone Category	Field Notes	Cowardin Code	HGM Code	Latitude	Longitude
asc23	001	Intermittent	Category A (50 ft)	Small 3ft wide x 3ft deep channel with hard clay/ cobble substrate.	R4	Riverine	33.474555	-88.488152
asc22	002	Other	Category A (50 ft)	Pond.	R4		33.474369	-88.487625
asc04	003	Perennial	Category A (50 ft)	Small stream feeding large pond. Channel flows thru wetland.	R4	Riverine	33.466339	-88.495102
asc01a	004	Other	Category A (50 ft)	Large Pond.	R4		33.461487	-88.501559
asc24	005	Perennial	Category A (50 ft)	Approximately 10ft wide x ? deep channel. High turbid water at time of survey.	R4	Riverine	33.451387	-88.514047
asc25	006	Perennial	Category A (50 ft)	n/a	R4	Riverine	33.448447	-88.514682
asc28	007	Perennial	Category A (50 ft)	5ft wide x 3ft deep channel with gravel substrate. Culvert in place in ROW.	R4	Riverine	33.435301	-88.514687
asc30	008	Intermittent	Category A (50 ft)	3ft wide x 2ft deep channel. Turbid at time of survey. Culvert present.	R4	Riverine	33.432426	-88.522801

asc32a	009	Other	Category A (50 ft)	Large commercial ponds	R4	Riverine	33.429834	-88.536364
asc32b	010	Perennial	Category A (50 ft)	Channel out of banks flooding ROW.	R4	Riverine	33.430155	-88.534739
asc32	011	Perennial	Category A (50 ft)	4ft wide x 4ft deep channel. Turbid water.	R4	Riverine	33.430115	-88.538517
asc34	012	Perennial	Category A (50 ft)	12 wide x 8ft deep channel. Turbid high water at time of survye.	R4	Riverine	33.429957	-88.544445
asc36	013	Perennial	Category A (50 ft)	n/a	R4	Riverine	33.429367	-88.566232
asc37	014	Perennial	Category A (50 ft)	12ft wide x 5ft deep channel. Turbid water. Weathered dead mussel shell.	R4	Riverine	33.432182	-88.572503
asc38	015	Perennial	Category A (50 ft)	6ft wide x 2ft deep channel with gravel substrate.	R4	Riverine	33.431179	-88.578383
asc39	016	Perennial	Category A (50 ft)	9ft wide x ? deep channel. Turbid at time of survey.	R4	Riverine	33.429182	-88.590595
BWA04	017	Perennial	Category A (50 ft)	7ft wide X 2ft deep stream. Slow moving. silty/gravel substrate	R4	Riverine	33.426159	-88.609213
asc42	018	Intermittent	Category A (50 ft)	6ft wide x 3ft deep channel with gravel substrate.	R4	Riverine	33.432474	-88.621526

asc42	019	Intermittent	Category A (50 ft)	Channel in culivated field.	R4	Riverine	33.437874	-88.621260
asc43	020	Intermittent	Category A (50 ft)	Channel in culivated field.	R4	Riverine	33.440526	-88.620781
BWA02	021	Perennial	Category A (50 ft)	Stream	R4	Riverine	33.636700	-88.689581
BWA05	022	Perennial	Category A (50 ft)	Fish present	R4	Riverine	33.632222	-88.702412
BWA06	023	Perennial	Category A (50 ft)	Stream going through wetland	R4	Riverine	33.618689	-88.712858
BWA07	024	Perennial	Category A (50 ft)	Flooded creek	R4	Riverine	33.617623	-88.713527
BWA10	025	Perennial	Category A (50 ft)	Fast flowing stream, 1ft by 3 ft.	R4	Riverine	33.554506	-88.759644
BWA11	026	Perennial	Category A (50 ft)	Stream in cattle field	R4	Riverine	33.550961	-88.764003
BWA23	027	Perennial	Category A (50 ft)	Stream	R4	Riverine	33.524468	-88.794862
BWA19	028	Intermittent	Category A (50 ft)	TDEC score of 20.5, did not map on the tremble GPS unit, however it was noted between structure 89-90. the line on the map may be inaccuate.	R4	Riverine	33.536591	-88.781455

BWA24	029	Perennial	Category A (50 ft)	2ft by 1ft, Stream	R4	Riverine	33.523645	-88.795936
BWA25	030	Perennial	Category A (50 ft)	Stream	R4	Riverine	33.521979	-88.796189
BWA17	031	Perennial	Category A (50 ft)	Sand Creek, Stream	R4	Riverine	33.505410	-88.799813

Appendix D – Detailed Wetland Descriptions

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Table D.1 – Wetlands Located within West Point-Starkville (L5022) 161kV Transmission Line ROW Proposed for Rebuild and access roads.

Wetland Identifier	Wetland Type[1]	TVARAM[2] Functional Capacity (Score)	Wetland Acreage in Footprint
W001b	PEM1E	Moderate (42)	5.64
W002b	PEM1E	Low (23)	0.17
W003b	PEM1E	Low (27)	1.86
W004b	PEM1E	Moderate (33)	3.07
W005b	PEM1E	Moderate (36)	5.32
W006b	PEM1E	Low (21)	1.12
W007b	PEM1E	Low (23)	7.98
W008b	PEM1E	Moderate (31)	2.79
W009b	PEM1E	Low (28)	0.77
W010b	PEM1E	Moderate (50)	6.77
W011b	PEM1E	Moderate (59)	6.36
W012b	PEM1E	Moderate (59)	2.51
W013b	PEM1E	Moderate (34)	0.31
W014b	PEM1E	Moderate (45)	0.20
W015b	PEM1E	Moderate (51)	4.07
W016b	PEM1E	Moderate (51)	1.59
W017b	PEM1E	Moderate (51)	1.22
W018b	PEM1E	Moderate (53)	3.26
W019b	PEM1E	Moderate (46)	1.18
W020b	PEM1E	Moderate (44)	0.58
W021b	PEM1E	Moderate (57)	8.42
W022b	PEM1E	Low (25)	0.12
W023b	PEM1E	Moderate (41)	0.29
W024b	PEM1E	Moderate (48)	0.48
W025b	PEM1E	Moderate (36)	0.02
W026b	PEM1E	Moderate (44)	1.59
W027b	PEM1E	Low (27)	0.32
W028b	PEM1E	Moderate (41)	0.56
W029b	PEM1E	Moderate (45)	1.83
W030b	PEM1E	Low (24)	0.01
W031b	PEM1E	Moderate (34)	0.69
W032b	PEM1E	Moderate (34)	0.28
W033b	PEM1E	Moderate (34)	0.94
		TOTAL ACRES	**72.32**

[1]Classification codes as defined in Cowardin et al. (1979): E = Seasonally flooded/saturated; EM1=Emergent, persistent vegetation; P=Palustrine

[2]TVARAM = Tennessee Valley Authority Rapid Assessment Method that categorizes wetland quality through quantification of functional capacity parameters

Table D.2 – Wetlands located within proposed new Artesia-West Columbus 161kV Transmission Line ROW corridor and access roads.

Wetland Identifier	Wetland Type[1]	TVARAM[2] Functional Capacity (Score)	Wetland Acreage in Footprint
W001a	PSS1E	Low (29)	0.02
W002a	PSS1E	Low (29)	0.05
W003a(a)	PEM1E	Moderate (50)	0.16
W003a(b)	PFO1E		0.24
W004a	PFO1E	Low (29)	0.20
W005a	PEM1E	Moderate (30.5)	2.34
W006a	PEM1E	Moderate (38)	7.41
W007a	PEM1E	Moderate (45)	2.29
W008a	PEM1E	Low (38)	3.28
W009a	PEM1E	Low (43)	1.38
W010a	PEM1E	Low (22)	3.92
W011a	PEM1E	Low (28)	2.37
W012a	PEM1E	Moderate (35)	0.22
W013a	PEM1E	Moderate (48)	0.67
W014a	PEM1E	Moderate (48)	0.85
W015a	PEM1E	Moderate (48)	2.20
W016a	PEM1E	Moderate (41)	2.19
W017a	PSS1E	Moderate (32.5)	0.58
W018a(a)	PFO1E	Moderate (49.5)	0.91
W018a(b)	PEM1E		0.73
W019a	PFO1E	Moderate (50.5)	0.05
W020a	PFO1E	Moderate (50.5)	1.11
W021a	PFO1E	Moderate (47)	1.43
W022a	PFO1E	Moderate (47)	0.51
W023a	PFO1E	Low (23)	0.11
W024a	PFO1E	Moderate (40)	3.74
W025a	PEM1E	Low (14)	0.07
W026a(a)	PEM1E	Low (27)	0.17
W026a(b)	PFO1E		1.06
W026a(c)	PEM1E		0.16
W001a-AR[3](#614)	PEM1E	Low (23)	0.75
W001b-AR(#614)	PFO1E	Moderate (39)	0.27
W002-AR(#643)	PEM1E	Low (7)	0.09
W003-AR(#Alt)	PEM1E	Low (14)	0.02
W004-AR(#Alt)	PEM1E	Low (14)	0.28
		TOTAL ACRES	**41.83**

[1]Classification codes as defined in Cowardin et al. (1979): E = Seasonally flooded/saturated; EM1=Emergent, persistent vegetation; FO1=Forested, broadleaf deciduous vegetation; P=Palustrine; SS1=Scrub-shrub, broadleaf deciduous vegetation;
[2]TVARAM = Tennessee Valley Authority Rapid Assessment Method that categorizes wetland quality through quantification of functional capacity parameters
[3]AR=Access Road (Access Road number)

Table D.3 – Action Alternative Permanent Wetlands Impacts Associated with the new Artesia-West Columbus 161kV Transmission Line ROW and access roads.

Wetland Identifier	Impact Type	Acreage of Wetland Fill	Acreage of Wooded Wetland Clearing
W001a	Clearing for TL Spans	--	0.0200
W002a	Clearing for TL Spans	--	0.0500
W003a(a)	Avoid	--	--
W003a(b)	Fill & Clearing for TL Structures and Spans	0.0102	0.2298
W004a	Clearing for TL Spans	--	0.2000
W005a	Fill for TL Structures/Guys	0.0054	--
W006a	Fill for TL Structures/Guys	0.0125	--
W007a	Fill for TL Structures/Guys	0.0013	--
W008a	Fill for TL Structures/Guys	0.0039	--
W009a	Fill for TL Structures/Guys	0.0013	--
W010a	Fill for TL Structures/Guys	0.0039	--
W011a	Fill for TL Structures/Guys	0.0013	--
W012a	Temporary for Access (wetland mats)	--	--
W013a	Temporary for Access (wetland mats)	--	--
W014a	Temporary for Access (wetland mats)	--	--
W015a	Fill for TL Structures/Guys	0.0013	--
W016a	Fill for TL Structures/Guys	0.0026	--
W017a	Clearing for TL Spans	--	0.5800
W018a(a)	Clearing for TL Spans	--	0.9100
W018a(b)	Fill for TL Structures/Guys	0.0020	--
W019a	Clearing for TL Spans	--	0.0500
W020a	Fill & Clearing for TL Structures and Spans	0.0068	1.1032
W021a	Clearing for TL Spans	--	1.4300
W022a	Clearing for TL Spans	--	0.5100
W023a	Clearing for TL Spans	--	0.1100
W024a	Fill & Clearing for TL Structures and Spans	0.0006	3.7304
W025a	Avoid		
W026a(a)	Avoid	--	--
W026a(b)	Clearing for TL Structures and Spans	--	1.0600
W026a(c)	Avoid	--	--
W001a-AR(#614)	Temporary for Access (wetland mats)	--	--
W001b-AR(#614)	Clearing for Access (wetland mats)	--	0.27
W002-AR(#643)	Temporary for Access (wetland mats)	--	--
W003-AR(#Alt)	Temporary for Access (wetland mats)	--	--
W004-AR(#Alt)	Temporary for Access (wetland mats)	--	--
	TOTAL ACRES	**0.0531**	**10.2534**

Appendix E – Noise During Transmission Line Construction and Operation

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Noise During Transmission Line Construction and Operation

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

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

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

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

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

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

Construction Noise

Construction noise impacts would vary with the number and specific types of equipment on the job, the construction methods, the scheduling of the work, and the distance to sensitive noise receptors such as houses. Typical construction activities for a TL are described in Section 2.2. Maximum noise levels generated by the various pieces of construction equipment typically range from about 70 to 85 dBA at 50 feet (Bolt et al. 1971). An exception would be the use of

track drills for building roads and installing foundations in rocky areas; track drills have a typical maximum noise level of 98 dBA at 50 feet. Use of track drills is not expected to be widespread.

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

Construction activities would be limited to daylight hours. Because of the sequence of construction activities, construction noise at a given point along the TL connections would be limited to a few periods of a few days each. The temporary nature of construction would reduce the duration of noise impacts on nearby residents.

Operational Noise

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

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

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