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ANDERSON 500-KV SUBSTATION AND ASSOCIATED SYSTEM MODIFICATIONS

DRAFT ENVIRONMENTAL ASSESSMENT

Anderson, Blount, Knox, and Roane Counties, Tennessee

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Purpose and Need For Action

The Tennessee Valley Authority (TVA) plans its transmission system according to mandatory and enforceable North American Electric Reliability Corporation (NERC) Standards for Transmission Planning. These standards state that the Bulk Transmission System must be planned to operate reliably over a broad spectrum of system conditions and following a wide range of probable contingencies with no loss of electric load.

Power for Knoxville, Tennessee and the surrounding areas have been mainly supplied through TVA's Bulk Electric Power System from TVA's Bull Run Fossil Plant (BRF) in Anderson County, Tennessee. TVA determined the expense to continue generating power from BRF is no longer cost effective (TVA 2019a). The costs of generating power and the lack of available generating units at BRF has resulted in its limited use for TVA to supply area power needs (TVA 2019a). As such, TVA plans to cease operations at BRF in 2023.

The impending loss of power generation at BRF has necessitated the need to upgrade the TVA Bulk Transmission System to ensure the electric load on the power grid is not disrupted and the surrounding area's future and present power needs are met. Recent reliability studies have shown that the transformer at the existing Bull Run 500-kilovolt (kV) Substation can overload in spring peak load conditions during maintenance. Additionally, sensitivity studies identified this could result in major reliability issues within the surrounding power service area. The proposed project would ensure TVA's Bulk Transmission System is able to continue to operate reliably within national industry standards and would provide operational flexibility once power generation ceases at BRF.

Proposed Action

To maintain reliable electric service in Knoxville and surrounding areas, and to compensate for the loss of generation at TVA's BRF, TVA proposes to build a new 500-kV substation and modify other transmission system assets (Figure 1).

The new Anderson 500-kV Substation would be constructed on TVA property (TVA Tract No. MHR-1) located near BRF in Anderson County to provide the bulk power supply to Knoxville and the surrounding areas (Figure 1). This property is classified as a TVA reservoir property asset and is managed by TVA's River and Resources Stewardship organization for multiple uses. In preparation of the Transmission, Power Supply and Support organization's proposal to construct the new 500-kV substation and realign several transmission lines within the project site, an internal use agreement was put in place which identifies the managing organization. A fenced enclosure would surround the proposed substation occupying roughly 14 acres of the approximate 50-acre located just west of Melton Hill Reservoir (Clinch River) and south of Edgemoore Road. The management of those portions outside of the substation's fenced enclosure area would continue to be River and Resources Stewardship's responsibility.

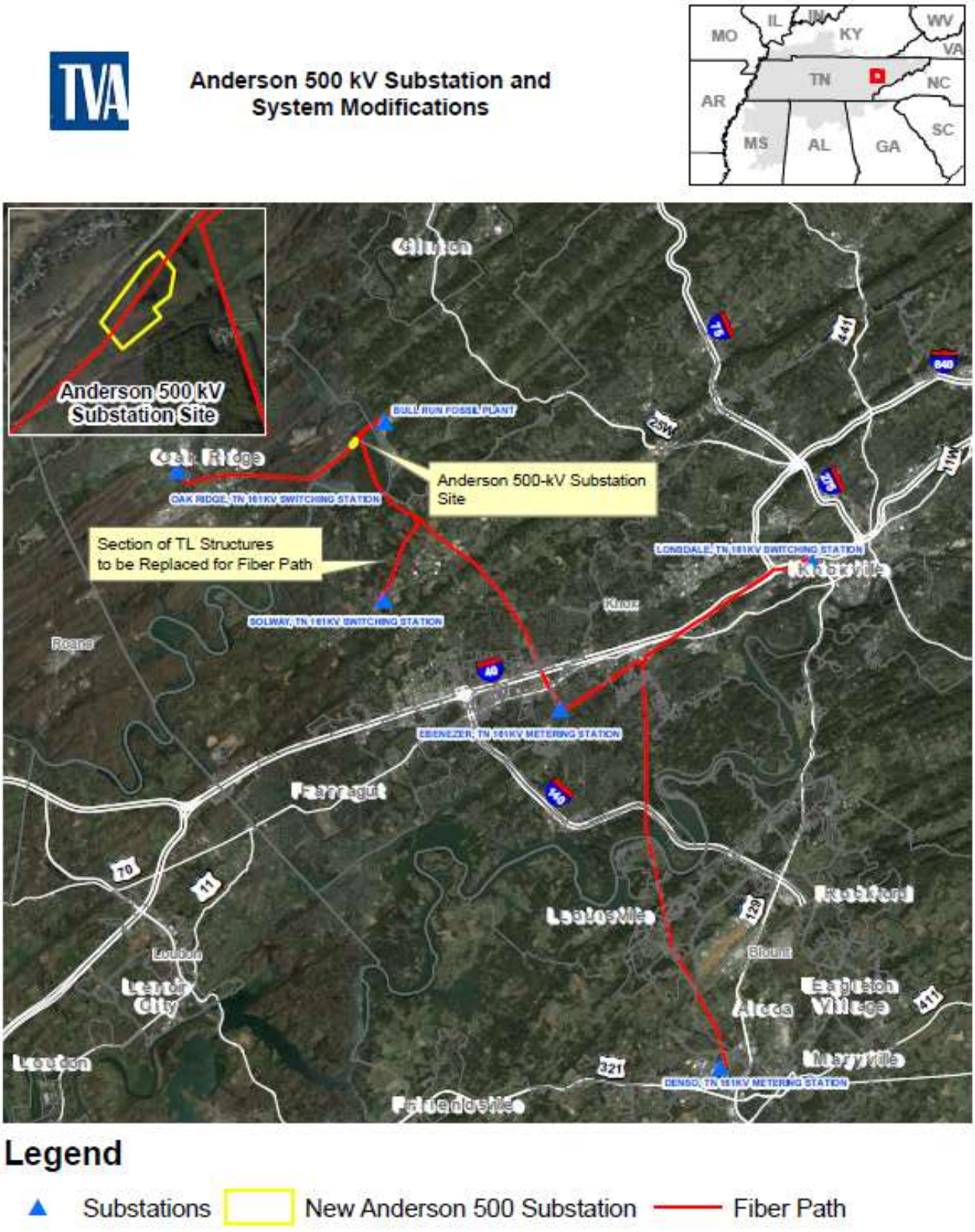


Figure 1. The Proposed Anderson 500-kV Substation Site and Associated System Modifications in Anderson, Blount, Knox, and Roane Counties, Tennessee

In addition to the construction and operation of the new Anderson 500-kV Substation, modifications to TVA's existing transmission system in Anderson, Blount, Knox, and Roane counties would be required to support the new substation. These modifications include the following:

- Structures 6 and 7 of the double-circuit Bull Run-Kingston and Bull Run–Norris 161-kV Transmission Line, located adjacent to the proposed substation site, would be relocated and the transmission lines re-routed to terminate into the proposed substation. TVA would add five new transmission line structures to accommodate the new termination. Additionally, the transmission line conductor between existing Structures 1 through 5 would be replaced.

- The Bull Run–Roane 500-kV Transmission Line would be looped into the new Anderson 500-kV Substation via an 'in line' connection. This would require retiring/replacing the existing Structure 6 and adding a new transmission line Structure 5A.

- The double-circuit Bull Run–Elza and Bull Run–Alcoa 161-kV Transmission Line would be re-routed at Structure 5/49 and terminate into the proposed substation. Eight new pole structures would be added within the existing transmission line ROW to facilitate the termination.

For communication purposes, TVA would also implement the following:

- Install a new 18.5 mile fiber optic groundwire (OPGW) path along portions of the Bull Run–Alcoa and Bull Run–Lonsdale 161-kV Transmission Lines, and between existing Structures 32 and 33 of the Bull Run–Oak Ridge 161-kV Transmission Line.

- Replace 14 structures along a 2.6-mile section of the Bull Run–Alcoa 161-kV Transmission Line, which provides power to the Solway Substation, to support the fiber optic path.

- Construct a new fiber optic ground wire pole structure just outside TVA's Ebenezer Substation.

- Upgrade substation equipment at several of TVA's existing substation sites to accommodate the addition of the new Anderson 500-kV Substation to the TVA transmission power system, and to allow for proper communications and protection of the power system. These substations include the Alcoa, Bull Run, Kingston, Norris, and Solway 161-kV substations as well as the Roane 500-kV Substation.

Additionally, the map board display at TVA's System Operations Center and Regional Operations Center would be updated to reflect this work. The scheduled in-service date for this project would be fall of 2023 or as soon as possible after that date.

Public and Agency Involvement

Since TVA is proposing to construct the new substation on TVA property at Melton Hill Reservation near BRF, an informational public open house was not conducted for this project. However, TVA has contacted the following federal and state agencies, as well as federally recognized Native American tribes, concerning the proposed project:

- Absentee Shawnee Tribe of Indians of Oklahoma
- Alabama-Coushatta Tribe of Texas
- Cherokee Nation
- Coushatta Tribe of Louisiana
- Eastern Band of Cherokee Indians
- Eastern Shawnee Tribe of Oklahoma
- Kialegee Tribal Town
- Jena Band of Choctaw Indians
- The Muscogee (Creek) Nation
- Shawnee Tribe
- Thlopthlocco Tribal Town
- United Keetoowah Band of Cherokee Indians in Oklahoma
- Tennessee Department of Environment and Conservation (TDEC)
- United States Fish and Wildlife Service (USFWS)
- United States Army Corps of Engineers (USACE)
- Tennessee State Historic Preservation Office (SHPO)

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 12977 (Interagency Security Committee), EO 13112 as amended by 13751 (Invasive Species), and applicable laws including the Farmland Protection Policy Act, the National Historic Preservation Act (NHPA), the Endangered Species Act (ESA) as amended, the Clean Air Act, and the Clean Water Act. Necessary permits and licenses are discussed below.

Other Environmental Reviews and Documentation

Melton Hill Reservoir Land Management Plan (TVA 1999). - Reservoir Land Management Plans (RLMPs) effectively guide land use approvals, private water use facility permitting, and resource management decisions on TVA-managed public land. Melton Hill RLMP was approved by the TVA Board of Directors in April 1999. Melton Hill RLMP contains a regional overview, information about the environment around the reservoir and descriptions of each parcel of land. The reservoir property is divided into 159 parcels, and each parcel is assigned a single land use allocation zone.

TVA Land Policy (2006) – In 2006, TVA's Board of Directors approved the Land Policy. TVA's Land Policy governs the retention, disposal, and planning of interests in real property. It is TVA's policy to manage its lands to protect the integrated operation of the TVA reservoir and power systems, to provide for continuing economic growth in the Valley.

2019 Integrated Resource Plan (IRP) (TVA 2019a) and the associated environmental impact statement (EIS) (TVA 2019b). 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 IRP is based upon a "scenario" planning approach that provides an understanding of how future decisions would play out in future scenarios.

Potential Bull Run Fossil Plant Retirement Environmental Assessment (TVA 2019c). - In August 2015, TVA published the 2015 IRP (TVA 2015b) and associated EIS (TVA 2015a) which was developed with input from stakeholder groups and the general public. The 2015 IRP identified a range of potential resource additions and retirements throughout the TVA power service area. Since that time, TVA has experienced flat to declining demand and has conducted economic analyses of all its generating assets considering load outlook, economic benefits and costs, performance, and environmental and social impacts. Under the current load outlook, economic analysis indicates that BRF capacity would eventually be replaced with a combination of solar and gas generating resources at lower cost and lower risk. The EA was prepared to assess impacts of the potential retirement of BRF.

Permits, Licenses, and Approvals

A TDEC general construction storm water permit would be needed because more than 1-acre would be disturbed. This permit also requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP). Additionally, a permit from the City of Oak Ridge may be necessary to meet their MS4 requirements. Furthermore, an individual aquatic resource alteration permit (ARAP)/401 Water Quality Certifications and an individual 404 USACE permit would be required for this work, and associated mitigation. In order to mitigate for stream impacts identified within the substation site, TVA would contract with a 3rd party to complete a Permittee Responsible Mitigation project scaled to account for 593 required Functional Feet (FF) Stream credits. The SWPPP would identify specific Best Management Practices (BMP) to address construction-related activities that would be adopted to minimize storm water impacts. Any permanent restroom facilities at the substation site would be properly sized, permitted and maintained.

Description of Alternatives

Two alternatives are addressed in this EA. Under the No Action Alternative (Alternative A), TVA would not implement the proposed action. The Action Alternative (Alternative B) involves the construction and operation of a new substation as well as various modifications to TVA's existing transmission system to support the new substation. These alternatives are described in more detail below.

Alternative A: The No Action Alternative - Do Not Construct a 500-kV Substation or Modify Existing Transmission Facilities

Under the No Action Alternative, TVA would not complete the Action Alternative described in this document. As a result, the TVA power system in Knoxville and the surrounding areas would continue to operate under the current conditions, increasing the risk for substation and transmission line overloading, loss of service, and occurrences of violations of NERC reliability criteria. TVA's ability to provide reliable service within the TVA Power Service Area would be jeopardized, which would not support TVA's overall mission. 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.

Alternative B: Action Alternative – Construct Anderson 500-kV Substation and Implement Transmission System and Communication Modifications

Under the Action Alternative, TVA would construct a new 500-kV substation and implement associated transmission line system and communication modifications. The proposed substation parcel encompasses an approximate 50-acre portion of TVA Tract No. MHR-1 on TVA's Melton Hill Reservation in Anderson County, Tennessee. However, the substation's physical footprint would occupy approximately 14 acres and would be fenced to exclude unauthorized admittance.

To connect the new substation to the transmission power system, TVA would modify the existing Bull Run–Norris/Bull Run–Kingston double-circuit 161-kV Transmission Lines, Bull Run–Roane 500-kV Transmission Line, and Bull Run–Elza/Bull Run–Alcoa double-circuit 161-kV Transmission Lines. Due to the proximity of existing transmission line infrastructure, the transmission line modifications would occur within approximately 1,000 feet of the proposed substation. This proposed site location allows for the use of the existing transmission system without requiring further significant upgrades.

Additionally, under the Action Alternative, TVA would complete the following actions to facilitate the operation of the new substation and transmission line connections.

- Install a new 18.5 mile fiber optic path along portions of the Bull Run–Alcoa and Bull Run–Lonsdale 161-kV Transmission Lines.
- Replace 14 structures along a 2.6-mile section of the Bull Run–Alcoa 161-kV Transmission Line, which provides power to the Solway Substation.
- Construct a new fiber optic ground wire pole structure just outside TVA's Ebenezer Substation.

Upgrade substation equipment at several of TVA's existing substation sites to accommodate the new Anderson 500-kV Substation and allow for proper communication and protection of the transmission system. These substations include the Alcoa, Bull Run, Kingston, Norris, and Solway 161-kV substations as well as the Roane 500-kV Substation.

The map board display at TVA's System Operations Center and Regional Operations Center would be updated to reflect this work. The scheduled in-service date for this project would be fall of 2023 or as soon as possible after that date.

Implementation of this alternative would reduce the risk for further substation and transmission line overloading, loss of service, and occurrence of violations of the NERC reliability criteria, thus improving the reliability of the TVA bulk power system. Additionally, this alternative would compensate for the loss of power generation when the BRF is shut down so the Knoxville area is provided with a continued reliable source of power for economic health and residential and commercial growth.

Alternatives Considered but Eliminated from Further Discussion

During the development of this proposal, TVA also considered one additional option for ensuring reliable transmission of electric power to meet anticipated power loads in the study area. During the course of the study, TVA determined that this option would not meet project needs and was considered infeasible.

Utilize the BRF Substation - Under this option, TVA would install an additional 500-161-kV transformer at the BRF 500-kV Substation. This would involve the installation of six new 500-kV breakers, retirement of four existing 500-kV breakers, providing upgrades to associated equipment for communication and protection purposes, and installing a new 500-kV & 161-kV switch house.

While this option seems feasible, the multiple extended outages that would be required to complete this action would greatly reduce the reliability to, and operations of, large power load customers being served in Anderson County and the areas surrounding Knoxville. Additionally, studies indicated that the duration required to complete this action could necessitate the delay of the shutdown deadline for BRF. Furthermore, the costs for this alternative were much greater than for the Action Alternative. For these reasons, this alternative was eliminated from further consideration.

Comparison of Alternatives

A summary of the anticipated potential effects of implementing the No Action Alternative or the Action Alternative is provided in Table 1.

Table 1. Summary and Comparison of Alternatives by Resource Area

Resource Area	Impacts from Implementing the No Action Alternative	Impacts from Implementing the Action Alternative
Air Quality	No effects to air quality are anticipated.	Fugitive dust produced from construction activities would be temporary and controlled by BMPs. Infrequent use of diesel engines would have *de minimis* impacts and not lead to exceedance or violation of any applicable air quality standard. Therefore, impacts to air quality would be minor and would not result in significant impacts.
Groundwater and Geology	No effects to local groundwater quality or quantity are expected.	Impacts to groundwater quality or quantity are anticipated to be insignificant.
Soils and Prime Farmland	No effects to soils and prime farmland are expected.	The minor loss of prime farmland within the substation footprint (9.2 acres) is negligible when compared to the amount of land designated as prime farmland within the surrounding region. Therefore, impacts to prime farmland soils would be minor. No impacts would occur as a result of the organizational change in responsibility of the 50-acre portion of TVA Tract No. MHR1.

Resource Area	Impacts from Implementing the No Action Alternative	Impacts from Implementing the Action Alternative
Surface Water	No changes in local surface water quality are anticipated.	Both direct and indirect impacts to surface waters would occur. One intermittent stream and one ephemeral/wet-weather conveyance (WWC) would be directly impacted either due to the filling in of a portion of the stream or encapsulation/rerouting. Those streams in the project area that would not require mitigation for impacts would be expected to have minor, temporary impacts with the proper implementation of BMPs (TVA 2017a).
Aquatic Ecology	Aquatic life in local streams would not be affected.	Aquatic life within the intermittent stream proposed for encapsulation would be directly affected. Mitigation would be based on 593 required FF Stream Credits to minimize impacts. With the implementation of streamside management zones (SMZ) and BMPs, effects to aquatic life in the remaining local surface waters are expected to be temporary and insignificant.
Vegetation	Local vegetation would not be affected at the proposed substation site. Routine maintenance of existing transmission line vegetation would continue, but overall impacts to vegetation are considered minor.	Site preparation and clearing of about 2.3 acres of forest for the proposed substation site would have a minor, temporary effect on most local vegetation. No uncommon plant communities are known from the vicinity of the project area and no rare plant communities occur at the project site during the field survey. Implementation of the proposed project would not potentially affect unique or important terrestrial habitat.
Wildlife	Local wildlife would not be affected at the proposed substation site. Routine maintenance of existing transmission line vegetation would continue, but overall impacts to wildlife are considered minor.	Wildlife inhabiting onsite forest, early successional, and edge habitats within the proposed substation site would be displaced. Because there are sufficient adjacent local habitats, any effects to wildlife are expected to be insignificant.

Resource Area	Impacts from Implementing the No Action Alternative	Impacts from Implementing the Action Alternative
Endangered and Threatened Species	No effects to endangered or threatened species or any designated critical habitats are anticipated from construction of the proposed substation site. Routine maintenance of existing transmission line vegetation would continue, but overall impacts to endangered or threatened species would be avoided.	With appropriate implementation of BMPs and procedures that are designed to avoid and minimize impacts to federally or state-listed species during site preparation, construction, and on-going maintenance activities, and adherence to guidelines in the programmatic biological assessment for bats (TVA 2017b), the proposed TVA action is expected to have only a minor effect on federally or state-listed species.
Floodplains	No changes in local floodplain functions are expected.	With the implementation of standard BMPs and mitigation measures, no significant impact on floodplains would occur. One stream would be relocated, however, it was determined there was no practicable alternative to constructing the substation over the unnamed tributary. All other actions would be consistent with EO 11988.
Wetlands	No changes in local wetland extent or function are expected.	Wetlands within the project footprint are anticipated to be avoided by the proposed project activities. There would be no significant direct, indirect, and cumulative impacts.
Visual Resources	Aesthetic character of the area is expected to remain virtually unchanged.	Minor visual discord above ambient levels would be produced during construction and maintenance activities. The proposed substation would present a minor, long-term visual effect.

Resource Area	Impacts from Implementing the No Action Alternative	Impacts from Implementing the Action Alternative
Noise and Vibration	No noise or vibration impacts from construction or operation would occur because the substation would not be constructed. Routine maintenance of existing transmission line vegetation would continue, but overall noise emissions are considered minor.	Construction noise may be distracting to users along a short segment of the Melton Hill Lake Greenway trail or a single hole on the Centennial Golf Course, however, noise impacts would not detract from the overall use of these recreational facilities. Users of adjacent Haw Ridge Park and the Centennial Golf Course could experience noise levels of up to 80.9 dBA and 81.5 dBA, respectively, while noise along the trail could occasionally surpass 85 dBA along the segment that passes through the project's limits of disturbance. Overall, temporary, minor noise above ambient levels would be produced during construction, operation and maintenance activities. In the event explosive blasting is required during construction, vibration impacts would be temporary and minor.
Recreation, Parks, and Natural Areas	No changes in local recreation opportunities or natural areas are expected.	There could be minor, temporary negative impacts to users of the Melton Lake Greenway trail during construction. However, no significant direct or indirect impacts are anticipated to natural areas, Wild and Scenic Rivers, National River Inventory streams, ecologically critical areas, federal, state, or local park lands, national or state forests, wilderness areas, scenic areas, wildlife management areas, recreational areas, greenways, or trails from construction or operation of the Anderson Substation.

Resource Area	Impacts from Implementing the No Action Alternative	Impacts from Implementing the Action Alternative
Archaeological and Historic Resources	No adverse effects to archaeological or historic resources are anticipated.	No archaeological sites are present and none would be affected by the project. Two National Register of Historic Places (NRHP)-listed properties would be affected, however, the effect would not be adverse. A minor change to the viewshed would occur to a third NRHP-listed property. TVA would leave wooded vegetation creating a visual buffer as to not compromise the historical significance for which the property has been determined eligible for the NRHP. In consultation with the TN SHPO and federally recognized Indian tribes, TVA finds that the proposed undertaking would result in no adverse effects on historic properties.
Socioeconomics and Environmental Justice	No change in local demographics, socioeconomic conditions, community services, or environmental justice populations. However, without necessary transmission system upgrades, lapses in a continuous, reliable source of power could result in negative impacts to local industries as well as area residents, including environmental justice populations.	Due to the loss of generation at the BRF, the increased reliability of service provided would benefit the area by helping to maintain economic stability and growth. Any effects to local property values from the proposed project would be minor. No long-term impacts to community services are anticipated and there would be no disproportionate impacts to low-income or minority communities in the area.
Transportation	No changes to transportation would occur.	Traffic generated during the construction phase is expected to be minor and localized and would be intermittent and short-term in nature.

Resource Area	Impacts from Implementing the No Action Alternative	Impacts from Implementing the Action Alternative
Substation Transmission Line Upgrades Post-Construction	There would be no substation constructed or transmission line upgrades, therefore no impacts.	Public exposure to Electromagnetic fields (EMF) would be minimal, and no significant impacts from EMFs are anticipated. A fenced enclosure would surround the proposed substation and only authorized personnel would be permitted. NESC standards are strictly followed when installing, repairing, or upgrading TVA substation, transmission lines or equipment. Therefore, touching a structure supporting a transmission line poses no inherent shock hazard. The proposed structures do not pose any significant physical danger.
Cumulative	No effects	The proposed substation would add a minor, long-term visual effect to the surrounding area. About 9.2 acres of prime farmland would be utilized for the substation site presenting a minor loss for the region. An intermittent stream and an ephemeral/WWC would be encapsulated/rerouted and mitigated based on 593 required FF Stream credits. As such, cumulative impacts would be minor.

Preferred Alternative

Alternative B—Construct Anderson 500-kV Substation and Implement Transmission System and Communication Modifications—is TVA's preferred alternative for this proposed project.

Affected Environment and Anticipated Impacts

Site Description

The entire project area, which includes the proposed substation site located in Anderson County and locations of the associated transmission system modifications in Anderson, Blount, Knox, and Roane counties, occupies approximately 77 acres in Tennessee. The project area is located in the Valley and Ridge Physiographic Province. An approximate 50-acre portion of a larger TVA property (TVA Tract No. MHR-1) is proposed for the Anderson 500-kV Substation site. Of this, about 23 acres would be disturbed to create the substation building pad and related facilities. The final fenced substation footprint would encompass approximately 14.2 acres. Landscape features within and surrounding the substation site consist of a variety of fragmented and contiguous forested habitat, wetlands, stream crossings, ponds, early successional habitat (i.e., right-of-way, pasture and agricultural), and residential or otherwise disturbed areas. Approximately 10.4 acres of forested habitat exist within the reviewed area, with approximately 2.3 acres of forested area within the substation footprint. Site preparation would require this 2.3 acres to be cleared for the proposed substation. The existing transmission line ROWs and associated

access roads comprise approximately 27 acres. There are a variety of natural landscape features located along the existing transmission line ROWs and associated access roads, such as fragmented forest habitat, wetlands, stream crossings, agricultural lands, and residential or otherwise disturbed areas. Each of the existing varying community types offers suitable habitat for species common to the region, both seasonally and year-round.

Impacts Evaluated

TVA reviewed the proposed project for potential environmental impacts related to the construction, operation and maintenance of the proposed substation along with the associated transmission line modifications and existing access roads. The early internal review process looked at both alternatives (Action and No Action) and identified all resources present within the project area. TVA documented its determination that the proposed Action Alternative would not significantly affect certain resources in the attached Categorical Exclusion Checklist (see Attachment 1 for details). As described in Attachment 1, minor, insignificant effects are anticipated for the following resources:

- *Wetlands*
- *Vegetation*
- *Wildlife*
- *Groundwater and Geology*
- *Socioeconomics and Environmental Justice*
- *Visual Resources*
- *Recreation, Parks, and Natural Areas*
- *Transportation*
- *Air Quality*
- *Waste*
- *Health & Safety*

Through the internal review process, TVA identified certain other resources as needing further analysis for the implementation of the proposed action including:

- *Surface Water,*
- *Aquatic Ecology,*
- *Threatened and Endangered Species and their Critical Habitats,*
- *Floodplains,*
- *Noise and Vibration,*
- *Land Use, Soils and Prime Farmland, and*
- *Archaeological and Historic Resources.*

The results of those additional analyses, and TVA's determination that the proposed action would not significantly affect these resources, are summarized in this EA and Finding of No Significant Impact.

Surface Water

Affected Environment – This project area drains to water ways within the Clinch River (0601020704) 10-digit HUC watershed. A total of eight watercourses, two perennial streams, one intermittent stream and five ephemeral/WWCs, are located within the project area (Attachment 2). Table 2 provides a listing of local streams with the state designated uses (TDEC 2018).

Table 2. Designations for Streams in the Vicinity of the Proposed Project

Stream	Use Classification[1]						
	NAV	DOM	IWS	FAL	REC	LWW	IRR
Clinch River/Melton Hill Reservoir	X	X	X	X	X	X	X
Clinch River Unnamed Tributaries				X	X	X	X
Beaver Creek and Tributaries		X	X	X	X	X	X

[1] 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

Precipitation in the general area of the proposed project averages about 56 inches per year. The wettest month is July with approximately 5.6 inches of precipitation, and the driest month is October with 3.1 inches. The average annual air temperature is 58 degrees Fahrenheit, ranging from an annual average of 47 degrees Fahrenheit to 70 degrees Fahrenheit (US Climate Data 2019). Stream flow varies with rainfall and averages about 24.75 inches of runoff per year, i.e., approximately 1.82 cubic feet per second, per square mile of drainage area (USGS 2008).

The federal Clean Water Act 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 U.S. Environmental Protection Agency (USEPA). The term “303(d) list” refers to the list of impaired and threatened streams and water bodies identified by the state. The Clinch River is currently listed as impaired for PCB and Chlordane due to contaminated sediments. Additionally, a downstream portion of the Clinch River /Melton Hill Reservoir (due to State Scenic River designation) is listed as Exceptional TN Waters. Table 2 provides a listing of local streams with their state (TDEC 2018) designated uses.

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. TVA would comply with all appropriate municipal, 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.

As part of the proposed substation design, approximately 2,550 linear feet of an intermittent stream and ephemeral stream would be required to be disturbed/encapsulated as part of this project. In addition to acquiring permits described above in the Permits, Licenses, and Approvals section, TVA would implement BMPs to avoid contamination of surface water in the project area (TDEC 2012; TVA 2017a). See the Aquatic Ecology Section for buffer zone sizes and additional stream crossing details.

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. Any permanent restroom facilities at the site would be properly sized, permitted and maintained.

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.

Environmental Consequences – Both direct and indirect impacts to surface water would be expected with the proposed project scope. TVA routinely includes precautions in the design, construction, and maintenance of its transmission projects to minimize these potential impacts. Permanent stream crossings that cannot be avoided are designed to not impede runoff patterns and the natural movement of aquatic fauna. Temporary stream crossings and other construction and maintenance activities would comply with appropriate state permit requirements and BMPs (TDEC 2012; TVA 2017a). However, one intermittent stream and one ephemeral stream/wet weather conveyance on the proposed substation site could not be avoided. The resulting adverse impacts, due either to encapsulation, the filling in of a portion of the stream, or rerouting for this project, would require mitigation. An ARAP/401 Water Quality Certifications and 404 USACE permit would be required for this work. In order to mitigate for stream impacts identified within the substation site, TVA would contract with a 3rd party to complete a Permittee Responsible Mitigation project scaled to account for 593 required FF Stream credits.

Maintenance of the proposed substation site would employ manual and low-impact methods wherever possible. Proper implementation of these controls is expected to result in only minor temporary impacts to surface waters.

Operations - The operations of the proposed substation site would not be expected to produce a process waste water stream, however if in the future a waste water stream is produced, than proper permit coverage would be obtained.

Proper implementation of BMP controls would be expected to result in only minor, temporary impacts to surface waters.

Aquatic Ecology

Affected Environment – Streams encountered during field surveys were typical of the Ridge and Valley sub-ecoregions. A total of eight watercourse intersections—including two perennial, one intermittent, and five WWCs/ephemeral streams—occur along the proposed transmission line route ROW and/or within the substation site (Attachment 2).

Because transmission line and substation construction and maintenance activities primarily affect riparian conditions and instream habitat, TVA evaluated the condition of these factors at each stream crossing along the proposed transmission line route. Riparian condition was evaluated during August and September 2019 field surveys. Hydrologic determinations were made using the Tennessee Division of Water Pollution Control (Version 1.4) field forms by Tennessee qualified hydrologic professionals and a qualified hydrologic professional-in training (Attachment 2). These forms evaluate the geomorphology, hydrology, and biology of each stream. A listing of stream crossings in the project area, excluding WWCs, is provided in Attachment 2.

Three classes were used to indicate the current condition of streamside vegetation across the length of the proposed project, as defined below, and accounted for in Table 3.

> Forested - Riparian area is fully vegetated with trees, shrubs, and herbaceous plants. Vegetative disruption from mowing or grazing is minimal or not evident. Riparian width extends more than 60 feet on either side of the stream.
>
> Partially forested - Although not forested, sparse trees and/or scrub-shrub vegetation is present within a wider band of riparian vegetation (20 to 60 feet). Disturbance of the riparian zone is apparent.
>
> Nonforested - No or few trees are present within the riparian zone. Significant clearing has occurred, usually associated with pasture or cropland.

Table 3. Riparian Condition of Streams Located along the Proposed Transmission Line Route Right-of-way and/ or within the Substation Site.

Riparian Condition	# Perennial Streams	# Intermittent Streams	Total
Forested	1		**1**
Partially forested	1		**1**
Nonforested		1	**1**
Total	**2**	**1**	**3**

TVA then assigns appropriate SMZs and BMPs based on these evaluations and other considerations (such as State 303(d) listing and presence of endangered or threatened aquatic species). Appropriate application of the BMPs minimizes the potential for impacts to water quality and instream habitat for aquatic organisms.

The Southern Limestone/ Dolomite Valleys and Low Rolling Hills subregion of the greater Ridge and Valley ecoregion is an area of low rolling ridges and valleys (Griffith et al. 2009). Soils fertility varies greatly in this subregion. Much of the region is agriculture, but there are also urban areas and thick forested areas as well. The area encompassing the proposed substation site is drained by the Clinch River (0601020704) 10-digit HUC watershed, a tributary of the Tennessee River. This region has great aquatic habitat diversity and is home to high numbers of aquatic fauna (Griffith et al. 2009).

Environmental Consequences – Aquatic ecology could be affected by the proposed action. Impacts would either occur directly by the alteration of habitat conditions within the streams or indirectly due to modification of the riparian zones and storm water runoff resulting from construction and maintenance activities around the project area. Potential impacts due to removal of streamside vegetation within the riparian zone include increased erosion and siltation, loss of instream habitat, and increased stream temperatures. Other potential effects resulting from construction and maintenance include alteration of stream banks and stream bottoms by heavy equipment and by herbicide runoff into streams. Siltation has a detrimental effect on many aquatic animals adapted to riverine environments. Turbidity caused by suspended sediment can negatively impact spawning and feeding success of fish and mussel species (Brim Box and Mossa 1999; Sutherland et al. 2002).

Applicable ARAP and USACE 404 Permits would be obtained for any stream alterations and the terms and conditions of these permits would be followed. One intermittent stream

and one ephemeral/WWC identified within the substation boundary would be directly impacted. To mitigate for stream impacts identified within the substation site, TVA would contract with a 3rd party to complete a Permittee Responsible Mitigation project scaled to account for 593 required FF Stream credits. SMZs and BMPs identified in the TDEC Erosion & Sediment Control manual minimize the potential for impacts to water quality and instream habitat for aquatic organisms (TDEC 2012). These guidelines outline site preparation standards with emphasis on soil stabilization practices, structural and sediment controls including runoff management, and general stream protection practices associated with construction activities. Furthermore, TVA would follow BMPs identified within A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities (TVA 2017a).

Watercourses that convey only surface water during storm events such as WWCs and that could be affected by the proposed site preparation would be protected by standard BMPs outlined in TVA (2017a) and/or TDEC (2012). These BMPs are designed in part to minimize disturbance of riparian areas, and subsequent erosion and sedimentation that can be carried to streams. Because appropriate BMPs would be implemented during site preparation and work, any impacts to the aquatic ecology of streams not directly impacted from the substation site would be temporary and insignificant as a result of the proposed TVA actions. Direct impacts to streams identified within the substation site would occur. Because there are currently no stream mitigation credits available at local mitigation banks, TVA would contract with a 3rd party to complete a Permittee Responsible Mitigation project scaled to account for the 593 required FF Stream credits and fulfill stream mitigation requirements for the associated impacts.

Threatened and Endangered Species and their Critical Habitats

The ESA provides broad protection for species of fish, wildlife, and plants that are listed as threatened or endangered in the United States or elsewhere. The Act outlines procedures for federal agencies to follow when taking actions that may jeopardize federally listed species or their Designated Critical Habitat. The policy of Congress is that federal agencies must seek to conserve endangered and threatened species and use their authorities in furtherance of the Act's purposes. USFWS implements the ESA and maintains a worldwide list of endangered species.

The State of Tennessee provides protection for species considered threatened, endangered, or deemed in need of management within the state in addition to those federally listed under the ESA. The listing is handled by the TDEC; however, the Tennessee Natural Heritage Program and TVA both maintain databases of species that are considered threatened, endangered, special concern, or tracked in Tennessee.

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 (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 substation, substation, ROW and associated access roads. Species of concern within the project area and vicinity based on a review of literature and the TVA Regional Heritage database are shown in Table 4.

Aquatics Table 4. Federally and State-Listed Species within the Proposed Anderson Substation and Associated System Modification Project Area[1]

Common Name	Scientific Name	Federal Status[2]	State Status[2] (rank[3])
FISH			
Blue Sucker	*Cycleptus elongatus*		T (S2)
Highfin Carpsucker	*Carpiodes velifer*		D (S2S3)
Lake Sturgeon	*Acipenser fulvescens*		E (S1)
Tennessee Dace	*Chrosomus tennesseensis*		D (S3)
MUSSELS			
Fanshell	*Cyprogenia stegaria*	LE	E(S1)
Fine-rayed Pigtoe	*Fusconaia cuneolus*	LE	E(S1)
Orange-foot Pimpleback	*Plethobasus cooperianus*	LE	E(S1)
Pink Mucket	*Lampsilis abrupta*	LE	E(S2)
Ring Pink	*Obovaria retusa*	LE	E(S1)
Sheepnose	*Plethobasus cyphyus*	LE	E(S2S3)
Shiny Pigtoe Pearlymussel	*Fusconaia cor*	LE	E(S1)
Slabside Pearlymussel	*Pleuronaia dolabelloides*	LE	E(S2)
Spectaclecase	*Cumberlandia monodonta*	LE	E(S2S3)
White Wartyback	*Plethobasus cicatricosus*	LE	E(S1)
REPTILES			
Eastern slender glass lizard	*Ophisaurus attenuatus longicaudus*		D(S3)
AMPHIBIANS			
Hellbender	*Cryptobranchus alleganiensis*	PS	E(S3)
Tennessee cave Salamander	*Gyrinophilus palleucus*		T(S2)
BIRDS			
Peregrine falcon	*Falco peregrinus*		-(S1B)
Barn-owl	*Tyto alba*		-(S3)
Bald eagle[4]	*Haliaeetus leucocephalus*	DM	D(S3)
MAMMALS			
Southeastern Shrew	*Sorex longirostris*		-(S4)
Little brown bat	*Myotis lucifugus*		T(S3)
Tricolored Bat	*Perimyotis subflavus*		T(S2S3)
Gray bat	*Myotis grisescens*	LE	E(S2)
Indiana bat[4]	*Myotis sodalis*	LE	E(S1)
Northern long-eared bat[4]	*Myotis septentrionalis*	LT	T(S1S2)
PLANTS			
Spreading Rockcress	*Arabis patens*		E(S1)
Spreading False-foxglove	*Aureolaria patula*		SPCO(S3)
American barberry	*Berberis canadensis*		SPCO(S2)
Bitter Cress	*Cardamine flagellifera*		T(S2)
Tall Larkspur	*Delphinium exaltatum*		E(S2)
Northern Bush-honeysuckle	*Diervilla lonicera*		T(S2)

Common Name	Scientific Name	Federal Status[2]	State Status[2] (rank[3])
Branching Whitlow-wort	*Draba ramosissima*		SPCO(S2)
Waterweed	*Elodea nuttallii*		SPCO(S2)
Willow-herb	*Epilobium ciliatum*		T(S1)
American Funaria Moss	*Funaria americana*		T(S1?)
Naked-stem sunflower	*Helianthus occidentalis*		SPCO(S2)
Red Iris	*Iris fulva*		T(S2)
Butternut	*Juglans cinerea*		T(S3)
Marsh Pea	*Lathyrus palustris*		SPCO(S1)
Sweet Pinesap	*Monotropsis odorata*		T(S2)
Prairie Ragwort	*Packera plattensis*		SPCO(S1)
American ginseng	*Panax quinquefolius*		S-CE(S3S4)
Torrey's Mountain Mint	*Pycnanthemum torreyi*		E(S1)
Budding Tortula	*Rhachithecium perpusillum*		SPCO(SH)
Prairie Goldenrod	*Solidago ptarmicoides*		E(S1S2)
Sweetscent Ladies'-tresses	*Spiranthes odorata*		E(S1)

[1] Sources: TVA Regional Natural Heritage database - queried on 08/01/2019, 10/1/2019 and 10/7/2019; IPaC 10/7/2019; USFWS Ecological Conservation Online System (http://ecos.fws.gov/ecos/home.action) extracted 10/1/2019;
[2] Status Codes: D = Deemed In Need of Management; DM = Delisted and Monitored; LE or E = Listed Endangered; LT or T = Listed Threatened; PS = Partial Status; SPCO = Listed Special Concern; S-CE = Special Concern/Commercially Exploited;
[3] State Ranks: S1 = Critically Imperiled; S2 = Imperiled; S3 = Vulnerable; S4 = Apparently Secure; SH = Historical; S? = Inexact or uncertain; S#S# = Denotes a range of ranks, the exact rarity of the element is uncertain (e.g., S1S2)
[4] Federally listed species know from Anderson and Knox Counties, TN but not from within three miles of the project area.

Affected Environment

Aquatic Animals – Ten mussel, and four fish federally and state-listed threatened and endangered species have been documented to occur within the Beaver Creek, Clinch River, Poplar Creek, Tennessee River 10-digit HUC watersheds encompassing the proposed project area (Table 4).

Direct impacts would occur on the substation site to one intermittent stream through encapsulation and to one ephemeral/WWC through rerouting. TVA would contract with a 3rd party to complete a Permittee Responsible Mitigation project to offset those impacts. These streams do not provide suitable habitat for any of the species listed in Table 4.

The remaining streams documented within the proposed project footprint would be protected by BMPs as defined in TVA (2017a) and/or TDEC (2012) or as required by standard permit conditions. These categories of protection are based on the variety of species and habitats that exist in the streams as well as the state and federal requirements to avoid harming certain species. No designated critical habitat is known from the potentially affected 10-digit HUC watersheds of the proposed project area. Therefore, with appropriate implementation of BMPs during site preparation activities, no impacts are anticipated to occur as a result of the proposed TVA action to the species listed in Table 4.

Terrestrial Animals - 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., right-of-way, pasture and agricultural), and residential or otherwise disturbed areas. All transmission line ROWs and access roads are existing and would be 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. Nine federally or state-listed terrestrial animal were assessed based on documented presence within three miles of the project footprint. Three additional federally listed or protected species (bald eagle, Indiana bat, and northern long-eared bat) were addressed based on presence within Anderson or Knox County. All twelve of these species have the potential to utilize the project area (see Table 4).

Plants - An August 1, 2019 query of the TVA Regional Natural Heritage database indicated no federally listed plant species and 21 state-listed plant species are known from within five miles of the proposed project (Table 4). No additional federally listed plant species are known from Anderson and Knox counties, Tennessee, where the project resides. Habitat capable of supporting rare plant species was present in parts of the project area; however, rare plants were not observed during the August 5 and September 17, 2019 field surveys.

Environmental Consequences

Aquatic Animals – As discussed in the Aquatic Ecology section, the proposed project could affect aquatic life either directly or indirectly. One intermittent stream and one ephemeral/WWC identified within the approximate 14-acre substation boundary would be directly impacted. These streams would not provide suitable habitat for any of the species listed in Table 4.

The remaining streams documented within the proposed project footprint would be protected by BMPs as defined in TVA (2017a) and/or TDEC (2012) or as required by standard permit conditions. These categories of protection are based on the variety of species and habitats that exist in the streams as well as the state and federal requirements to avoid harming certain species. No designated critical habitat is known from the potentially affected 10-digit HUC watersheds of the proposed project area. Therefore, with appropriate implementation of BMPs during site preparation activities, no impacts are anticipated to occur to as a result of the proposed TVA action to the fourteen federally or state-listed aquatic species listed in Table 4.

Terrestrial Animals - Populations of hellbender, Tennessee cave salamander, peregrine falcon, barn owl, southeastern shrew would not be affected by the proposed actions.

Populations of Eastern slender glass lizard, bald eagle are not expected to be significantly impacted by the proposed actions.

Approximately 10.4 acres of forested habitat exist within the reviewed substation area. Of this, the approximately 2.3 acres of forested area that would be cleared within the substation footprint provides suitable summer roosting habitat for federally listed little brown bats, tricolored bats, Indiana bats, and northern long-eared bats.

Little brown bats, tricolored bats, Indiana bats, and northern long-eared bats all hibernate in caves and gray bats roost in caves year-round. Although there are approximately 40 known caves within 3 miles of the project footprint, none are within 0.5 mile or are likely to be affected by the proposed actions. Adherence to BMPs would further reduce possible impacts to caves from sedimentation.

Foraging habitat for each of the five bat species addressed in this document exists throughout the proposed project area in forest fragments, ROW edges, and over water bodies and wetlands. BMPs would be used to minimize impacts to water bodies within the affected area, thus aquatic foraging habitat would not be impacted by the proposed actions. Forested foraging habitat within the substation footprint would be cleared but similar habitat is abundant in the surrounding area. Tree roosting species (tricolored bats, Indiana bats, and northern long-eared bats) may be impacted if maternity roost trees are cleared before pups are volant.

A number of activities associated with the proposed project were addressed in TVA's programmatic consultation with the USFWS on routine actions and federally listed bats in accordance with ESA Section 7(a)(2) (TVA 2017b). 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 (Attachment 3) and need to be reviewed/implemented as part of the proposed project.

Plants - The proposed action would not affect federally or state-listed plant species. No uncommon plant communities are known from the vicinity of the project area and no rare plant communities occur at the project site during the field survey. Implementation of the proposed project would not potentially affect unique or important terrestrial habitat.

Floodplains

A floodplain is the relatively level land area along a stream or river that is subject to periodic flooding. The area subject to a one-percent chance of flooding in any given year is commonly called the 100-year floodplain. The 100-year floodplain is that area of land that would be inundated in a 100-year flood. 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 substation parcel is located adjacent to Clinch River Mile 47.6. At this location, the 100- and 500-year flood elevations of the Clinch River would be 797.3 and 798.1 feet, respectively, referenced to National Geodetic Vertical Datum 1929.

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 (US Water Resources Council 1978). The EO requires that agencies avoid the 100-year floodplain unless there is no practicable alternative.

Affected Environment –The proposed substation site encompasses approximately 50 acres and would be located on TVA property. Only about 22 acres would be disturbed to create the substation building pad and related facilities.

Environmental Consequences – The substation building pad would avoid identified 100-year floodplains and perennial streams, which would be consistent with EO 11988.

The grade of the substation would be about elevation 828, which would be well above the 500-year flood elevation, and therefore consistent with EO 11988 for critical actions.

In addition to the construction and operation of the proposed substation, the project scope includes modifications to TVA's existing transmission system needed to support the new substation. Of the proposed work, only Structure 6 on the Alcoa-Bull Run Tap to Solway Transmission Line (L5657-3) is located within 100-year floodplains, specifically the floodplain of Beaver Creek. Consistent with EO 11988, transmission structures are considered to be repetitive actions in the 100-year floodplain that should result in minor impacts (TVA 1981). The replacement structure would be placed in essentially the same location as the existing structure, which would be consistent with EO 11988.

Knox County, Tennessee, participates in the National Flood Insurance Program, and any development must be consistent with its floodplain ordinance. Structure 6 is located in the floodway of Beaver Creek, outside the channel of the stream. Structure 6 would be replaced in essentially the same location with a structure of identical or similar size. The Beaver Creek floodway is about 270 feet wide at Structure 6, with an overall floodplain width of about 960 feet. The existing structure is presumed to be about two feet in diameter. Replacing the structure with one the same size, or potentially three feet in diameter, would not result in a measurable increase in flood elevations for a floodplain and floodway of this size. Therefore, construction of Structure 6 would not create an obstruction in the floodway, which would comply with the National Flood Insurance Program. Therefore, the replacement of Structure 6 would be consistent with EO 11988.

The addition of the new OPGW to existing transmission lines would occur well above the 100-year flood elevation on existing structures, which would be consistent with EO 11988.

Existing access roads would be used without modifications, which would be consistent with EO 11988.

Based on the implementation of standard BMPs during construction activities to minimize adverse impacts, the proposed Anderson 500-kV Substation, modifications to TVA's existing transmission system, temporary re-routes of the transmission lines that are immediately adjacent to the site, a new 18.5-mile OPGW, and the structure replacements for 14 of the 29 total structures on the Alcoa-Bull Run Tap to Solway Transmission Line (L56573) segment would have no significant impact on floodplains and their natural and beneficial values.

Noise and Vibration

Affected Environment – Noise is unwanted or unwelcome sound usually caused by human activity and added to the natural acoustic setting of a locale. It is further defined as sound that disrupts normal activities or that diminishes the quality of the environment. Community response to noise is dependent on the intensity of the sound source, its duration, the proximity of noise-sensitive land uses, and the time of day the noise occurs (i.e., higher sensitivities would be expected during the quieter overnight periods).

Sound is measured in logarithmic units called decibels (dB). Given that the human ear cannot perceive all pitches or frequencies of sound, noise measurements are typically weighted to correspond to the limits of human hearing. This adjusted unit of measure is known as the A-weighted decibel (dBA) which filters out sound in frequencies above and below human hearing. A noise level change of 3 dBA or less is barely perceptible to average human hearing. However, a 5 dBA change in noise level is clearly noticeable. The noise level associated with a 10 dBA change is perceived as being twice as loud; whereas the noise level associated with a 20 dBA change is considered to be four times as loud and would therefore represent a “dramatic change” in loudness.

To account for sound fluctuations, environmental noise is commonly described in terms of the equivalent sound level. The equivalent sound level is the constant noise level that conveys the same noise energy as the actual varying instantaneous sounds over a given period. Fluctuating levels of continuous, background, and/or intermittent noise heard over a specific period are averaged as if they had been a steady sound. The day-night sound level (Ldn), expressed in dBA, is the 24-hour average noise level with a 10-dBA correction penalty for the hours between 10 p.m. and 7 a.m. to account for the increased sensitivity of people to noises that occur at night. Typical background day-night noise levels for rural areas is anticipated to range between an Ldn of 35 and 50 dB, whereas higher-density residential and urban areas background noise levels range from 43 dB to 72 dB (USEPA 1974).

Anderson County has established standards for noise emissions for each of its zoning districts, as codified in the county’s Zoning Resolution adopted in 1977 and amended through July 20, 2015. However, these regulations do not apply to the substation construction and operation as they are enforced only in the portions of Anderson County which lie outside of incorporated municipalities (such as the City of Oak Ridge, within which the proposed substation would be located) and are also not applicable to construction activities (Anderson County 2015). As the City of Oak Ridge has not established quantitative noise level limits (City of Oak Ridge 2018), there are no other federal, state, or locally established regulations specifying environmental noise limits for the substation site. However, the USEPA noise guideline recommends outdoor noise levels do not exceed Ldn of 55 dBA, which is sufficient to protect the public from the effect of broadband environmental noise in typical outdoor and residential areas. These levels are not regulatory goals but are “intentionally conservative to protect the most sensitive portion of the American population” with “an additional margin of safety” (USEPA 1974). The U.S. Department of Housing and Urban Development (HUD) considers an Ldn of 65 dBA or less to be compatible with residential areas (HUD 1985).

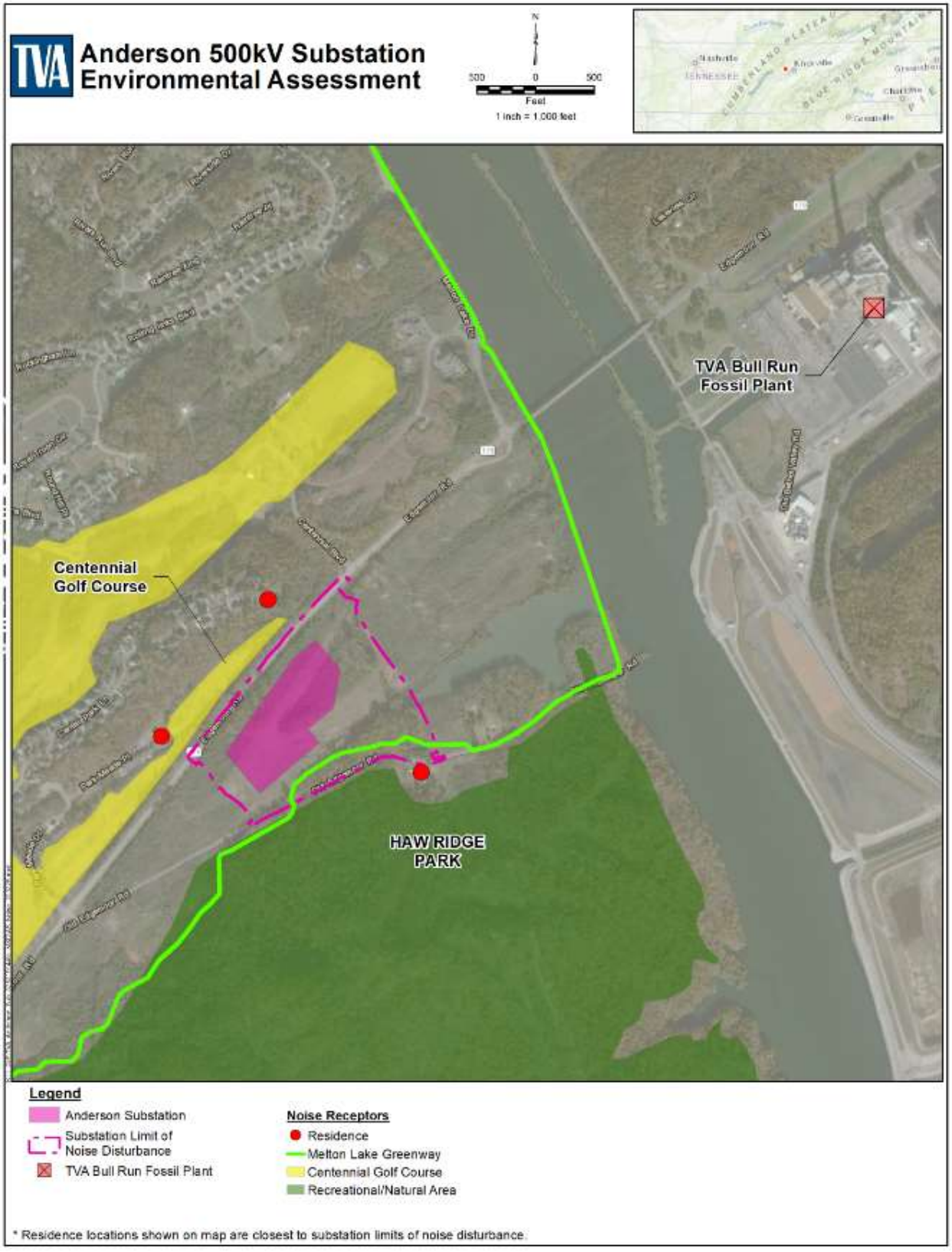


Figure 2. Sensitive Noise Receptors in the Vicinity of Proposed Substation

The proposed substation site is located in a semi-rural area with a relatively low number of residential receptors. BRF is located on the Melton Hill Reservoir at Clinch River Mile 48, approximately 0.8 miles to the east of the project site. Ambient noise is characterized by traffic noise along surrounding roadways. As shown in Figure 2, there are noise sensitive land uses (i.e., residential and outdoor recreational areas) located northwest and southeast of the proposed project site. Nearby recreational facilities include the Melton Lake Greenway trail, of which a small portion extends through the TVA property approximately 130 feet from the proposed substation at its closest point; Haw Ridge Park, located south adjacent to the substation site; and the Centennial Golf Course, of which several holes are located to the northwest on the opposite side of Edgemoor Road.

Noise sources common to activities evaluated in this EA include transportation noise and construction noise. Transportation noise related to activities evaluated in the EA primarily includes noise from highway traffic. Three primary factors influence highway noise generation; traffic volume, traffic speed and vehicle type. Generally, greater traffic volumes, higher speeds and greater numbers of trucks increase the emissions of highway traffic noise. Other factors that affect the emissions of traffic noise include a change in engine speed and power, such as at traffic lights, hills and intersecting roads and pavement type. Highway traffic noise is not usually a serious problem for people who live more than 500 feet from heavily traveled freeways or more than 100 to 200 feet from lightly traveled roads (Federal Highway Administration [FHWA] 2011). Due to the nature of the decibel scale and the attenuating effects of noise with distance, a doubling of traffic typically results in a 3 dBA increase in noise levels (FHWA 2011).

The level of construction noise is dependent upon the nature and duration of the project. Construction activities for most large-scale projects would be expected to result in increased noise levels as a result of the operation of construction equipment on-site and the movement of construction-related vehicles (i.e., worker trips and material and equipment trips) on the surrounding roadways. Noise levels associated with construction activities increase ambient noise levels adjacent to the construction site and along roadways used by construction-related vehicles.

In addition, explosive blasting may be utilized to break rock for excavation within the substation construction site. The fact that the noise generation from blasting would occur in isolated events removes it from the continuous, background, and intermittent noise category that defines equivalent sound level, L_{dn}, and corresponding levels of sensitivity within the community. For example, a jet flyover at 1,000 feet has a high sound pressure level of approximately 105 dB (Arizona Department of Transportation 2008), but in most environments, is not a recurring event that would contribute to typical noise levels. Similarly, a single explosive blast event may be equivalent to a thunderclap (120 dB) at the source (TVA 2018). In contrast, ongoing noise generated by heavy equipment used during construction activities would fall under the standard continuous, background, and intermittent noise category that determines L_{dn} and associated community sensitivity.

Environmental Consequences

Construction Noise - Under the Action Alternative, substation construction activities would last for approximately three years and would be limited to daytime hours. During construction, noise would be generated by a variety of equipment including standard pick-up trucks, dump trucks, concrete trucks, feller-bunchers, bulldozers, excavators, graders, pile-drivers, augers, rollers, and explosive blasting. Typical noise levels from this equipment

is expected to be 85 dBA or less at a distance of 50 feet from the construction equipment, with the exception of pile-drivers and explosive blasting, which produce noise levels of up to 95 dBA at a distance of 50 feet (FHWA 2016).

The closest sensitive noise receptors to the proposed substation footprint (within which structures would be built and the majority of construction noise would be produced) are outdoor recreation areas including the Melton Lake Greenway trail, the Centennial Golf Course, and Haw Ridge Park, which are located approximately 130 feet, 260 feet, and 310 feet from substation footprint, respectively, at their closest points (Figure 2). Based on straight line noise attenuation, noise emissions from most construction equipment (85 dBA or less at a distance of 50 feet) may reach levels of 69.2 to 76.7 dBA at these facilities. However, these maximum noise levels would only be experienced from the boundaries of the recreational facilities closest to the proposed substation and would dissipate at further distances. Additionally, the actual noise would likely be lower in the field, where objects and topography would cause further noise attenuation. While the construction noise may be distracting to users along a short segment of trail or a single golf course hole, noise impacts would not detract from the overall use of these recreational facilities. The closest residential noise receptor to the substation footprint is a residence located approximately 475 feet north-northwest of the proposed substation, on the opposite side of Edgemoor Road (Figure 2). It is estimated that noise levels from most construction equipment would attenuate to 65.5 dBA at this residence, higher than USEPA's recommended L_{dn} guidance of 55 dBA for residential areas, but just slightly above HUD's recommendation of 65 dBA. Other nearby residences, such as those to the west-northwest and southeast of the site, would typically experience maximum construction noise levels ranging from 60.9 to 64.8 dBA.

Periodically, sensitive receptors may experience construction noise levels greater than those described above. For example, during construction requiring the use of pile-drivers or explosive blasting within the substation footprint, it is estimated that noise levels would attenuate to 79.2 to 86.7 dBA at nearby recreational areas; 75.5 dBA at the nearest residence; and 70.9 to 74.8 dBA at other residences in the vicinity. However, these would be infrequent occurrences that would not contribute to typical background noise levels, as they would not fall under the continuous, background, and intermittent noise category that defines L_{dn}. In addition, construction equipment may be operated outside of the substation footprint, but within the 50-acre project area, to support activities such as clearing and grading. Therefore, for the purposes of this assessment, the 50-acres project area, which extends to Edgemoor Road to the north and Old Edgemoor Road to the south, has been defined as the limits of noise disturbance (Figure 2) to accurately assess the potential noise impact. The closest residence is located 50 feet to the southeast of this area, on the opposite side of Old Edgemoor Road. Based on straight line noise attenuation, maximum noise levels for typical construction equipment operated at the boundary of the limits of noise disturbance would be expected to attenuate to approximately 85.0 dBA at the closest residence, with noise levels ranging from 70.2 to 70.7 dBA at other nearby residences. Users of adjacent Haw Ridge Park and the Centennial Golf Course could experience noise levels of up to 80.9 dBA and 81.5 dBA, respectively, while noise along the Melton Lake Greenway trail could occasionally surpass 85 dBA along the segment that passes through the project's limits of noise disturbance.

Although noise levels at nearby residences and outdoor recreation areas may periodically surpass the USEPA and HUD's recommended L_{dn} guidance for residential areas (55 dBA and 65 dBA, respectively), the highest noise levels, like those associated with blasting, pile-driving, and activities near the boundary of the project's limits of noise disturbance, would be infrequent and short-term. As all construction noise would be temporary in nature and limited to daytime hours, noise impacts from construction of the proposed substation are anticipated to be minor.

There is also a potential for indirect noise impacts associated with a temporary increase in traffic related to the workforce vehicle traffic, transport of spoil material offsite, and transport of borrow material to the proposed substation site. Assuming vehicle occupancy of one person per vehicle, daily workforce traffic would range from 10 to 35 vehicles over a period of approximately three years. Workforce traffic noise would only occur twice per day as workers are entering and leaving the project site and would be negligible further from the site as vehicles disperse throughout the transportation network and assimilate into existing traffic patterns. The transport of spoil material offsite and the transport of borrow material onsite are each expected to occur at rates of approximately 5 to 10 truckloads per day, resulting in a combined maximum of 20 truckloads, or 40 total trips, per day. Haul routes for spoil and borrow materials would utilize highways or major arterial roadways as much as possible, and due to the small number of trucks, would not result in a noticeable increase in traffic volume, or consequently traffic noise, in the vicinity of these roadways. Overall, given the temporary and intermittent nature of project activities and the relatively low vehicle numbers, noise impacts associated with workforce traffic and transport of spoil and borrow materials would be minor.

In addition, transmission line modifications such as structure replacement may require the use of construction equipment including trucks, truck-mounted augers and drills, excavators, tracked cranes, and bulldozers. Maximum noise levels generated by the various pieces of construction equipment typically range from approximately 70 to 85 dBA at 50 feet. An exception would be the use of track drills for installing foundations in rocky areas, which have a typical maximum noise level of 98 dBA at 50 feet (Bolt et al. 1971). However, use of track drills is not expected to be widespread. Transmission line related construction noise levels would likely exceed background noise levels by more than 10 dBA at distances within 500 feet in developed areas, to over 1,000 feet in rural areas with little development where background noise levels are typically lower. These distances are without the use of track drills; drilling activities could increase these distances by an additional 500 feet. A 10 dBA increase is typically perceived as a significant increase over the existing noise level and could result in annoyance to adjacent residents. The residential noise level guidelines of 55 dBA, conservatively recommended by USEPA, and 65 dBA, recommended by HUD, could also be temporarily exceeded for residences near construction activities, especially those located immediately adjacent to the existing ROW. However, construction activities would be intermittent and would be limited to daylight hours. Because of the sequence of construction activities, construction noise at a given point along the transmission line segments would be limited to short periods lasting just a few days each. Because of the short construction period, noise-related effects are expected to be temporary and minor.

Operational Noise - Under certain wet weather conditions, substations and high-voltage transmission lines may produce an audible low-volume hissing or crackling noise from corona discharge (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. Under normal conditions, corona-generated noise is not audible, and during rain showers, the corona noise would likely not be readily distinguishable from background noise. During very moist, non-rainy conditions, such as heavy fog, the resulting corona noise may produce a very minor increase in background noise levels, but it is not expected to result in annoyance to adjacent residents.

Transformers at the substation would generally operate in self-cooled mode; although a few days a year during extreme temperatures, transformers would operate in fan-cooled mode. When fans are used, they would generate noise levels of approximately 85 dB at a distance of 3 feet, attenuating to levels of approximately 41 dB at the nearest residence. As this falls within typical background day-night noise levels for rural areas, the fan noise would not generally be audible over background noise at nearby residences.

The substation would produce a loud impulse noise when a breaker is tripped due to excessive current, high voltage, low voltage, low frequency, or other less common problems. When such problems occur, the circuit breaker opens to disconnect part of the system, and the flow of current is interrupted. The noise from the breaker is expected to last 1/20 of a second and range from 96 to 105 dB at a distance of 50 feet. Although breaker noise would be quite loud, it is only expected to occur approximately 18 times each year. Breaker noise may be audible to nearby residents. However, because of the infrequent occurrence, impacts from breaker noise would be minor. Overall, noise impacts from the operation of the proposed substation would be minor, as the occasional corona discharge and fan cooling would result in only slight increases to background noise levels at nearby residences, and audible breaker noise would be infrequent and short-lived.

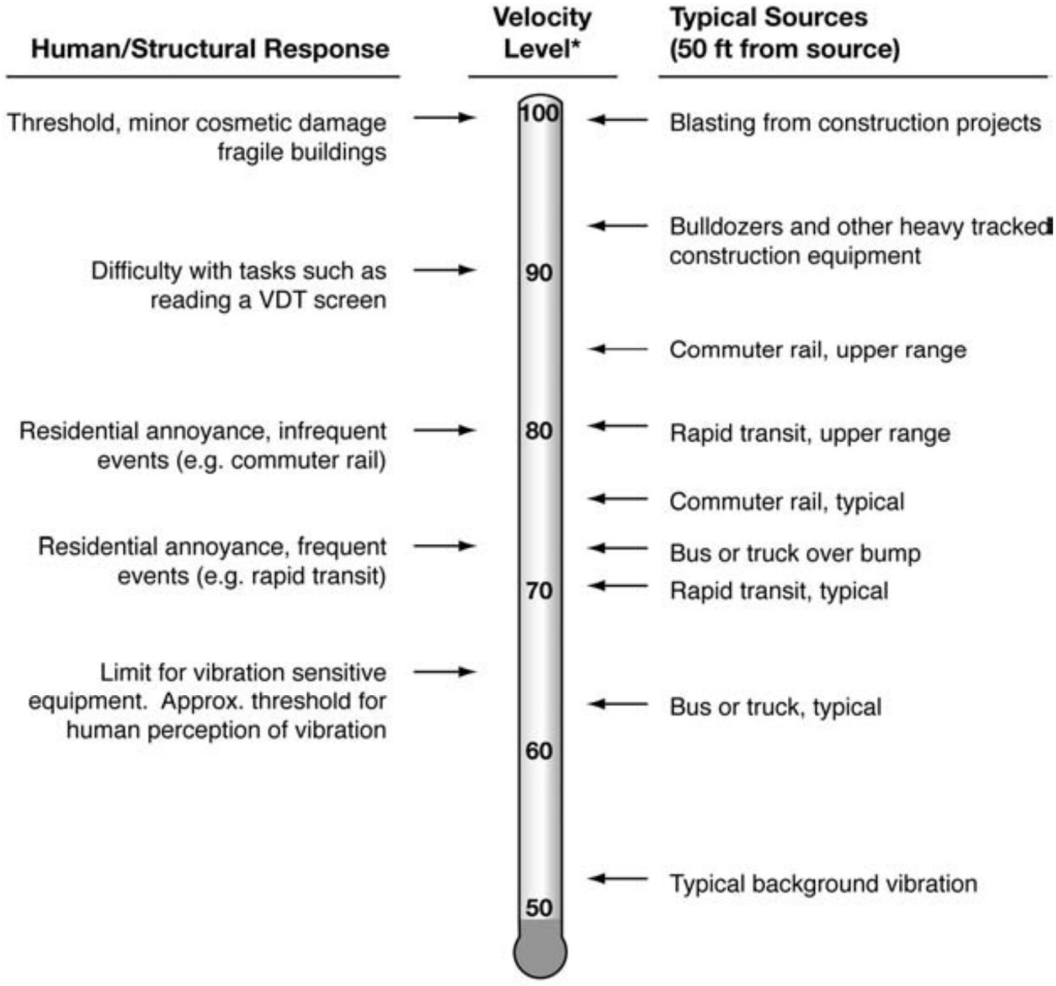
In addition, the operation and maintenance of transmission lines can result in periodic noise related to line maintenance, vegetation management, and, under certain atmospheric conditions, corona discharge. However, as all transmission line modifications are proposed along existing alignments, there would be no change in operational noise compared to current conditions.

Vibration - Construction activities, including the operation of heavy machinery, construction-related vehicles, and blasting, can create ground vibration. There are three primary types of receivers that can be adversely affected by ground vibration: people, structures, and equipment. Ground vibrations and ground noise can cause annoyance to people who live or work near sources of vibration. Additionally, if the vibration amplitudes are high enough, there is the possibility of physical and cosmetic damage to structures, and the possibility of interference with the functioning of sensitive machinery. The length of time and strength of vibration varies with the equipment used. For example, the vibration from blasting has a high amplitude and short duration, whereas vibration from grading or highway traffic is lower in amplitude but longer in duration (Caltrans 2013).

During construction of the proposed substation, most of the vibration sources would consist of equipment that produces continuous vibration, including excavation equipment, tracked vehicles, and heavy machinery operation. However, single-impact vibration sources such as blasting may also be used. All blasting would be conducted within the footprint of the proposed substation.

The Federal Transit Authority developed a noise and vibration impact assessment manual for estimating vibrations generated by common transportation and construction sources, possible damage levels, and dampening distances. Figure 3 presents typical levels of

ground-borne vibration at 50 feet for a variety of common transportation and construction equipment. At 50 feet from the source, community annoyance begins at a velocity level of 70 vibration decibels (VdB) for frequent events. Cosmetic damage to structures, also at 50 feet from the source, can occur at 100 VdB for one-time activities such as blasting operations (Federal Transit Authority 2006). There are no residences or privately-owned structures located within 50 feet of the substation footprint; the nearest residence is approximately 475 feet northwest of the proposed substation.



Source: FTA 2006

Figure 3. Typical Levels of Ground-Borne Vibration at 50 Feet for a Variety of Common Transportation and Construction Equipment

During construction of the proposed substation, the introduction of energy into the site from sources such as heavy equipment or explosive blasting would produce the potential for damage from vibration induced displacements in the surrounding area. Correlations between the magnitude of energy introduced and the distance from the source have been developed which predict the resulting particle velocity (i.e. the motion of a particle of the medium through which the energy wave is traveling). Additional studies have determined the damage threshold in terms of particle velocity for various types of structures and

equipment. By measuring the energy input and the distance from the sources of energy to the nearest structures and noting the composition of the structure, predictions of damage potential can be made. Energy input by movement of heavy equipment has been measured in the past and determined to be small compared to more intense inputs such as pile driving or blasting. Therefore, operation of heavy equipment should be considered to have a very low potential for vibration-related community annoyance or damage to structures given the distances between the construction site and the closest residences.

During construction, explosive blasting may be necessary to remove rock during the excavation process. Explosive devices release energy, the majority of which is in the form of ground vibration. Past correlations of the weight of an explosive charge (energy) detonated on one interval within a blast (delay) have been used to determine safe vibration levels when site specific measurements are not available (TVA 1982). Given that the closest structure is approximately 475 feet from the proposed substation footprint and assuming the most sensitive structures are present, the use of an explosive below 40 pounds per delay would result in a very low risk for damage from vibration.

TVA, in conjunction with the blasting contractor, would develop and implement a blasting plan to meet constraints for sound and vibration and minimize effects to nearby structures. Site-specific allowable blasting criteria could be developed prior to construction which may allow larger explosive amounts (in excess of 40 pounds per delay) by measuring the vibrations at defined distances caused by known weights of explosives and calculating a site-specific prediction equation. If deemed necessary, the installation of imported fill, dirt binder and geofabric could also serve as a form of vibration control. Due to the temporary nature of the operation, implementation of the blast plan, and distance to nearest receptors, vibration effects are expected to be minor and temporary.

Land Use, Soils, and Prime Farmland
Affected Environment

Land Use – Under the Action Alternative, a 50-acre, TVA property site has been proposed for the location of a new TVA 500-kV substation. This 50-acre site is part of a larger parcel (TVA Tract No. MHR-1) which is classified as a TVA reservoir property asset. According to the Melton Hill Reservoir Land Management Plan (TVA 1999), this parcel is designated as land that TVA manages for protection and enhancement of sensitive resources. Implementation of the Melton Hill Reservoir Land Management Plan is guided by TVA's Land Policy, which states that "TVA shall continue to utilize reservoir properties to meet the operational needs of the agency…" (TVA 2006). Given the purpose and need for this proposed action, TVA has an operational need that necessitates the use of this reservoir property for a use other than protection and enhancement of sensitive resources.

Soils and Prime Farmland - The 1981 Farmland Protection Policy Act (7 CFR Part 658) requires all federal agencies to evaluate impacts to prime and unique farmland prior to permanently converting to land use incompatible with agriculture. Prime farmland soils have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. These characteristics allow prime farmland soils to produce the highest yields with minimal expenditure of energy and economic resources. In general, prime farmlands have an adequate and dependable water supply, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. Prime farmland soils are permeable to water and air, not excessively erodible or saturated for extended periods, and are protected from frequent flooding.

The acreage of prime farmland soils within the proposed substation limits of disturbance and within a 5-mile radius are summarized in Table 6. One soil type (Capshaw Silt Loam), comprising 9.2 acres within the approximately 50-acre project area is classified as prime farmland soils (U.S. Department of Agriculture, Natural Resources Conservation Service 2019).

Table 6. Acres of Prime Farmland Soils

Soil Type	Substation Limits of Disturbance (acres)	5-mile Radius (acres)
All prime farmland soils	9.2	5,800.7
Farmland of local importance	--	3,101.5
Prime farmland if drained	--	175.0
Prime farmland if protected from flooding or not frequently flooded during the growing season	--	248.9
Not prime farmland	41.0	44,871.1
Total	**50.2**	**54,197.2**

Source: USDA NRCS 2019

As shown in Table 6, prime farmland is not a unique feature in the project vicinity, as more than 10 percent of soils in a 5-mile radius are considered prime farmland soils. Overall, prime farmland soils within the proposed substation limits of disturbance comprise just 18 percent of the soils within the project area and 0.16 percent of the total prime farmland soils found within a 5-mile radius of the proposed substation project area.

Environmental Consequences

Land use – In 2006, the TVA Board of Directors approved a Land Policy which governs the retention and use of public lands (Reservoir, Power, and Corporate properties). The Land Policy aligns with TVA's mission to manage property in its custody and control for multiple uses including integrated operation of the reservoir and power systems. The Land Policy says *"TVA shall continue to utilize reservoir properties to meet the operational needs of the agency…"* (TVA 2006).

In preparation of the Transmission, Power Supply and Support organization's proposal to construct the new 500-kV substation and realign several transmission lines within the project site, an internal use agreement was put in place which identifies the managing organization. The management of those portions outside of the substation area would remain under River and Resources Stewardship's responsibility.

Under the proposed Action Alternative, the 50-acre portion of TVA Tract No. MHR-1 would remain as TVA property and would be utilized for public power needs. Therefore, the reassignment of the approximately 50-acres as the responsibility of Transmission, Power Supply and Support would meet the uses directed by the Land Policy (2006).

TVA would implement the commitments and appropriate BMPs identified in this EA during construction, operation, and maintenance activities thus minimizing and/or avoiding impacts on the natural and physical environment. The proposed action would change TVA's land use management, however, both land uses are considered to be for meeting the public's needs. River and Resources Stewardship's manages approximately 2,578 acres on Melton

Hill Reservoir. As such, the proposed Action Alternative would remove a minimal acreage from the overall total and effects are considered minor.

Prime Farmland – Based on the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) soil mapping, there are approximately 9.2 acres of prime farmland soils within the substation limits of disturbance that have the potential to be permanently converted for utility uses. TVA initiated coordination with the NRCS through submittal of the AD 1006 Farmland Conversion Impact Rating Form. The NRCS uses a land evaluation and site assessment system to establish a farmland conversion impact rating score. This score is used as an indicator to determine if adverse impacts to farmland exceed the recommended allowable level. The higher the numerical score assigned, the more protection the farmland would receive. Project sites receiving a total score of less than 160 need not be given further consideration for protection and no additional sites need to be evaluated. The proposed substation site received a score of 117. The completed AD 1006 Form is provided in Attachment 4.

Approximately 5,800 acres (10.7 percent) of the area within 5 miles have soils classified as prime farmland. The minor loss of onsite soils with prime farmland characteristics due to the development of the proposed substation is minor when compared to the amount of land designated as prime farmland within the surrounding region. Therefore, impacts to prime farmland soils associated with the development of the proposed substation would be minor and would not impact regional agriculture or crop production.

In addition, all associated modifications to the existing transmission system would take place within the existing TL ROW. Borrow would be obtained from a previously developed and permitted borrow site, spoil would be deposited at a designated spoil area located on TVA's BRF, and the transport of these materials would utilize existing roads such that no new roads would need to be constructed. Therefore, project activities would not result in the conversion of any existing land uses outside of the proposed substation limits of disturbance and there would be no additional impacts to prime farmlands soils.

Cultural Resources

Affected Environment – Cultural resources include prehistoric and historic archaeological sites, districts, buildings, structures, and objects, as well as locations of important historic events that lack material evidence of those events. Cultural resources that are listed, or considered eligible for listing, on the NRHP are called historic properties. Cultural resources become historic properties when they possess both integrity and significance. A historic property's integrity is based on its location, design, setting, materials, workmanship, feeling, and association. The significance is established when historic properties meet at least one of the following criteria: (a) are associated with important historical events that have made a significant contribution to the broad patterns of our history; (b) are associated with the lives of significant historic persons; (c) embody distinctive characteristics of a type, period, or method of construction or represent the work of a master or have high artistic value; or (d) have yielded or may yield information important in history or prehistory.

Section 106 of the NHPA requires federal agencies to consider the effects of their proposed undertakings on historic properties and provide the Advisory Council on Historic Preservation an opportunity to comment on those effects. TVA determined that the Proposed Action Alternative is an "undertaking" as defined by the regulations under NHPA. Once an action is determined to be an undertaking, the regulations require agencies to consider whether the proposed activity has the potential to impact historic properties. If the

undertaking is such an activity, then the agency must follow the following steps: (1) involve the appropriate consulting parties; (2) define the area of potential effects (APE); (3) identify historic properties in the APE; (4) evaluate possible effects of the undertaking on historic properties in the APE; and (5) resolve adverse effects (36 CFR § 800.4 through 800.13). An APE is defined as the "geographic area or areas within which the undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist" (36 CFR § 800.16). TVA defined the APE for this undertaking as all areas that have the potential for ground disturbance (that have not been previously surveyed) as well as areas within a half-mile radius of the proposed substation and new structures from which the project would be visible, where visual effects on above-ground resources could occur.

Section 106 of the NHPA also requires federal agencies to consult with the respective SHPO when proposed federal actions could affect historic and cultural resources, including archaeological resources, which are also protected under the Archaeological Resources Protection Act, and the Native American Graves Protection and Repatriation Act, in addition to the NHPA.

The Tennessee Valley 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.

In the early historic period, the area was claimed by the Cherokee tribe. The influx of European settlers into the region forced cession of Cherokee lands through a series of treaties in the 1780s and 1790s. Anderson County was founded in 1801; Blount and Knox counties were founded in 1795 and 1792, respectively.

Environmental Consequences

Archaeological Resources – TVA Cultural Compliance staff conducted a desktop study of available documents pertaining to the APE's potential to contain archaeological sites. The location of the proposed substation has been previously surveyed and none were identified (Herrmann and Frankenberg 2000). The remainder of the APE had not been previously surveyed. As a result, TVA contracted with TRC Environmental, Inc., to conduct an archaeological survey of the transmission lines to be upgraded and associated access roads. The survey investigated four newly proposed and 131 existing structure locations where the structures would be replaced. Additionally, approximately 14.1 miles of access routes were surveyed. Although numerous sites have been recorded nearby, no archaeological sites were discovered in the APE (Jordan-Greene et al. 2019).

Historic Structures - During the archaeological survey, TRC Environmental, Inc., also conducted an architectural assessment of the APE. Four previously documented architectural resources and three NRHP-listed properties have been recorded within 0.5-mile and in line of sight of aspects of the project. During the current survey, TRC documented that all four previously documented architectural resources have been destroyed since they were initially identified in the 1980s. All three NRHP-listed properties

are extant. One new above-ground resource was identified by TRC (Jordan-Greene et al. 2019).

Statesview, located at 600 S. Peters Road, is a Federal-style house that was listed in the NRHP in 1973. The house is a substantial, two-story brick building and one of the few remaining residences in Knox County that reflect early nineteenth-century Federal-style architecture. The house served as the residence of Charles McClung, a prominent early Knox County resident. McClung helped survey the original layout of Knoxville, was a member of the Constitutional Convention that drafted the state constitution, and ran a successful mercantile business known as “Charles McClung & Son.” Although Statesview was originally built in rural section of Knox County, it is now within the densely populated west Knoxville area (Jordan-Greene et al. 2019).

Ebenezer Mill, located at 411 Ebenezer Road, is a ca. 1870 gristmill that was listed in the NRHP in 1987. The mill was built by Frederick S. Heiskell, who lived in the aforementioned Statesview. The mill is representative of late-nineteenth century agriculture-based milling operations that played a significant role in the regional economy. Mills were once common on Ten Mile Creek, but Ebenezer Mill is the sole survey mill on the stream. At the time of its listing in 1987, intact machinery was still present inside the mill building. Like Statesview, it was originally built in an agrarian setting, but has since been enveloped by residential and commercial development (Jordan-Greene et al. 2019).

The J. B. Jones House, located on Old Edgemoor Road, is directly across the road from the parcel where the new substation is proposed to be built. The property is a ca. 1920 Craftsman/bungalow residence. In 1991, the house was listed on the NRHP under the Historic and Architectural Resources of Oak Ridge Multiple Property Submission document under Criterion A for its historical association with the settlement of rural Anderson County and as “…the only remaining early 20th century house in Oak Ridge…” not demolished following the end of World War II. Since its listing, the surrounding area has not been developed and maintains its rural setting (Jordan-Greene et al. 2019).

Property HS-1 is a ca. 1966 contemporary-style house in suburban west Knoxville. It is a typical example of mid-twentieth century residential construction which fails to exhibit distinctive characteristics of its architectural style or workmanship. Based on the lack of architectural merit, the property is considered not eligible for the NRHP (Jordan-Greene et al. 2019).

Under the Action Alternative, TVA would build the new substation and upgrade associated transmission lines and add optical ground wire. Based on the results of previous and current surveys of the project area, no archaeological sites are present and none would be effected by the project.

The architectural assessment identified one new historic above-ground resource and verified that the three NRHP-listed properties are extant. The newly identified resource has been recommended ineligible for the NRHP and the proposed activities would have no effect. Two of the three NRHP-listed properties (Statesview and Ebenzer Mill) are within line of sight of the existing Ebenezer substation in suburban west Knoxville, where their viewsheds have been compromised by residential and commercial development, and existing TVA transmission lines and substations. Although the addition of minor elements in the form of new ground wire pole structures would have an effect on the viewshed of both Statesview and Ebenezer Mill, the effect would not be adverse.

Currently, a wooded area is located north and northwest of the J. B. Jones house. Multiple transmission lines, carried on metal towers, are in clear line of sight of the property to the southeast, east and northeast. Although over a mile away, the largest stack at the BRF is also visible from the property. The newly proposed substation footprint and new transmission line structures would be constructed north of the wooded area. TVA has committed to leaving the wooded area in place, creating a visual buffer between the house and the new substation. The tops of new, taller structures in and around the substation may be visible from the Jones property. However, maintaining the vegetative buffer would only result in a minor change to the viewshed and would not compromise the historical significance for which the property has been determined eligible for the NRHP.

TVA consulted with the TN SHPO office in a letter dated January 23, 2020. In a letter dated February 6, 2020, the TN SHPO concurred with TVA's finding of No Adverse Effect. Pursuant to 36 CFR § 800.3(f)(2), in a letter dated January 23, 2020, TVA consulted with federally recognized Indian tribes regarding historic properties within the APE that may be of religious and cultural significance and are eligible for the NRHP (Attachment 5). TVA received no responses.

Cumulative Impacts

The proposed Anderson 500-kV Substation would be constructed on an approximately 50-acre TVA property site located near BRF in Anderson County, Tennessee. Construction would disturb about 23 acres with the completed substation occupying roughly 14 acres.

The proposed substation would present a minor, long-term visual effect. Two NRHP-listed properties would be affected; however, the effect would not be adverse. A minor change to the viewshed would occur to a third NRHP-listed property. TVA would leave wooded vegetation creating a visual buffer as to not compromise the historical significance for which the property has been determined eligible for the NRHP.

The minor loss of prime farmland within the substation footprint (9.2 acres) is negligible when compared to the amount of land designated as prime farmland within the surrounding region. The encapsulation/rerouting of an intermittent stream and an ephemeral/WWC on the substation site would be mitigated based on 593 required FF Stream credits. As such, cumulative impacts would be minor.

Additionally, TVA proposes transmission system modifications to substations, structures, transmission lines (including the addition of OPGW to 18.5-miles of transmission line), access roads and TVA's Operation Centers. As these facilities are existing, effects would be minor. Therefore, no significant cumulative impacts are expected as a result of implementing the proposed action.

Mitigation Measures

TVA employs standard practices when constructing, operating, and maintaining substations, transmission lines, structures, and the associated ROW and access roads. These can be found on TVA's transmission website, https://www.tva.com/Energy/Transmission-System (TVA 2019b). 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 substation and associated transmission line, and access roads are as follows:

- TVA would utilize standard BMPs, as described in Transmission's 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).
- Wetlands would be protected by the implementation of standard BMP's as identified in Transmission's BMP manual (TVA 2071a)
- Ephemeral streams that could be affected by the proposed construction would be protected by implementing standard BMPs as identified in Transmission's BMP manual (TVA 2017a).
- Perennial and intermittent streams would be protected by the implementation of standard stream protection (Category A) as defined in Transmission's BMP manual (TVA 2017a).
- During vegetation clearing activities, marketable timber would be salvaged where feasible; otherwise, woody debris and other vegetation would be piled and burned, chipped, or taken off site. 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*, and *Environmental Quality Protection Specifications for Transmission Substation or Communications Construction* (TVA 2019b), and Transmission's BMP manual (TVA 2017a) provide further guidance for clearing and construction activities.
- During construction of access roads, 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 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 new temporary access roads to previous conditions.
- Pesticide/herbicide use as part of construction or maintenance activities would comply with the TDEC 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.

- Any retired wooden poles would be offered to the local power company or property owners. If any wooden poles remain and require disposal, a special permit would be obtained, and TVA would follow its Environmental Protection Procedures for reuse and/or disposal (TVA 2019b).
- Any lead pins removed from the retired insulators would be handled according to TVA's Environmental Protection Procedures (TVA 2019b).

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

- Integration of BMPs during construction and maintenance to minimize potential impacts to foraging bat habitat as described and in accordance with TVA's Programmatic Consultation on Bats on routine actions (TVA 2017b).
- There are currently no stream restoration credits available at local mitigation banks. As such, to compensate for direct impacts to streams identified within the Anderson Substation site, TVA would contract with a 3rd party to complete a Permittee Responsible Mitigation project scaled to account for 593 FF Stream credits.
- TVA would leave in place the vegetative, wooded area between the J. B. Jones house and the proposed substation and new transmission line structures to create a visual buffer.

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ATTACHMENT 1

Please note as part of the Categorical Exclusion Checklist (CEC), some questions refer the reader with "For comments see attachments." These are provided in Attachment 1 if they *are not* included in the body of the draft Anderson 500-kV Substation and Associated System Modifications Environmental Assessment (EA) for analysis.

Categorical Exclusion Checklist for Proposed TVA Actions

Categorical Exclusion Number Claimed	Organization ID Number	**Tracking Number** *(NEPA Administration Use Only)* 41780

Form Preparer	Project Initiator/Manager	Business Unit
Joseph E Melton	Todd C Liskey	ED - Electric System Projects

Project Title	Hydrologic Unit Code
Anderson, TN. 500-kV Substation & Associated TL Modifications	

Description of Proposed Action *(Include Anticipated Dates of Implementation)* ☐ Continued on Page 3 *(if more than one line)*
For Proposed Action See Attachments and References

Initiating TVA Facility or Office	TVA Business Units Involved in Project

Location *(City, County, State)*
Anderson County, TN. See attached map for location description.

Parts 1 through 4 verify that there are no extraordinary circumstances associated with this action:

Part 1. Project Characteristics

Is there evidence that the proposed action...	No	Yes	Commit-ment	Information Source for Insignificance
1. Is major in scope?	X			Melton, Joseph E. 10/22/2019
2. Is part of a larger project proposal involving other TVA actions or other federal agencies?		X		For comments see attachments
* 3. Involves non-routine mitigation to avoid adverse impacts ?		X	No	For comments see attachments
4. Is opposed by another federal, state, or local government agency?	X			Melton, Joseph E. 10/22/2019
* 5. Has environmental effects which are controversial?	X			Melton, Joseph E. 10/22/2019
* 6. Is one of many actions that will affect the same resources?	X			Melton, Joseph E. 10/22/2019
7. Involves more than minor amount of land?	X			Melton, Joseph E. 10/22/2019

*If "yes" is marked for any of the above boxes, consult with NEPA Administration on the suitability of this project for a categorical exclusion.

Part 2. Natural and Cultural Features Affected

Would the proposed action...	No	Yes	Permit	Commit-ment	Information Source for Insignificance
1.Potentially affect endangered, threatened, or special status species?		X	No	No	For comments see attachments
2.Potentially affect historic structures, historic sites, Native American religious or cultural properties, or archaeological sites?		X	No	No	For comments see attachments
3.Potentially take prime or unique farmland out of production?		X	No	No	For comments see attachments
4.Potentially affect Wild and Scenic Rivers or their tributaries?	X		No	No	For comments see attachments
5.Potentially affect a stream on the Nationwide Rivers Inventory?	X		No	No	For comments see attachments
6.Potentially affect wetlands?		X	No	No	For comments see attachments
7.Potentially affect water flow, stream banks or stream channels?		X	Yes	No	For comments see attachments
8.Potentially affect the 100-year floodplain?	X		No	No	For comments see attachments
9.Potentially affect ecologically critical areas, federal, state, or local park lands, national or state forests, wilderness areas, scenic areas, wildlife management areas, recreational areas, greenways, or trails?		X	No	No	For comments see attachments
10.Contribute to the spread of exotic or invasive species?		X	No	No	For comments see attachments
11.Potentially affect migratory bird populations?	X		No	No	For comments see attachments
12.Involve water withdrawal of a magnitude that may affect aquatic life or involve interbasin transfer of water?	X		No	No	Melton, Joseph E. 10/22/2019
13.Potentially affect surface water?		X	Yes	No	For comments see attachments
14.Potentially affect drinking water supply?	X		No	No	Melton, Joseph E. 10/22/2019
15.Potentially affect groundwater?	X		No	No	For comments see attachments
16.Potentially affect unique or important terrestrial habitat?	X		No	No	For comments see attachments
17.Potentially affect unique or important aquatic habitat?	X		No	No	For comments see attachments

Part 3. Potential Pollutant Generation

Would the proposed action potentially (including accidental or unplanned)...	No	Yes	Permit	Commit-ment	Information Source for Insignificance
1.Release air pollutants?	X		No	No	Melton, Joseph E. 10/22/2019
2.Generate water pollutants?		X	Yes	No	For comments see attachments
3.Generate wastewater streams?	X		No	No	Melton, Joseph E. 10/22/2019
4.Cause soil erosion?		X	Yes	No	For comments see attachments
5.Discharge dredged or fill materials?		X	No	No	For comments see attachments
6.Generate large amounts of solid waste or waste not ordinarily generated?	X		No	No	For comments see attachments
7.Generate or release hazardous waste (RCRA)?	X		No	No	Melton, Joseph E. 10/22/2019
8.Generate or release universal or special waste, or used oil?		X	No	No	For comments see attachments
9.Generate or release toxic substances (CERCLA, TSCA)?	X		No	No	Melton, Joseph E. 10/22/2019
10.Involve materials such as PCBs, solvents, asbestos, sandblasting material, mercury, lead, or paints?		X	No	No	For comments see attachments
11.Involve disturbance of pre-existing contamination?	X		No	No	Melton, Joseph E. 10/22/2019
12.Generate noise levels with off-site impacts?		X	No	No	For comments see attachments
13.Generate odor with off-site impacts?	X		No	No	Melton, Joseph E. 10/22/2019
14.Produce light which causes disturbance?	X		No	No	For comments see attachments
15.Release of radioactive materials?	X		No	No	Melton, Joseph E. 10/22/2019
16.Involve underground or above-ground storage tanks or bulk storage?	X		No	No	Melton, Joseph E. 10/22/2019
17.Involve materials that require special handling?		X	No	No	For comments see attachments

Part 4. Social and Economic Effects

Would the proposed action...	No	Yes	Permit	Commit-ment	Information Source for Insignificance
1.Potentially cause public health effects?	X			No	Melton, Joseph E. 10/22/2019
2.Increase the potential for accidents affecting the public?	X			No	Melton, Joseph E. 10/22/2019
3.Cause the displacement or relocation of businesses, residences, cemeteries, or farms?	X			No	Melton, Joseph E. 10/22/2019
4.Contrast with existing land use, or potentially affect resources described as unique or significant in a federal, state, or local plan?		X		No	For comments see attachments
5.Disproportionately affect minority or low-income populations?	X			No	For comments see attachments
6.Involve genetically engineered organisms or materials?	X			No	Melton, Joseph E. 10/22/2019
7.Produce visual contrast or visual discord?		X		No	For comments see attachments
8.Potentially interfere with recreational or educational uses?	X			No	For comments see attachments
9.Potentially interfere with river or other navigation?		X	No	No	For comments see attachments
10.Potentially generate highway or railroad traffic problems?		X		No	For comments see attachments

Part 5. Other Environmental Compliance/Reporting Issues

Would the proposed action...	No	Yes	Commit-ment	Information Source for Insignificance
1.Release or otherwise use substances on the Toxic Release Inventory list?	X		No	Melton, Joseph E. 10/22/2019
2.Involve a structure taller than 200 feet above ground level?	X		No	Melton, Joseph E. 10/22/2019
3.Involve site-specific chemical traffic control?	X		No	Melton, Joseph E. 10/22/2019
4.Require a site-specific emergency notification process?	X		No	Melton, Joseph E. 10/22/2019
5.Cause a modification to an existing environmental permit or to existing equipment with an environmental permit or involve the installation of new equipment/systems that will require a permit?	X		No	Melton, Joseph E. 10/22/2019
6.Potentially impact operation of the river system or require special water elevations or flow conditions??	X		No	Melton, Joseph E. 10/22/2019
7.Involve construction or lease of a new building or demolition or renovation of existing building (i.e. major changes to lighting, HVAC, and/or structural elements of building of 1000 sq. ft. or more)?	X		No	Melton, Joseph E. 10/22/2019

Parts 1 through 4: If "yes" is checked, describe in the discussion section following this form why the effect is insignificant. Attach any conditions or commitments which will ensure insignificant impacts. Use of non-routine commitments to avoid significance is an indication that consultation with NEPA Administration is needed.

An ☒ *EA or* ☐ *EIS Will be prepared.*

Based upon my review of environmental impacts, the discussion attached, and/or consultations with NEPA Administration, I have determined that the above action does not have a significant impact on the quality of the human environment and that no extraordinary circumstances exist. Therefore, this proposal qualifies for a categorical exclusion under Section 5.2. _____ of TVA NEPA Procedures.

Project Initiator/Manager Todd C Liskey		Date 02/18/2020
TVA Organization EE&SS	E-mail tcliskey@tva.gov	Telephone

Environmental Concurrence Reviewer

Joseph E Melton 02/14/2020
Signature

Preparer Closure

Joseph E Melton 03/02/20
Signature

Other Environmental Concurrence Signatures *(as required by your organization)*

_____
Signature

_____
Signature

	Signature		*Signature*

Other Review Signatures *(as required by your organization)*

B Keith Elder	02/21/2020		
	Signature		*Signature*
Travis Adam Giles	02/24/2020		
	Signature		*Signature*
Joseph E Melton	02/14/2020		
	Signature		*Signature*

Attachments/References

Description of Proposed Action Continued from Page 1
TVA proposes to build a new 500-kV substation (SS) in Anderson County, Tennessee. The proposed substation would occupy roughly 14 acres of the approximate 50-acre green-field site located just west of Melton Hill Reservoir and South of Edgemoor Rd. Modifications to TVA's existing transmission system will be required to support the new station. For communication purposes, a new 18.5 mile fiber optic path would be constructed along portions of the Bull Run – Alcoa and Bull Run – Lonsdale 161-kV TLs. To support the fiber path, fourteen (14) strs. would be replaced along a section of the fiber path. Also, a new ground wire pole would be installed just outside TVA's Ebenezer SS. Substation equipment upgrades would be necessary at several of TVA's existing substation sites. The map board display at TVA's System Operations Center and Regional Operations Center would be updated to reflect this work. (see attached project description for detail).

CEC General Comment Listing

1.	The Project Description is attached.			
	By: Joseph E Melton		10/16/2019	
	Files:	Project Description.docx	10/16/2019	14.17 Bytes
2.	List of Project/Work Orders.			
	By: Joseph E Melton		10/16/2019	
	Files:	Anderson 500kV List of WO_6-20-19.docx	10/16/2019	24.23 Bytes
3.	The TVA Bat Strategy Form is attached.			
	By: Joseph E Melton		10/16/2019	
	Files:	ToddLiskey_BatForm_Anderson_440945_5-22-19.pdf	10/16/2019	1,155.86 Bytes
4.	TPS Environmental Quality Protection Specifications will apply throughout the life of the project.			
	By: Joseph E Melton		02/14/2020	
	Files:	TVA ROW Clearing Specifications_July2017.pdf	02/14/2020	39.87 Bytes
		TVA Environmental Quality Protection Specifications for Transmission Line Construction_July2017.pdf	02/14/2020	40.52 Bytes
		TVA Site Clearing and Grading Specifications_July2017.pdf	02/14/2020	44.09 Bytes
		TVA Environmental Quality Protection Specifications for Transmission Substation or Communications Construction_July2017.pdf	02/14/2020	46.01 Bytes
		TVA Transmission Construction Guidelines Near Streams_July2017.pdf	02/14/2020	46.87 Bytes
5.	The specification diagrams are attached.			
	By: Joseph E Melton		02/14/2020	
	Files:	SK-2117 SH2_Phase 1.pdf	02/14/2020	106.17 Bytes
		SK-2117 SH1_Phase 1.pdf	02/14/2020	189.85 Bytes
6.	TPS's Best Management Practices manual would be used for this project.			
	By: Joseph E Melton		02/14/2020	
	Files:	BMP Manual Revision 3.0.pdf	02/14/2020	2,640.76 Bytes
7.	The Environmental Vicinity Maps are attached.			
	By: Joseph E Melton		02/14/2020	
	Files:	Anderson_TLSS_ENV_Vicinity 21.pdf	02/14/2020	527.80 Bytes
		Anderson_TLSS_ENV_Vicinity 20.pdf	02/14/2020	602.95 Bytes
		Anderson_TLSS_ENV_Vicinity 22.pdf	02/14/2020	619.86 Bytes
		Anderson_TLSS_ENV_Vicinity 23.pdf	02/14/2020	628.75 Bytes
		Anderson_TLSS_ENV_Vicinity 24.pdf	02/14/2020	654.86 Bytes

8.	The Environmental Vicinity Maps are attached.			
	By: Joseph E Melton		02/14/2020	
	Files:	Anderson_TLSS_ENV_Vicinity 19.pdf	02/14/2020	618.62 Bytes
		Anderson_TLSS_ENV_Vicinity 18.pdf	02/14/2020	639.50 Bytes
		Anderson_TLSS_ENV_Vicinity 15.pdf	02/14/2020	685.89 Bytes
		Anderson_TLSS_ENV_Vicinity 16.pdf	02/14/2020	712.84 Bytes
		Anderson_TLSS_ENV_Vicinity 17.pdf	02/14/2020	727.27 Bytes
9.	The Environmental Vicinity Maps are attached.			
	By: Joseph E Melton		02/14/2020	
	Files:	Anderson_TLSS_ENV_Vicinity 5.pdf	02/14/2020	610.89 Bytes
		Anderson_TLSS_ENV_Vicinity 6.pdf	02/14/2020	666.38 Bytes
		Anderson_TLSS_ENV_Vicinity 7.pdf	02/14/2020	675.04 Bytes
		Anderson_TLSS_ENV_Vicinity 8.pdf	02/14/2020	715.08 Bytes
		Anderson_TLSS_ENV_Vicinity 9.pdf	02/14/2020	718.98 Bytes
10.	The Environmental Vicinity Maps are attached.			
	By: Joseph E Melton		02/14/2020	
	Files:	Anderson_TLSS_ENV_Vicinity 3.pdf	02/14/2020	589.17 Bytes
		Anderson_TLSS_ENV_Vicinity 1.pdf	02/14/2020	598.85 Bytes
		Anderson_TLSS_ENV_Vicinity 4.pdf	02/14/2020	636.49 Bytes
		Anderson_TLSS_ENV_Vicinity 2.pdf	02/14/2020	688.27 Bytes

CEC Comment Listing

Part 1 Comments

2.	TVA completed an environmental assessment on the "Potential Retirement of the Bull Run Fossil plant (BRF)" and subsequently released a final EA and Finding of No Significant Impact on February 11, 2011. The EA identified that should TVA decide to retire BRF, actions associated with deconstruction and demolition of BRF and the disposition of the plant site would be addressed in future NEPA reviews. Other related actions that were identified included the construction of facilities to provide alternate power sources that were not ripe for consideration.			
	By: Joseph E Melton		03/02/2020	
3.	In order to mitigate for stream impacts identified within the substation site, TVA would complete a Permittee Responsible Mitigation project scaled to account for required Functional Feet (FF) Stream credits.			
	By: Joseph E Melton		10/22/2019	
1.	T&E input prepared by Biological and Cultural Compliance is attached.			
	By: Joseph E Melton		10/22/2019	
	Files:	TerrZoo_Project_435787_Anderson_500_kV_Greenfield_Substation_EA_Input.docx	10/22/2019	44.37 Bytes
		34211_botany_Anderson 500 PSA (2).docx	10/22/2019	25.12 Bytes
		34211_EA_Aquatic-r1.docx	02/14/2020	33.86 Bytes
1.	Botany - An August 1, 2019 query of the TVA Heritage database indicates no federally listed plant species and twenty-one state-listed plant species are known from within five miles of the proposed project (Table 1). No additional federally listed plant species are known from Anderson and Knox Counties, Tennessee, where the project resides. Habitat capable of supporting rare plant species was present in parts of the project area; however, rare plants were not observed during the August 5 and September 17, 2019 field surveys. The proposed action would not affect federal or state-listed plant species.			
	By: Joseph E Melton		10/22/2019	
1.	Terrestrial Zoology - Nine terrestrial animal species (eastern slender glass lizard, hellbender, Tennessee cave salamander, peregrine falcon, barn owl, southeastern shrew, little brown bat, tricolored bat, and gray bat) were assessed based on documented presence within three miles of the project footprint. Three additional federally protected species (bald eagle and Indiana bat, and northern long-eared bat) were addressed based on presence within Anderson or Knox County. All twelve of these species have the potential to utilize the project area. With the proper implementation of standard TVA BestManagement Practices (TVA, 2017)and adherence to the conservation measures outlined in the TVA Bat Strategy Form, it is anticipated no federally protected species would be impacted by the proposed action.			
	By: Joseph E Melton		10/22/2019	

1.	Aquatics - A query of the TVA Natural Heritage Database (10/8/2019) and IPaC (10/17/2019) for records of listed aquatic animal species indicated that 19 listed mussel species, 8 listed fish species, and 3 snail species have been documented to occur within the Beaver Creek (0601020702), Clinch River (0601020704), Poplar Creek (0601020703), Tennessee River (0601020102) 10-digit HUC watershed encompassing the proposed project area with the exception of the Rough Pigtoe (Aquatics Table 1). Streams encountered during field surveys were typical of the Ridge and Valley sub-ecoregions. A total of eight watercourse intersections—including 2 perennial, 1 intermittent, and 5 wet-weather conveyances (WWCs)/ ephemeral streams—occur along the proposed TL route right-of-way (ROW) and/ or within the substation site. Applicable Aquatic Resource Alteration Permits (ARAP) and US Army Corps of Engineers 404 Permits would be obtained for any stream alterations and the terms and conditions of these permits would be followed. In order to mitigate for stream impacts identified within the substation site, TVA would contract with a 3rd party to complete a Permittee Responsible Mitigation project scaled to account for required Functional Feet (FF) Stream credits. These streams would not provide suitable habitat for any of the species. The remaining streams documented within the proposed project footprint would be protected by BMPs as defined in TVA (2017) and/or TDEC (2012) or as required by standard permit conditions. These categories of protection are based on the variety of species and habitats that exist in the streams as well as the state and federal requirements to avoid harming certain species. No designated critical habitat is known from the potentially affected 10-digit HUC watersheds of the proposed project area.		
	By: Joseph E Melton	02/14/2020	
2.	The Cultural Input prepared by Biological and Cultural Compliance and SHPO concurrence is attached..		
	By: Joseph E Melton	02/25/2020	
	Files: 34211 EA Greenfield substation - Cultural input_02_27_20.pdf	02/27/2020	125.90 Bytes
	SHPO consultation.pdf	02/25/2020	1,278.24 Bytes
3.	Prime Farmland Input is attached.		
	By: Joseph E Melton	02/11/2020	
	Files: AS Prime Farmland_112119.docx	02/11/2020	22.08 Bytes
4.	Natural Areas input prepared by Biological and Cultural Compliance is attached.		
	By: Joseph E Melton	10/22/2019	
	Files: 34211_NaturalAreas_AndersonTN500kVSS.docx	02/11/2020	36.69 Bytes
5.	See Natural Areas input attached to Part 2, Question 4 for details.		
	By: Joseph E Melton	10/22/2019	
8.	Based on the implementation of standard BMPs during construction activities, the proposed Anderson 500-kV Substation, modifications to TVA's existing transmission system, temporary re-routes of the transmission lines that are immediately adjacent to the site, a new 18.5-mile OPGW, and the structure replacements for 14 of the 29 total structures on the Alcoa-Bull Run Tap to Solway Transmission Line (L56573) segment would have no significant impact on floodplains and their natural and beneficial values.		
	By: Joseph E Melton	02/19/2020	
8.	Floodplain input prepared by Biological and Cultural Compliance is attached.		
	By: Joseph E Melton	10/22/2019	
	Files: 34211_440945_Anderson TN 500kV Greenfield Substation_EA-floodplains.docx	02/28/2020	14.02 Bytes
9.	See Natural Areas input attached in Part 2, Question 4 for details.		
	By: Joseph E Melton	10/22/2019	
10.	It is likely that project related construction would result in localized increases of invasive plants, but the plants most likely to colonize the area are distributed widely throughout the region and implementation of the proposed project would not change this situation. The project would not significantly contribute to the spread of exotic or invasive species.		
	By: Joseph E Melton	10/22/2019	
10.	See attached TZ, Botany, & Aquatic input in Part 2, Question 1 for detail.		
	By: Joseph E Melton	02/12/2020	
11.	Two wading bird colonies have been documented within three miles of the project area, the nearest 1.0 miles away. No new wading bird colony or osprey records were recorded during field review. The nearest bald eagle nesting record is 5.6 miles outside of the project footprint. No additional nests or individuals were observed during field surveys		
	By: Joseph E Melton	10/22/2019	
11.	See Terrestrial Zoology input attached to Part 2, Question 1 for detail.		
	By: Joseph E Melton	10/22/2019	
13.	Insignificant surface water impacts would result from proper implementation of standard TVA BestManagement Practices (TVA, 2017) and standard commitments to contain/dispose all wastes and to prevent pollution runoff and discharge.		
	By: Joseph E Melton	10/22/2019	
13.	Surface Water input is attached.		
	By: Joseph E Melton	02/18/2020	
	Files: 34211_Anderson TN SS EA _Surface Water_R3 _ 02_18_19.docx	02/18/2020	23.19 Bytes

15. Best Management Practices (BMPs) as described in A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority (TVA, 2017) 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. No cumulative impacts are anticipated.
By: Joseph E Melton 10/22/2019

15. Groundwater input prepared by Biological and Cultural Compliance is attached.
By: Joseph E Melton 10/22/2019
Files: 34211 EA Anderson, TN 500kV Greenfield Substation-r1 - GW Input.docx 02/12/2020 20.33 Bytes

16. See attached Terrestrial Zoology input attached to Part 2, Question 1 for detail.
By: Joseph E Melton 10/22/2019

17. See attached Aquatic input attached to Part 2, Question 1 for detail.
By: Joseph E Melton 10/22/2019

6. Wetland input and associated TVA RAM and USACE data sheets prepared by Biological and Cultural Compliance is attached.
By: Joseph E Melton 10/22/2019
Files: WETLANDS_CEC_Anderson500kVSS_34211.docx 10/22/2019 29.40 Bytes
WETLANDS_TRAM_34211_Anderson500_PSA_440945.pdf 10/22/2019 1,585.37 Bytes
WETLANDS_USACE_34211_Anderson500_PSA_44095.pdf 10/22/2019 1,080.86 Bytes

6. Five wetlands were mapped on the substation parcel, but all are located outside the construction zone and would not be impacted. Two wetlands were identified along rights-of-way area were transmission line work is proposed. All wetlands within the review area footprint will be avoided entirely by the proposed Anderson 500kV substation construction and associated transmission line work. Therefore, due to the avoidance measures in place, no significant wetland impacts are anticipated to result from the proposed activities.
By: Joseph E Melton 10/22/2019

7. A total of eight watercourse intersections—including 2 perennial, 1 intermittent, and 5 wet-weather conveyances (WWCs)/ ephemeral streams—occur along the proposed TL route right-of-way (ROW) and/ or within the substation site. Applicable Aquatic Resource Alteration Permits (ARAP) and US Army Corps of Engineers 404 Permits would be obtained for any stream alterations and the terms and conditions of these permits would be followed. In order to mitigate for stream impacts identified within the substation site, TVA would complete a Permittee Responsible Mitigation project scaled to account for 593 Functional Feet (FF) Stream credits. Streamside management zones (SMZs) and best management practices (BMPs) identified in the Tennessee Department of Environment & Conservation (TDEC) Erosion & Sediment Control manual minimize the potential for impacts to water quality and instream habitat for aquatic organisms (TDEC 2012). Furthermore, TVA would follow BMPs identified within A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities (TVA 2017). Because appropriate BMPs would be implemented during site preparation and work, any impacts to the aquatic ecology of streams not directly impacted from the substation site would be temporary and insignificant as a result of the proposed TVA actions.
By: Joseph E Melton 02/12/2020

7. See aquatics input attached to Part 2, Question 1 for more details.
By: Joseph E Melton 10/22/2019

Part 3 Comments

2. Insignificant impacts would result with proper implementation of standard Best Management Practices as identified in TVA (2017), and proper containment/treatment/disposal of wastewaters, storm water runoff, wastes and potential pollutants. See Surface Water input attached to Part 2, Question 13 for more details.
By: Joseph E Melton 10/22/2019

4. Insignificant impacts will result from proper implementation of standard Best Management Practices as identified in TVA (2017). A state and/or MS4 construction stormwater permit will be required if the disturbance threshold for any applicable permits is exceeded. See Surface Water input attached to Part 2, Question 13 for more details.
By: Joseph E Melton 10/22/2019

5. All spoil to be taken off-site from the grading of the pad for the substation would be tested and disposed of according to Transmission's Environmental Protection Procedures - Soil Management Guidelines.
By: Joseph E Melton 02/18/2020

5. All fill required for the substation expansion would be obtained from an approved borrow pit.
By: Joseph E Melton 02/18/2020

6. Unusable materials will be properly characterized and disposed. Any generated/retired solid waste (conductor , metals, steel, etc.) shall be scrapped/recycled where economically feasible. Coordinate with the site environmental contact to ensure proper handling/disposal.
By: Joseph E Melton 10/22/2019

8. The retired wood poles will be reused by distributor or property owners. If any wood poles remain and require disposal, a special permit will be obtained by Environmental Operations. TPS procedures for reuse and/or disposal for treated wood wastes will follow TVA's Solid Waste (non-CCR) Management program (TVA-SPP-05.50). Retrieved from: http://chapedmw2.cha.tva.gov/dms/pc/
By: Joseph E Melton 10/23/2019

10. The retired wavetraps would be inspected for asbestos insulation and PCBs in the tuning pack. If asbestos or PCBs are present, they would be disposed/handled per TVA's Asbestos Management program (TVA-SPP-05.67) and TVA's PCB Management program (TVA-SPP-05.060). Retrieved from: http://chapedmw2.cha.tva.gov/dms/pc/

By: Joseph E Melton 10/22/2019

10. The retired electromechanical relays would be managed according to the "Management of PCBs in Electromechanical Relays" procedure outlined in Transmission's Environmental Protection Procedures -- PCB Management Section. http://ed.tva.gov/environmental/Environmental%20Protection%20Procedure%20and%20Supporting/Forms/AllItems.aspx

By: Joseph E Melton 10/22/2019

10. Any asbestos work or disturbance would require certified personnel. Any asbestos waste would be handled, packaged and disposed of according to TVA's Asbestos Management program (TVA-SPP-05.67). Retrieved from: http://chapedmw2.cha.tva.gov/dms/pc/

By: Joseph E Melton 10/22/2019

12. Noise input is attached.

By: Joseph E Melton 02/11/2020

Files: AS Noise and Vibration_022820_final.docx 03/02/2020 805.50 Bytes

14. Installation of a new substation and addition of switch house at the existing Solway Substation would new light sources. By adhering to the lighting requirements as defined in "TVA Substation Lighting Guidelines", lighting disturbance would be insignificant.

By: Joseph E Melton 10/22/2019

17. See comments for Part 3, Question 10.

By: Joseph E Melton 10/22/2019

Part 4 Comments

4. See Natural Areas input attached in Part 2, Question 4 for details.

By: Joseph E Melton 02/25/2020

5. Socioeconomics and Environmental Justice input for this project is attached.

By: Joseph E Melton 02/11/2020

Files: AS Socio and EJ_012420.docx 02/18/2020 1,000.08 Bytes

7. Visual input for this project is attached.

By: Joseph E Melton 02/11/2020

Files: AS Visual_112119.docx 02/11/2020 911.72 Bytes

7. Minor visual discord above ambient levels would be produced during construction and maintenance activities. The proposed substation would present a minor, long-term visual effect.

By: Joseph E Melton 02/28/2020

10. The transportation input is attached.

By: Joseph E Melton 03/02/2020

Files: Att 1_AS Transportation_112119.docx 03/02/2020 899.75 Bytes

8. Recreational input prepared by Biological and Cultural Compliance is attached.

By: Joseph E Melton 10/22/2019

Files: Request ID 34211 - Recreation Resources.docx 02/12/2020 12.34 Bytes

9. All construction activities across navigable waterways would be completed per TPS's Water Crossing Construction Standard (TCM-CL-CS-06.003.12) to avoid potential impacts to any watercraft navigation. Retrieved from: http://chapedmw2.cha.tva.gov/dms/pc/

By: Joseph E Melton 10/22/2019

CEC Permit Listing

Part 2 Permits

7. Section 404 Permit (¿404 Clean Water Act)

By: Joseph E Melton 10/22/2019

7. State Water Quality Certification (¿401 Clean Water Act)

By: Joseph E Melton 10/22/2019

13. Stormwater Discharge Permit

By: Joseph E Melton 10/22/2019

Part 3 Permits

2. State Water Quality Certification (¿401 Clean Water Act)

	By: Joseph E Melton	02/28/2020
4.	Stormwater Discharge Permit	
	By: Joseph E Melton	10/22/2019

CEC Commitment Listing

Comment for CEC Part 2 Questions 4, 5, and 9

DATE: October 3, 2019 (Revised 02/10/2020)
REQ #: 34211
PROJECT TITLE: ANDERSON TN 500-KV SUBSTATION
PREPARED BY: Kim Pilarski-Hall, Biological Compliance Programs

For Part 2, #4 - *Potentially affect Wild and Scenic Rivers or their tributaries?* No
Commitment: None
Comments: Because no such designated waters occur at or adjacent to the project site, the proposed action is not anticipated to impact Wild and Scenic Rivers or their tributaries.

For Part 2, #5 - *Potentially affect a stream on the Nationwide Rivers Inventory (NRI)?*
Commitment: None
Comments: The Clinch River, designated as a stream on the NRI, is located 0.50-miles from the proposed project site. This is of sufficient distance such that there will no impacts to this NRI feature.

For Part 2, #9 - *Potentially affect ecologically critical areas, federal, state, or local park lands, national or state forests, wilderness areas, scenic areas, wildlife management areas, recreational areas, greenways, or trails?* Yes
Commitment: None
Comments: There are no natural areas within the proposed project footprint. However, there is a 5.7-mile trail (Melton Lake Greenway) that begins at Solway Park and extends northeast to Haw Ridge Park. A 0.25-mile section of this trail passes in close proximity (130-feet) to the substation site. Project construction-related activities could have some negative impacts on users as they pass through this section of the trail. Because this trail segment is relatively short section of the trail and considering the limited duration of construction activities, overall impacts on trail users are expected to be minor and temporary.
The natural areas listed below are within three miles of the proposed project, yet are of sufficient distance such that there will be no direct, indirect, nor cumulative impacts to natural areas as the result of this project.

Natural Area	Distance from Project (miles)
Haw Ridge Park	0.05
Chestnut Ridge Bluff TVA Habitat Protection Area	0.88
Pine Ridge Bluff TVA Habitat Protection Area	1.26
University of Tennessee Arboretum / Wildlife Observation Area	1.49
Pumping Station Embayment Slope TVA Habitat Protection Area	1.5
Solway Bend Bluffs	1.67
Three Bends Wildlife Refuge	1.8
Lower Bull Run TVA Habitat Protection Area	2.38
Palisades Subdivision Embayment TVA Habitat Protection Area	2.73

Comment for CEC Part 2 Question 6: Potentially affect wetlands

TVA CATEGORICAL EXCULSION CHECKLIST (CEC) INPUT – WETLANDS

DATE: October 4, 2019
REQ /PSO#: 34211/440945
PROJECT TITLE: ANDERSON 500KV SUBSTATION AND TL MODIFICATIONS
CUSTOMER: Joe Melton, Environment-Transmission
PREPARED BY: Britta Lees, Biological Compliance-Wetlands

Field surveys were conducted in May, August, and September 2019, to map wetlands on the proposed 50-acre Anderson 500kV substation site, all rights-of-way area proposed for modifications necessary to support the new substation, and all pole replacement and access road work necessary for fiber optic ground wire (OPGW) installation. Five wetlands were mapped on the substation parcel, but all are located outside the construction zone and would not be impacted (see Table W-1). Two wetlands were identified along rights-of-way area were transmission line work is proposed (Table W-1). Wetland boundaries were mapped with a Trimble ProHX geographic positioning system and ESRI ArcMap 10.5.1 mapping software.

Activities in wetlands are regulated by state and federal agencies to ensure no net loss of wetland resources. Under the Clean Water Act (CWA) §404, activities resulting in the discharge of dredge, fill, and potential secondary impacts resulting in degradation to waters of the U. S., including wetlands, must be authorized by the U.S. Army Corps of Engineers (USACE) through a Nationwide, Regional, or Individual Permit. CWA §401 of the Clean Water Act requires state water quality certification for projects requiring USACE approval. In Tennessee, the Department of Environment and Conservation (TDEC) is responsible for issuance of water quality certifications pursuant to Section 401. Lastly, Executive Order 11990 requires federal agencies to avoid construction in wetlands and minimize wetland degradation to the extent practicable. 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 2012).

Using the Tennessee Rapid Assessment Method (TRAM) wetlands were evaluated by their functions and classified into three categories: low, moderate quality, or exceptional resource value (TDEC 2015). 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. Exceptional resource value wetlands offer high functions and values within a watershed or are of regional/statewide concern. These 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 superior quality wetlands often represent restoration goals for wetlands functioning at a lower capacity.

Table W-1. Wetlands within the Anderson 500kV SS Project Footprint.

Wetland ID	Type[1]	TRAM Category (score)	Location	Wetland Acreage in Review Area	Wetland Impacts
W001-TL5648[2]	PFO1E	Low (23)	Adjacent to AR09[3] Between Str. 45 and Str. 46	0.04	None -- Avoid
W002-TL5658	PEM1E	Low (21)	Between Str. 47 and Str. 48	0.04	None -- Avoid
W001-SS[4]	PEM1E	Low (37)	Substation Parcel	0.06	None -- Avoid
W002-SS	PFO1E	Moderate (47)	Substation Parcel	0.03	None -- Avoid
W003-SS	PEM1E/H	Moderate (49)	Substation Parcel	0.10	None -- Avoid
W004-SS	PEM1E	Low (39)	Substation Parcel	0.01	None -- Avoid
W005-SS	PEM1E	Low (39)	Substation Parcel	0.01	None -- Avoid
			TOTAL	**0.29 Acre**	**0.00 Acre**

[1]Classification codes as defined in Cowardin et al. (1979): PEM1 = Palustrine emergent, persistent vegetation; E = Seasonally flooded/saturated; FO=Forested; 1=broadleaf deciduous

[2]TL=Transmission Line number

[3]AR=Access Road number

[4]SS=Substation Site

W001 on transmission line #5648 (W001-TL5658) is a forested wetland depression located in the woodland strip comprising a natural valley between two right-of-ways. Access road #9 is adjacent to this wetland, crossing the drainage swale at the southern end of W001-TL5658 that serves as the wetland's discharge point. This wetland contained standing water at the time of the site visit. The duration of inundation has been adequate for development of hydric soil coloration. W001-TL5658 was dominated by black willow and in the overstory and rice cut grass and soft pathrush in the understory, all of which are hydrophytic species. W001-TL5658 exhibited low functional capacity due to small size and past disturbances.

W002 on transmission line #5658 (W002-TL5648) is an emergent wetland within a small drainage swale in the Ten Mile Creek floodplain crossed by the right-of-way. W002-TL5648's geomorphic position and presence of crayfish burrows indicates sufficient hydrology for wetland development. Soils were grey and mottled soil within the top 12", indicative of hydric conditions. Dominant vegetation consisted of tall thoroughwort, cattails, and jewelweed, all hydrophytic species. W002-TL5648 scored as low value, indicating less than desirable provision of wetland functions.

W001 on the substation parcel (W001-SS) is an emergent wetland feature located along an intermittent stream in the southeast quarter of the tract. This wetland exhibited saturated soils, which has resulted in soil profile coloration that is grey and mottled, indicating the presence of hydric conditions. W001-SS was dominated by wetland sedges, giant goldenrod, and monkeyflower. W001-SS scored as a low value wetland resource due primarily to its small size and hydrologic influence.

W002 on the substation parcel (W002-SS) is a forested wetland feature located along the same intermittent stream, but further downstream near the confluence with the embayment along Melton Hill Lake. This wetland exhibited saturated soils, which has resulted in soil

profile coloration that is grey and mottled, indicating the presence of hydric conditions. The soil profile, however, was shallow, with gravel present at an eight inch depth. W002-SS was dominated by American elm, sweetgum, and sycamore, all of which are hydrophytic species. W002-SS scored as a moderate value wetland resource, indicating a healthy provision of wetland functions.

W003 on the substation parcel (W003-SS) is an emergent wetland feature located along the on-site embayment on Melton Hill Lake. This wetland exhibited inundated and saturated soils, which has resulted in soil profile coloration that is grey and mottled throughout, indicating the presence of hydric conditions. W003-SS was dominated by rice cut grass and cattails, both obligate wetland species. W003-SS scored as a moderate value wetland resource due to its geomorphic position and influence on downstream water quality.

W004 on the substation parcel (W004-SS) is an emergent wetland feature within a linear drain that serves as an overflow channel for the adjacent main conveyance. This wetland's geomorphic position and drainage patterns indicate sufficient presence of wetland hydrology. Soil coloration was grey and mottled within ten inches from the soil surface, indicating the presence of hydric conditions. W004-SS was dominated by rice cut grass, beggar's ticks, and jewelweed, all of which are considered wetland species. W004-SS scored as a low value due to its small size and associated lack of influence on downstream hydrology.

W005 on the substation parcel (W005-SS) is an emergent wetland feature located along the west side of a perennial stream along the eastern side of the tract. This wetland exhibited saturated soils, which has resulted in soil profile coloration that is grey and mottled, indicating the presence of hydric conditions. W005-SS was dominated by beggar's tick, rice cut grass, and knotweed, all of which are considered wetland species. W005-SS scored as a low value wetland resource due primarily to its small size and associated lack of hydrologic influence.

All wetlands within the review area footprint will be avoided entirely by the proposed Anderson 500kV substation construction and associated transmission line work. Their presence shall be noted and their boundaries shall be transferred onto work plans to ensure avoidance of these wetland resources. Substation construction impacts shall remain north and west of all delineated wetlands on the substation parcel. In compliance with TDEC/USACE CWA 404/401 regulations, hydrology conveyed through the drainage feature proposed for impacts on the substation site shall be adequately routed to ensure no hydrologic impacts to the downstream wetlands associated with this regulated water feature. The two wetlands located on the transmission line rights-of-way where work is proposed would be circumnavigated by equipment for structure access. Therefore, due to the avoidance measures in place, no significant wetland impacts are anticipated to result from the proposed activities.

Literature Cited

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. *Classification of Wetland and Deepwater Habitats of the United States*. Washington, D.C.: U.S. Fish and Wildlife Publication FWS/OBS-79/31.

Environmental Laboratory. 1987. *Corps of Engineers Wetland Delineation Manual*. Vicksburg, Miss.: U.S. Army Corps of Engineers Waterways Experiment Station. Technical Report Y-87-1

Lichvar, R.W., D.L. Banks, W.N. Kirchner, and N.C. Melvin. 2016. *The National Wetland Plant List*: 2016 wetland ratings. Phytoneuron 2016-30: 1-17. Published 28 April 2016. ISSN 2153 733X.

Tennessee Valley Authority. 2017. A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities, Revision 3. Edited by G. Behel, S. Benefield, R. Brannon, C. Buttram, G. Dalton, C. Ellis, C. Henley, T. Korth, T. Giles, A. Masters, J. Melton, R. Smith, J.Turk, T. White, R. Wilson. Chattanooga, TN.

U.S. Army Corps of Engineers. 2012. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region Version 2.0*, ed. J. F. Berkowitz, J. S. Wakeley, R. W.Lichvar, C. V. Noble. ERDC/EL TR-12-9. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

Comment for CEC Part 2 Questions 1, 10, and 16

ENVIRONMENTAL REVIEW – Project #34211
Anderson, TN 500kV Greenfield Substation - WO: 33R4D; 435787
October 17, 2019

BOTANICAL INPUT AS FOLLOWS:

For Part 2.1 – *Potentially affect T & E species?*
No – Adam Dattilo/David Nestor
Commitment: None
Comments: An August 1, 2019 query of the TVA Heritage database indicates no federally listed plant species and twenty-one state-listed plant species are known from within five miles of the proposed project (Table 1). No additional federally listed plant species are known from Anderson and Knox Counties, Tennessee, where the project resides. Habitat capable of supporting rare plant species was present in parts of the project area; however, rare plants were not observed during the August 5 and September 17, 2019 field surveys. The proposed action would not affect federal or state-listed plant species.

For Part 2.10 – *Contribute to the spread of exotic or invasive species?*
Yes – Adam Dattilo/David Nestor
Commitment: None
Comments: It is likely that project related construction would result in localized increases of invasive plants, but the plants most likely to colonize the area are distributed widely throughout the region and implementation of the proposed project would not change this situation. The project would not significantly contribute to the spread of exotic or invasive species.

For Part 2.16 – *Potentially affect unique or important terrestrial habitat?*
No – Adam Dattilo/David Nestor
Commitment: None
Comments: No uncommon plant communities are known from the vicinity of the project area and no rare plant communities occur at the project site during the field survey. Implementation of the proposed project would not potentially affect unique or important terrestrial habitat.

Project Title: Anderson, TN 500kV Greenfield Substation & Associated TL Work - (Project #440945)
Project Type: Environmental Assessment
Media Area: Terrestrial Zoology
Reviewer's Name: Jesse Troxler
Date Submitted: 10/4/2019

Chapter 3: Affected Environment
Terrestrial Ecology
Habitat assessments for terrestrial animal species were conducted in the field on August 5, 2019 for the Anderson, TN 500-kV substation and on September 17, 2019 for the associated transmission line (TL) modifications. The area reviewed was approximately 51.3 acres and the substation footprint was approximately 14.2 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., right-of-way, pasture and agricultural), and residential or otherwise disturbed areas. Approximately 10.4 acres of forested habitat exist within the reviewed area and approximately 2.3 acres of forested area within the substation footprint are suitable habitat for federally listed bats. All TL right-of-ways (ROWs) and access roads (ARs) are existing and would be 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.

Deciduous and mixed deciduous-evergreen forests occupy approximately 10.4 acres of the habitat within the project review area. Deciduous and mixed evergreen-deciduous forests within the project footprint contain a mixture of canopy species that includes: northern and southern red oak, white oak, hackberry, yellow poplar, sugar maple, elm, American hornbeam, sweetgum, sycamore, shagbark hickory, and other hickories and pines. Deciduous and mixed forest types provide habitat for an array of terrestrial animal species. Birds typical of this habitat include scarlet tanager, summer tanager, yellow-billed cuckoo, white-eyed vireo, red-eyed vireo, yellow-throated vireo, yellow-throated warbler, Kentucky warbler, red-bellied woodpecker, wood thrush, wild turkey, red-tailed hawk, red-shouldered 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, evening bat, tricolored bat, northern long-eared bat, and Indiana bat. Eastern chipmunk, eastern woodrat, bobcat, and gray fox 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 dusky salamander, northern slimy salamander, upland chorus frog, gray treefrog, and wood frog (Bailey et al. 2006, Petranka 1998).

Approximately 0.2 acres of wetland were recorded within the project review area. Both emergent and forested wetlands were recorded within the project footprint. Sweetgum, sycamore, red maple, green ash, and winged elm are common in this habitat type. Such habitat provides resources for birds including pileated woodpecker, barred owl, northern harrier, red-winged blackbird, wood duck, song sparrow, northern parula, swamp sparrow, and white-throated sparrow (National Geographic 2002; Nicholson 1997). American beaver, southeastern shrew, golden mouse, muskrat, and mink are common mammals in emergent wetland and aquatic communities (Kays and Wilson 2002; Whitaker 1996). River cooter, 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; Scott and Redmond 2008). Amphibians typical of this region found in and around emergent wetlands and open streams include American bullfrog, northern cricket frog, eastern newt, green frog, and southern two-lined salamander (Bailey et al. 2006; Petranka 1998).

Existing TL ROWs containing early successional habitat comprise approximately 27 acres of the project review area. This project also includes modifications to TVA’s transmission system using existing ROWs and ARs outside the 51.3 acre review area. 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). White-tailed deer, groundhog, coyote, eastern cottontail, 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 North American racer, ring-necked snake, and Dekay's brown snake are also known to occur in this habitat type (Bailey et al. 2006; Conant and Collins 1998; Dorcas and Gibbons 2005). Pollinators such as ailanthus web worm moth, red-spotted purple, gulf fritillary, great spangled fritillary, eastern tiger swallowtail, and monarch butterflies may be observed in this region (Brock and Kaufman 2003).

Existing TLs to be modified are in developed areas and areas otherwise previously disturbed by human activity. These areas are home to a large number of common species. American robin, American crow, eastern phoebe, common nighthawk, 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 and eastern fence lizard (Conant and Collins 1998; Dorcas and Gibbons 2005).

Review of the TVA Regional Natural Heritage database in October 2019 indicated 2 recorded caves within three miles of the substation area and approximately 38 additional caves within three miles of the TL modification work with the nearest approximately 0.5 miles from the proposed actions. No additional caves were identified during field review in August and September, 2019. No other unique or important terrestrial habitats were identified within the project area. Further, two wading bird colonies have been documented within three miles of the project area, the nearest 1.0 miles away. No new wading bird colony or osprey records were recorded during field review.

Review of the USFWS's Information for Planning and Consultation website in October 2019 resulted in sixteen migratory bird species of conservation concern identified as having the potential to occur in the project action area (bald eagle, black-billed cuckoo, bobolink, Canada warbler, cerulean warbler, eastern whip-poor-will, golden eagle, golden-winged warbler, Henslow's sparrow, Kentucky warbler, northern saw-whet owl, prairie warbler, red-headed woodpecker, rusty blackbird, wood thrush, and yellow-bellied sapsucker). Suitable nesting or foraging habitat exists in the action area for bald eagle, black-billed cuckoo, bobolink, Canada warbler, eastern whip-poor-will, Kentucky warbler, northern saw-whet owl, prairie warbler, red-headed woodpecker, wood thrush, and yellow-bellied sapsucker.

Terrestrial Ecology – Threatened and Endangered Species

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.

A review of literature and the TVA Regional Heritage database in October 2019 resulted in records of eight state-listed terrestrial animals, (eastern slender glass lizard, hellbender, Tennessee cave salamander, peregrine falcon, barn-owl, southeastern shrew, little brown

bat, tricolored bat) and one federally listed species (gray bat) within three miles of the project area. Two additional federally listed species, (Indiana bat, and northern long-eared bat) and one federally protected species, (bald eagle) are known from Anderson and/or Knox Counties (Table X-1).

Table 1. Federally listed terrestrial animal species reported from Anderson and Knox Counties, Tennessee and other species of conservation concern documented within three miles of Anderson, TN 500kV Greenfield Substation and TL - WO: 33R4D; 435787[1]

Common Name	Scientific Name	Status[2]	
		Federal	State (Rank[3])
Reptiles			
Eastern slender glass lizard	*Ophisaurus attenuatus longicaudus*	-	D(S3)
Amphibians			
Hellbender	*Cryptobranchus alleganiensis*	PS	E(S3)
Tennessee cave Salamander	*Gyrinophilus palleucus*	-	T(S2)
Birds			
Peregrine falcon	*Falco peregrinus*	-	-(S1B)
Barn-owl	*Tyto alba*	-	-(S3)
Bald eagle[4]	*Haliaeetus leucocephalus*	DM	D(S3)
Mammals			
Southeastern Shrew	*Sorex longirostris*	-	-(S4)
Little brown bat	*Myotis lucifugus*	-	T(S3)
Tricolored Bat	*Perimyotis subflavus*	-	T(S2S3)
Gray bat	*Myotis grisescens*	LE	E(S2)
Indiana bat[4]	*Myotis sodalis*	LE	E(S1)
Northern long-eared bat[4]	*Myotis septentrionalis*	LT	T(S1S2)

[1] Source: TVA Regional Natural Heritage Database and USFWS Ecological Conservation Online System (http://ecos.fws.gov/ecos/home.action) extracted 10/1/2019.
[2] Status Codes: D = Deemed in Need of Management; DM = Delisted and Monitored; E or LE = Listed Endangered; LT or T = Listed Threatened; PS = Partial Status.
[3] State Ranks: S1 = Critically Imperiled; S2 = Imperiled; S3 = Vulnerable; S4 = Apparently Secure.
[4] Federally listed species know from Anderson and Knox Counties, TN but not from within three miles of the project area.

Eastern slender glass lizards prefer dry, open grasslands or woodlands. They are typically found in dried grass or burrows; occasionally in vacant lots and farms. Females lay eggs under logs or other cover during spring and summer. Eggs hatch in a couple of months. The nearest records of this species were collected at unspecified locations in Knoxville. Suitable habitat is present within the project action area however all records within 3 miles are historical, the most recent from 1951.

Hellbenders favor clear, rocky creeks and rivers with water temperatures that are ideally less than or equal to 20°C, where there are large shelter rocks. Eggs are laid in nests in late summer or fall beneath these large, flat shelter rocks or submerged logs. The nearest hellbender record is 0.6 miles from the TL in Melton Hill Reservoir and is possibly historical. This section of the Clinch River was impounded in 1963 and it is likely that this record from 1976 represents an individual that survived. It is unlikely that a population has persisted in the Reservoir.

Tennessee cave salamander is an aquatic, cave obligate amphibian. This species is affected by water quality degradation from above ground disturbance. The nearest record for the species is in a cave approximately 1.7 miles from the TL. The nearest caves are approximately 2.1 miles from the proposed substation and 0.5 miles from the existing TL. Two caves are known within 3 miles of the substation footprint and 38 additional caves are known within 3 miles of the TLs but none were observed during field surveys.

Peregrine falcons often nest on ledges or holes on faces of rocky cliffs or crags. Ideal locations include undisturbed areas with a wide view, near water, and close to plentiful prey. Substitute man-made sites include tall buildings, bridges, rock quarries, and raised platforms. When not breeding, this species occurs in areas where prey concentrate. They feed primarily on birds including medium-size passerines up to small waterfowl. The nearest non-historical record of this species is from the TVA east tower, 1.9 miles from the TL. The project footprint does not contain ideal nest sites but may include suitable foraging areas.

Barn owls inhabit open areas, including agricultural fields, grasslands and marshes. They nest in hollow trees and in buildings where there is not much human activity. Nesting may occur throughout the year but peaks in spring. The nearest record of this species is a nest 2.1 miles from the TL. Suitable nesting and foraging habitat for this species exists throughout forest fragments in the project footprint.

Bald eagles are protected under the Bald and Golden Eagle Protection Act (USFWS 2013) and the Migratory Bird Treaty Act (16 United States Code §§ 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. The nearest bald eagle nesting record is 5.6 miles outside of the project footprint. Suitable nesting and roosting areas were observed within the substation footprint. Foraging habitat exists on the adjacent Melton Hill Reservoir. No additional nests or individuals were observed during field surveys in August or September 2019.

Southeastern shrews are found in variety of habitat from bogs to damp woods to upland shrubby or wooded habitat. This species prefers moist to wet areas usually bordering swamps, marshes, or rivers and heavy ground cover. The nearest record of this species is 0.4 miles from the project footprint. Suitable habitat for this species is present within the substation and TL project footprints.

Little brown bats primarily hibernate in caves and mines. During summer this species can be found in hot buildings, where females form nursing colonies. Colonies are usually close to water bodies where these bats prefer to forage. Foraging also occurs among trees in open areas. Tricolored bats are associated with forested landscapes where they forage near trees and along waterways, especially riparian areas. Maternity and other summer roosts are mainly in dead or live tree foliage. Caves, mines, culverts, and rock crevices may

be used as night roosts and hibernacula. Gray bats are a federally listed species associated year-round with caves, roosting in different caves throughout the year (Brady et al. 1982, Tuttle 1976). Gray bats disperse from colonies at dusk to forage along waterways (Harvey 1992). Melton Hill Reservoir and various smaller waterways are present within the project area and may provide foraging habitat for each of these species. The substation footprint contains suitable roosting and foraging habitat for tricolored bat. The nearest known little brown bat and tricolored bat records are from a hibernaculum approximately 2.3 miles from the substation footprint. The nearest gray bat record is from a hibernaculum approximately 1.7 miles from the TL. Two caves are known within 3 miles of the substation footprint and 38 additional caves are known within 3 miles of the TLs.

Indiana bats hibernate in caves in winter and use areas around them in fall and spring (for swarming and staging), prior to migration back to summer habitat. During the summer, Indiana bats roost under the exfoliating bark of dead and living trees (typically greater than 5 inches in diameter) in mature forests with an open understory, often near sources of water (USFWS 2018). Indiana bats are known to change roost trees frequently throughout the season, yet still maintain site fidelity, returning to the same summer roosting areas in subsequent years. This species forages over forest canopies, along forest edges and tree lines, and occasionally over bodies of water (Pruitt and TeWinkel 2007, Kurta et al. 2002, USFWS 2018). 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). The nearest records of Indiana bat and northern long-eared bat are from mist-net captures approximately 3.5 miles away. Foraging habitat for both species exists in the substation footprint, over water bodies, and less developed sections of the TL ROWs. Two caves are known within 3 miles of the substation footprint and 38 additional caves are known within 3 miles of the TLs.

Assessment of the project area for presence of summer roosting habitat for Indiana bats and northern long-eared bat followed federal guidance (USFWS 2014, 2015, 2018). Field surveys resulted in the identification of 67 suitable roost trees scattered throughout the 10.4 acres of suitable forested habitat within the project review area. Habitat quality was moderate, based on the presence of trees with exfoliating bark (i.e., 49 white oaks, 11 snags, 7 shagbark hickories) and fragmented nature of the reviewed area. Solar exposure and proximity to water sources was also considered. Suitable summer roosting areas were comprised of mature deciduous and mixed deciduous-evergreen stands containing red oak, white oak, hickory, ash, maple, elm, and pine species, hackberry, yellow poplar, musclewood, sweetgum, and sycamore.

Chapter 4: Environmental Consequences
Terrestrial Ecology – Wildlife
Alternative A

Under Alternative A (No Action Alternative), TVA would not construct the proposed substation or modify the existing transmission system. Soil, vegetation, and aquatic

features would remain in their current state and tree clearing and earth moving would not occur in association with this project. No direct or indirect impacts to wildlife would occur under the No Action Alternative.

Alternative B

Under Action Alternative B, TVA would construct the proposed substation and modify the existing transmission system. TVA would re-route lines adjacent to the site, add fiber optic wire to 18.5 miles of existing lines, and replace structures. TVA would convert up to 2.3 acres of forest and 7.4 acres of early successional habitat (existing ROWs) in the substation footprint to build a 500-kV substation. TVA would continue to maintain early-successional, herbaceous habitat (pastures, cultivated fields, residential areas) within the existing ROWs. 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 replaced. 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.

Approximately 2.3 acres of forest would be removed and permanently maintained as substation. 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. agricultural fields, residential homes, commercial development, 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.

Endangered and Threatened Species

Alternative A

Under Alternative A (No Action Alternative), TVA would not construct the proposed substation or modify the existing transmission system. Soil, vegetation, and aquatic features would remain in their current state and tree clearing and earth moving would not occur in association with this project. No direct or indirect impacts to threatened and endangered wildlife would occur under the No Action Alternative.

Alternative B

Under Action Alternative B, TVA would construct the proposed substation and modify the existing transmission system. TVA would re-route lines adjacent to the site, add fiber optic wire to 18.5 miles of existing lines, and replace structures. TVA would convert up to 2.3 acres of forest and 7.4 acres of early successional habitat (existing ROWs) in the project

footprint to build a 500-kV substation. TVA would continue to maintain early-successional, herbaceous habitat (pastures, cultivated fields, residential areas) within the existing ROWs.

Nine terrestrial animal species (eastern slender glass lizard, hellbender, Tennessee cave salamander, peregrine falcon, barn owl, southeastern shrew, little brown bat, tricolored bat, and gray bat) were assessed based on documented presence within three miles of the project footprint. Three additional federally protected species (bald eagle and Indiana bat, and northern long-eared bat) were addressed based on presence within Anderson or Knox County. All twelve of these species have the potential to utilize the project area.

Eastern slender glass lizard may occur within the herbaceous cover of the existing ROWs or the wooded areas that will be cleared for the substation. Direct effects to some individuals may occur if those individuals are present during the time of habitat removal. Due to the low likelihood of the occurrence of this species in the action area, populations of this species are not expected to be significantly impacted by the proposed actions.

Presence of a population of hellbenders in the project area is unlikely due to urban development and impoundment of the Clinch River since 1963. Use of BMPs (TVA 2017) would minimize sedimentation and other impacts to water bodies in the project area. Hellbender would not be affected by the proposed actions.

Tennessee cave salamanders are a cave obligate species. Although there are approximately 40 known caves within 3 miles of the project footprint, none are within 0.5 mile or are likely to be affected by the proposed actions. Adherence to BMPs will further reduce possible impacts to caves from sedimentation. This species would not be affected by the proposed actions.

Suitable nest sites for peregrine falcon are not present within the project footprint. Foraging behavior would not disrupted. Peregrine falcon would not be affected by the proposed actions.

Barn owl nest sites may be present in the forested areas proposed for clearing. Impacts may occur to individual nests or juveniles if clearing occurs during nesting. Some cleared areas would be maintained as herbaceous TL ROWs providing additional foraging habitat for this species. Similar nesting and foraging habitat is abundant in the project area and populations of barn owls would not be affected by the proposed actions.

No bald eagle nests are known in the project area and none were observed during field survey in August and September 2019. BMPs would be used to minimize impacts to the nearby reservoir. Actions are in compliance with the National Bald Eagle Management Guidelines. With the use of BMPs, bald eagles would not be significantly impacted by proposed actions.

Impacts to individual southeastern shrews may occur if the species is present in the project footprint during construction. Similar habitat is abundant in the project area and populations of southeastern shrews would not be affected by the proposed actions.

Little brown bats, tricolored bats, Indiana bats, and northern long-eared bats all hibernate in caves and gray bats roost in caves year-round. Although there are approximately 40 known caves within 3 miles of the project footprint, none are within 0.5 mile or are likely to be affected by the proposed actions. Adherence to BMPs will further reduce possible impacts to caves from sedimentation.

Foraging habitat for each of the five bat species addressed in this document exists throughout the proposed project area in forest fragments, ROW edges, and over water bodies and wetlands. BMPs would be used to minimize impacts to water bodies within the affected area, thus aquatic foraging habitat would not be impacted by the proposed actions. Forested foraging habitat within the substation footprint will be cleared but similar habitat is abundant in the surrounding area. Tree roosting species (tricolored bats, Indiana bats, and northern long-eared bats) may be impacted if maternity roost trees are cleared before pups are volant.

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) (TVA 2017b). 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 XXX) and need to be reviewed/implemented as part of the proposed project.

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Comment for CEC Part 2 Question 15: Potentially affect groundwater

EA Groundwater and Geology Input

Affected Environment – Groundwater and Geology

The project area is located in the Valley and Ridge Physiographic Province and is according to available mapping is underlain by Ordovician aged rocks (Swingle and Luther, 1964). The Valley and Ridge aquifer consists of folded and faulted bedrock comprised of carbonates, sandstone, and shale. Soluble carbonate rocks and some easily eroded shales underlie the valleys in the province, and more erosion-resistant siltstone, sandstone, and cherty dolomite underlie ridges. The arrangement of the northeast-trending valleys and ridges are the result of a combination of folding, thrust faulting, and erosion. Compressive forces from the southeast have caused these rocks to yield, first by folding and subsequently by repeatedly breaking along a series of thrust faults. The result of the faulting is that geologic formations are repeated several times across the region often with older age strata overlying rock of a younger geologic age. (Lloyd and Lyke, 1995).

Groundwater in the Valley and Ridge aquifers primarily is stored in and moves through fractures, bedding planes, and solution openings in the rocks. These aquifers are typically present in valleys and rarely present on the ridges. Most of the carbonate-rock aquifers are directly connected to sources of recharge, such as rivers or lakes, and solution activity has enlarged the original openings in the carbonate rocks. In the carbonate rocks, the fractures and bedding planes have been enlarged by dissolution of the rock. The dissolution occurs as slightly acidic water dissolves some of the calcite and dolomite which are the principle components of carbonate-rock aquifers. Chemical weathering progresses ultimately resulting in the development of karst features (caves, sinkholes, springs).

Generally, groundwater movement is from the ridges toward lower water levels adjacent to major streams that flow parallel to the long axes of the valleys. Most of the groundwater is discharged directly to local springs or streams (Lloyd and Lyke, 1995). In unconfined or poorly confined conditions, karst aquifers have very high flow and contaminant transport rates under rapid recharge conditions such as during storm events.

The chemical quality of water in the freshwater parts of the Valley and Ridge aquifers is similar for shallow wells and springs. The water is hard, is a calcium magnesium bicarbonate type, and typically has a dissolved-solids concentration of 170 milligrams per liter or less. In places where the residuum that overlies the carbonate rocks is thin, the Valley and Ridge aquifers are susceptible to contamination by human activities (USGS, 1995).

The source for public drinking water for Anderson County is primarily provided by surface water (EPA 2019). The population in the project area is supplied by this public water systems; however, some residences may also have private wells.

Environmental Consequences – Groundwater

Potential impacts to groundwater could result if sediments from excavated materials enter or clog sinkholes or springs, and from the transport of contaminants such as herbicides and fertilizers into sinkholes and other karst features. Available mapping indicates several sinkholes located in the project area. 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* (TVA 2017) 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. No cumulative impacts are anticipated.

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Comment for CEC Part 4 Question 5: Disproportionately affect minority or low-income populations

1.1 Socioeconomics and Environmental Justice

1.1.1 Affected Environment

The proposed substation would be constructed in the city of Oak Ridge in southern Anderson County, Tennessee. Associated transmission system modifications would also take place in areas of Anderson County, as well as in neighboring Knox and Blount Counties. Given the nature of the proposed actions, the study area for socioeconomic and environmental justice analysis is defined as the 32 census block groups encompassing or immediately adjacent to the proposed project actions. As the study area spans Anderson, Knox, and Blount counties, these three counties and the state of Tennessee 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 2013-2017 American Community Survey 5-year estimates provided by the U.S. Census Bureau (USCB) (USCB 2019a).

1.1.1.1 Demographic and Economic Conditions

Demographic characteristics of the communities that make up the study area and of the secondary reference geographies are summarized in Table 3-X. The study area has a resident population of 62,561 and is predominantly characterized by urban development associated with the city of Knoxville and its suburbs. The three counties encompassing the study area are all included in the Knoxville Metropolitan Statistical Area, and together their population accounts for approximately 10 percent of the total population of Tennessee. The counties range in population size from Anderson County (75,538 residents), portions of which are rural and mountainous, to Knox County (452,286 residents) which contains the more densely populated areas in and around Knoxville. Since 2010, the population within the block groups that make up the study area has increased by 6.9 percent, somewhat higher than the increases experienced by Knox and Blount counties (4.6 and 3.4 percent, respectively) and the state of Tennessee (4.0 percent). During this same period, the population of Anderson County essentially remained the same, experiencing a population increase of less than 1 percent.

Approximately 80 percent of the population within the study area is white. The largest minority group in the study area is Black or African American, representing 7.1 percent of the population, followed by Hispanic or Latino with 5.2 percent, Asian with 4.2 percent, and small numbers who are American Indian and Alaska Native, Native Hawaiian and Other Pacific Islander, some other race, or persons who identified as two or more races. Minority population percentages in the study area are generally slightly higher than those of the referenced counties, which have total minority populations ranging from 8.6 to 17.3 percent. However, compared to the state of Tennessee which has a total minority population of 25.7 percent, minority percentages in the study area tend to be similar to or lower than state levels (Table 3-X).

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

	Study Area (Census Block Groups Encompassing Proposed Actions)	Anderson County, TN	Knox County, TN	Blount County, TN	State of Tennessee
Population[1,2]					
Population, 2017 estimate	62,561	75,538	452,286	127,135	6,597,381
Population, 2010	58,497	75,129	432,226	123,010	6,346,105
Percent Change 2010-2017	6.9%	0.5%	4.6%	3.4%	4.0%
Persons under 18 years, 2017	20.4%	21.1%	21.3%	20.9%	22.7%
Persons 65 years and over, 2017	13.5%	19.2%	14.8%	18.9%	15.4%
Racial Characteristics[1]					
Not Hispanic or Latino					
White alone, 2017 (a)	80.6%	89.6%	82.7%	91.4%	74.3%
Black or African American, 2017 (a)	7.1%	3.4%	8.8%	2.5%	16.7%
American Indian and Alaska Native, 2017 (a)	0.5%	0.1%	0.2%	0.3%	0.2%
Asian, 2017 (a)	4.2%	1.4%	2.1%	0.7%	1.7%
Native Hawaiian and Other Pacific Islander, 2017 (a)	0.1%	0.1%	0.0%	0.1%	0.1%
Some Other Race alone, 2017 (a)	0.2%	0.2%	0.2%	0.0%	0.1%
Two or More Races, 2017	2.0%	2.6%	1.9%	1.9%	1.9%
Hispanic or Latino, 2017	5.2%	2.7%	4.0%	3.1%	5.2%
Total Minority Percentage (b)	19.4%	10.4%	17.3%	8.6%	25.7%

(a) Includes persons reporting only one race.

(b) All non-white and Hispanic or Latino racial groups combined

Source: [1]USCB 2019a, [2]USCB 2011

Economic conditions of the study area and the secondary reference geographies are summarized in **Error! Reference source not found.**. The average median household income in the block groups that make up the study area is $56,144, which is higher than the median household income reported for the surrounding counties (ranging from $47,206 to $52,458) and the state of Tennessee ($48,708). Correspondingly, the percentage of the study area population falling below the poverty level is 13.3 percent, relatively low when compared to the surrounding counties and the state, where 13.0 to 16.7 percent of the population are living below the poverty level.

Within the block groups that make up the study area, there are 51,083 people over 16 years of age, 34,794 of which belong to the civilian labor force. The total employed civilian population is 33,260, with the unemployment rate at or 4.4 percent of the civilian labor force (1,534 people). This unemployment rate is noted to be slightly lower than the unemployment rates of the secondary reference geographies which range from 5.5 to 6.9 percent (**Error! Reference source not found.**3-XX).

Table 3-XX. Economic Conditions of Study Area and Secondary Reference Geographies

	Study Area (Census Block Groups Encompassing Proposed Actions)	Anderson County, TN	Knox County, TN	Blount County, TN	State of Tennessee
Housing and Income[1]					
Housing units, 2017	30,115	34,864	200,608	56,732	2,903,199
Median household income, 2013-2017	$ 56,144	$ 47,206	$ 52,458	$ 51,172	$ 48,708
Persons below poverty level, 2013-2017	13.3%	16.3%	15.8%	13.0%	16.7%
Persons below low-income threshold, 2013-2017 (a)	29.8%	36.3%	33.0%	32.7%	37.3%
Employment Characteristics[1]					
Population >16 years	51,083	61,430	366,908	104,133	5,270,257
Civilian Labor Force	34,794	34,601	235,712	61,987	3,207,366
Employed	33,260	32,213	222,748	58,333	2,996,610
Unemployed	1,534	2,388	12,964	3,654	210,756
Unemployment					
% of Total Population > 16 years	3.0%	3.9%	3.5%	3.5%	4.0%
% of Civilian Labor Force	4.4%	6.9%	5.5%	5.9%	6.6%

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

Source: [1]USCB 2019a, [2]USCB 2011

1.1.1.2 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. When applicable, the study area for the evaluation of impacts to community services is the service area of various providers; otherwise, a secondary study area identified for the purposes of a socioeconomic analysis may be defined. In this case, a 5-mile radius was utilized from both the substation site and along the length of the TL where modifications would occur to identify facilities and emergency services that could be potentially impacted by proposed project activities or emergency incidents.

Based on a review of aerial imagery and online information including the U.S. Geological Survey (USGS) Geographic Names Information System database, community facilities and services available within a 5-mile radius of the proposed project area include numerous schools and universities, churches, cemeteries, libraries, health care facilities, police and emergency services, and several small airports (USGS 2019). The majority of these facilities are concentrated in and around Knoxville, in the eastern portion of the study area, as well as in Oak Ridge, northwest of the proposed substation site. The proposed substation site itself is in a relatively rural area, with no community facilities in close proximity (within 0.5 mile). The closest facilities to the site consist of churches located in the

communities across Melton Hill Reservoir and the Oak Ridge Memorial Park cemetery located approximately 1.8 miles to the southwest.

1.1.1.3 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 the 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 2018 USCB Poverty Threshold for an individual is an annual income of $13,064, and for a family of four it is an annual household income of $25,900 (USCB 2019b). 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 study 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, with the highest proportions of minority and low-income individuals concentrated along the eastern portion of the study area, near Knoxville. A more detailed evaluation was completed using the 2013-2017 American Community Survey data to identify specific block groups within the study area that exceed environmental justice thresholds.

Total minority populations (i.e., all non-white and Hispanic or Latino racial groups combined) comprise approximately 26 percent of the population of Tennessee. In the three counties where project activities are proposed, total minority populations range from 8.6 to 17.3 percent of the population. Approximately 19.4 percent of people living within the study area are minorities, with percentages for individual block groups ranging from 0.9 to 63.0 percent of the population. Eight of the block groups within the study area have minority populations that either exceed 50 percent of the total population or significantly exceed the minority percentage of one or more of the reference geographies. Figure 3-X identifies these block groups determined to meet the criterion for consideration as minority population groups subject to environmental justice considerations.

The percentage of the population of Tennessee living below the low-income threshold is 37.3 percent. Of the three counties considered, Anderson County has the highest percentage of low-income individuals (36.3 percent), followed by Knox County (33.0 percent), and Blount County (32.7 percent). Approximately 29.8 percent of people living within the study area are considered low-income, with percentages for individual block groups varying considerably, ranging from 6.5 to 82.4 percent of the population. Nine of the block groups within the study area have low-income populations that either exceed 50 percent of the total population or significantly exceed the low-income percentage of one or more of the reference geographies. Figure 3-X identifies these block groups determined to meet the criterion for consideration as low-income population groups subject to environmental justice considerations.

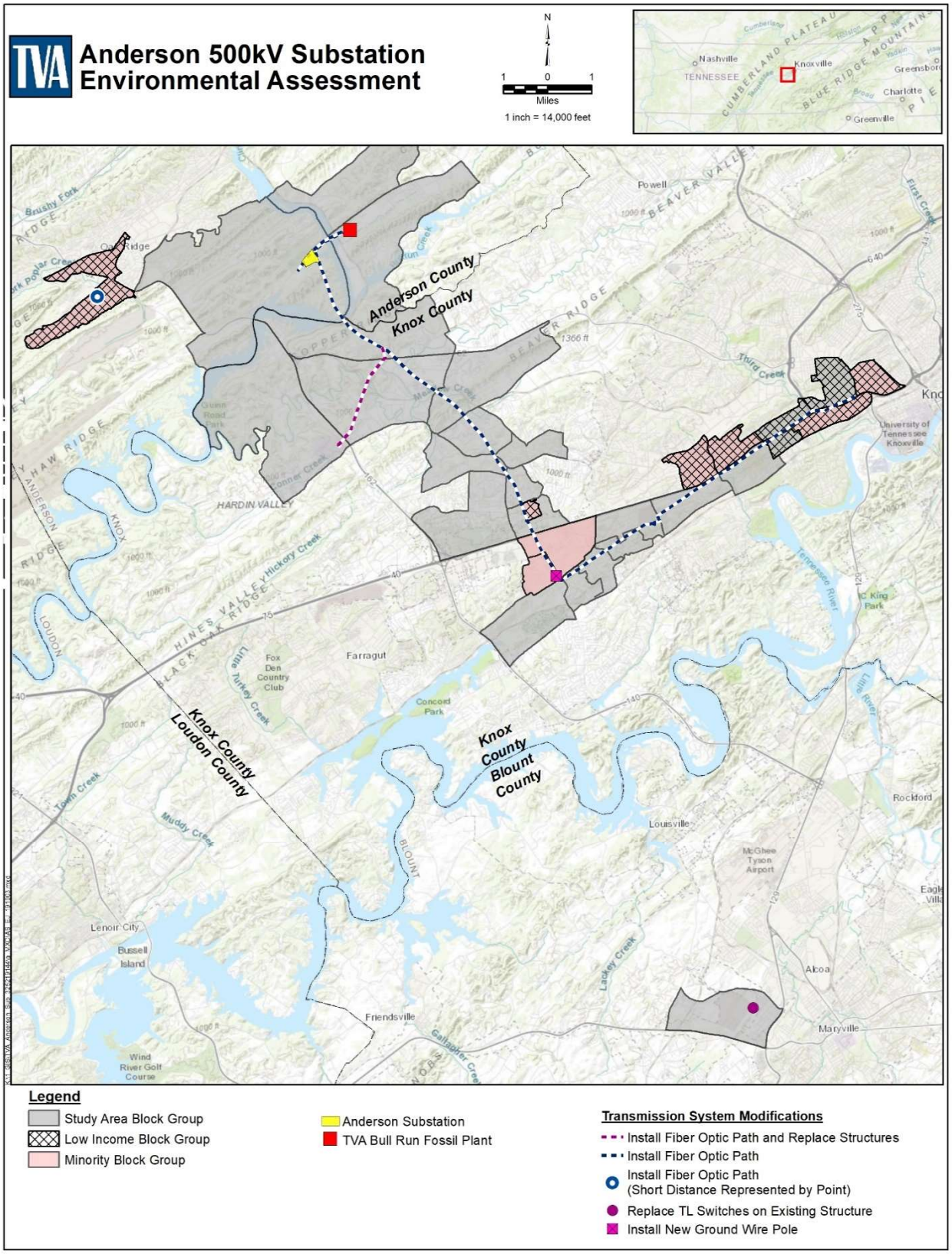
Anderson 500kV Substation
Environmental Assessment
N
1 0 1
Miles
1 inch = 14,000 feet
Nashville
Knoxville
TENNESSEE
Greenville
Anderson County
Knox County
Knox County
Loudon County
Knox
County
Blount
County
Powell
Oak Ridge
Farragut
HARDIN VALLEY
Lenoir City
Bussell Island
Louisville
Rockford
Alcoa
Maryville
Friendsville
Wind River Golf Course
Fox Den Country Club
Concord Park
Tennessee River
Legend
Study Area Block Group
Low Income Block Group
Minority Block Group
Anderson Substation
TVA Bull Run Fossil Plant
Transmission System Modifications
Install Fiber Optic Path and Replace Structures
Install Fiber Optic Path
Install Fiber Optic Path
(Short Distance Represented by Point)
Replace TL Switches on Existing Structure
Install New Ground Wire Pole

Figure 3-X. Environmental Justice Populations Within the Study Area

1.1.2 Environmental Consequences

1.1.2.1 No Action Alternative

Under the No Action Alternative, TVA would not construct the proposed 500kV substation in Anderson County or make associated modifications to the existing transmission system. Therefore, there would be no change in local demographics, socioeconomic conditions, or community services, and there would be no construction-related impacts to environmental justice populations. However, without the necessary upgrades to the transmission system, lapses in a continuous, reliable source of power could result in negative impacts to local industries as well as area residents, including environmental justice populations.

1.1.2.2 Action Alternative

1.1.2.2.1 Demographic and Economic Conditions

Under the Action Alternative, demographic and employment characteristics of the study area and surrounding counties are not expected to change significantly in response to the minor increase in workforce personnel. Proposed construction activities would occur over approximately three years and would entail the use of a construction workforce totaling between 10 and 35 workers at a given time. It is anticipated that most of these workers would be drawn from the labor force that currently resides in the region; however, some specialty workers and laborers not available within the area may be needed to support construction activities. Following construction, works crews would be present in the study area for occasional operation and maintenance activities. In both cases, given the relatively small workforce and that the majority of workers needed would likely be drawn from the existing labor force, impacts to demographics and local employment would be minor.

Potential economic impacts associated with the proposed project relate to direct and indirect effects of substation construction and operations. As the substation would be constructed on TVA property and associated transmission system modifications would occur within existing ROW, no new easements or property acquisition would be required. However, construction and maintenance activities would 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 workforce personnel in the local communities.

In addition, the implementation of the proposed Action Alternative would provide a continuous, reliable source of power for the cities of Knoxville, Oak Ridge, and the surrounding service area. Currently, the existing Bull Run 500kV transformer can overload in spring peak load conditions during maintenance, as well as during sensitivity studies, resulting in major reliability issues within the service area (Section 1.X). With the impending loss of generation at the Bull Run Fossil Plant, upgrades to the transmission system are needed to maintain reliability and provide operational flexibility. The increased reliability of service that would be provided under the Action Alternative would benefit the area by helping to maintain economic stability and growth.

There is also the potential for indirect effects to local residential property values for those parcels in the vicinity of transmission lines and related facilities such as substations. These effects can vary greatly depending on local conditions such as distance between residences and the facilities, demand for local real estate, and the extent to which an adjoining property is encroached upon by the ROW easement or facility. Siting of the proposed substation and the associated connections would occur on existing TVA property

and would not require new acquisition from any local residential properties. Most residences in the vicinity of the proposed substation site are located to the northwest on Park Meade Place and Center Park Lane, on the opposite side of Edgemoor Road. Thus, the proposed substation site is not immediately adjacent to any residences and is somewhat blocked from view by intervening vegetation. Associated transmission system modifications would occur along segments of existing transmission line which would be unlikely to result in any notable changes to adjacent property values. Therefore, any effects to local property values from the proposed project would be minor.

1.1.2.2.2 Community Facilities and Services

Direct impacts to community facilities occur when a community facility is displaced or access to the facility is altered. Neither the construction of the proposed substation nor the associated modifications to the existing transmission system would result in the displacement of community facilities or impede access to any facilities. Therefore, there would be no direct impacts to community facilities or services under the Action Alternative.

Indirect impacts to community services may occur when a proposed action or project results in a population increase that would result in greater demands for services and/or affect the delivery of such services. As the substation construction and related project actions 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 substation or along the transmission line corridor, local law enforcement, fire, and/or EMS response would likely be required. Both the City of Oak Ridge, which would serve the substation location, and the City of Knoxville, which would serve much of the southeastern portion of the project area, have extensive emergency services that would be available in the event of an emergency. In addition, the need for emergency services at the substation or along the TL is anticipated to be a rare occurrence. Therefore, implementation of the Action Alternative would not have a notable impact on the demand for emergency services in the area.

1.1.2.2.3 Environmental Justice

Under the Action Alternative, TVA would construct a 500kV substation in Anderson County, which could result in minor impacts to nearby residents, including temporary impacts such as increased noise, fugitive dust, and air emissions during the construction period, as well as long-term visual impacts. However, the proposed facility 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. Additionally, no minority or low-income populations subject to environmental justice considerations were identified in the block groups encompassing or adjacent to the substation site (Figure 3-X). Therefore, the construction and operation of the proposed substation would have no direct impacts on environmental justice populations.

Construction of the proposed substation would temporarily result in additional traffic from the construction workforce, truck traffic associated with the transport of borrow to the site and spoil material from the site, and the heavy haul of substation transformers. The construction workforce is anticipated to range in size from 10 to 35 personnel per day over the approximately three-year construction period. Assuming vehicle occupancy of one person per vehicle, a peak construction workforce traffic volume would consist of 70 vehicles trips per day (35 vehicles inbound in the morning and 35 vehicles outbound in the afternoon). Impacts would be greatest where this traffic converges at the construction site;

however, no environmental justice populations were identified in the block groups encompassing or adjacent to the proposed substation site. At greater distances from the site, the workforce traffic would disperse throughout the transportation network and would likely use interstate highways or major arterial roadways when possible, where the additional vehicles would assimilate into existing traffic patterns. Therefore, the impact associated with the construction workforce traffic would be minor but would not be disproportionate as it would be consistent across all communities within the regional transportation network.

Spoil material generated at the project site during substation construction would be deposited in a designated spoil area located at TVA's Bull Run Fossil Plant at a rate of approximately five to ten truckloads per day. As the neither the substation location, nor the fossil plant, nor the route between the two are located in block groups with low-income or minority populations (Figure 3-X), spoil transport would have no impact on environmental justice communities. Borrow material may be required during construction and would be transported onsite from a previously developed and permitted borrow site at a rate of approximately five to ten truckloads per day. As a specific borrow location has not been identified, it is possible that the hauling of borrow material would pass through environmental justice communities. However, due to the small number of truck trips and temporary nature of the actions, any impacts to these communities would be minor. Similarly, the heavy haul of the substation transformers may pass through environmental justice communities and may cause traffic delays. However, the heavy haul would consist of four or five isolated events (one trip for each of four to five transformers) that would be coordinated with and permitted by the Tennessee Department of Transportation. Additionally, heavy equipment hauling would primarily utilize high-capacity roadways, minimizing impacts to residential areas. For these reasons, impacts from heavy hauling would be temporary and minor and would not be disproportionate, as impacts would be consistent across all communities in the vicinity of the haul route.

TL modifications associated with the proposed substation, including the temporary re-routes that would take place immediately adjacent to the substation site, the replacement of existing transmission structures, and the replacement of transmission line switches on an existing structure would have no impact on environmental justice populations, as these modifications would not represent an appreciable source of environmental pollution, air emissions, increased visual discord, or other effects that would lower the quality of the existing environment. Furthermore, no block groups meeting the criteria as a minority or low-income were identified in these areas (Figure 3-X).

A number of block groups encompassing or adjacent to the TL segments where a new fiber optic path would be installed and where a new ground wire pole is proposed were determined to meet the criteria for consideration as minority and/or low-income population groups subject to environmental justice considerations (Figure 3-X). However, impacts to environmental justice populations located along the proposed fiber optic routes would be minimal, as these modifications would take place along existing TL ROWs, and construction activities at any one point along the route would be short-term. Following construction, any impacts to environmental justice populations associated with the operation and maintenance of the TLs would be similar to those experienced under current conditions. Therefore, impacts to environmental justice populations associated with TL modifications 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 segments.

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Comment for CEC Part 4 Question 7: Produce visual contrast or visual discord

3.1.1 Visual Resources

3.1.2 Affected Environment

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.XX.

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 this analysis, the affected environment includes the areas within the proposed substation limits of disturbance and the existing ROW where associated TL modifications would occur, encompassing both permanent and temporary impact areas. The proposed substation site is located in southern Anderson County which is characterized by ridge and valley topography, with elevations within a 1-mile radius ranging from approximately 780 to 1,130 feet above mean sea level. The landscape is largely dominated by developed suburban and industrial features including residential development, roadways, existing utility corridors, and TVA's Bull Run Fossil Plant (BRF) which is located east of the proposed substation site on the opposite bank of Melton Hill Reservoir. The proposed substation site itself is currently occupied by multiple high-voltage (both 161-kV and 500-kV) TLs originating from BRF, as well as fragmented areas of mixed evergreen and deciduous forest. In the foreground to the north and west of the substation site are Edgemoor Road, residential neighborhoods and a private golf course, while densely wooded parkland associated with Haw Ridge Park is located to the south.

Modifications to the existing transmission system will occur along existing alignments extending through portions of Anderson, Knox, and Blount counties. These TL ROWs extend through suburban to urban areas with flat to rolling terrain. Portions of the ROWs extend through forested and agricultural land; however, the majority of modifications would occur in areas where the TL extends through highly developed residential and commercial areas.

The viewshed of certain facilities, such as dwellings, churches, schools, and outdoor recreation sites can be vulnerable to visual modifications in the surrounding landscape. A number of residences are located in the foreground of the proposed substation site, most of which are located in a neighborhood to the northwest, on the opposite side of Edgemoor Road. There is also a single residence, the J. B. Jones House, located to the southeast off Old Edgemoor Road. As this property is listed in the National Register of Historic Places (NRHP), the discussion of this resource and assessment of visual impacts to it are included in Section 3.XX.

Other sensitive visual receptors in the foreground of the proposed substation site, depicted in Figure 3-X, are limited to recreational facilities including the Melton Lake Greenway trail, of which a small portion extends through the TVA property approximately 130 feet from the proposed substation at its closest point; Haw Ridge Park, located south adjacent to the substation site; and the Centennial Golf Course, located to the northwest on the opposite side of Edgemoor Road. In the middleground (0.5 to 4 miles from the site), there are a large number of churches, cemeteries, schools, and other outdoor recreation facilities located near downtown Oak Ridge, as well in the smaller unincorporated communities in the vicinity. However, the closest of these sensitive visual receptors are located over one mile from the proposed substation site.

The composition and patterns of vegetation are the prominent features of the landscape, with high-voltage transmission lines and the stacks from the BRF constituting notable alterations to the viewshed of the project area and surrounding landscape. Vegetation consists of a variety of deciduous and evergreen trees and herbaceous ground cover. 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-X). The forms, colors, and textures in the project area are normally seen throughout the characteristic landscape and, therefore, it is not considered to have distinctive visual quality. In the foreground and middleground, the scenic integrity is considered moderate due to the notable human alteration including industrial, utility, and residential uses. However, in the background these alterations are not substantive enough to dominate the view of the landscape. 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 good.

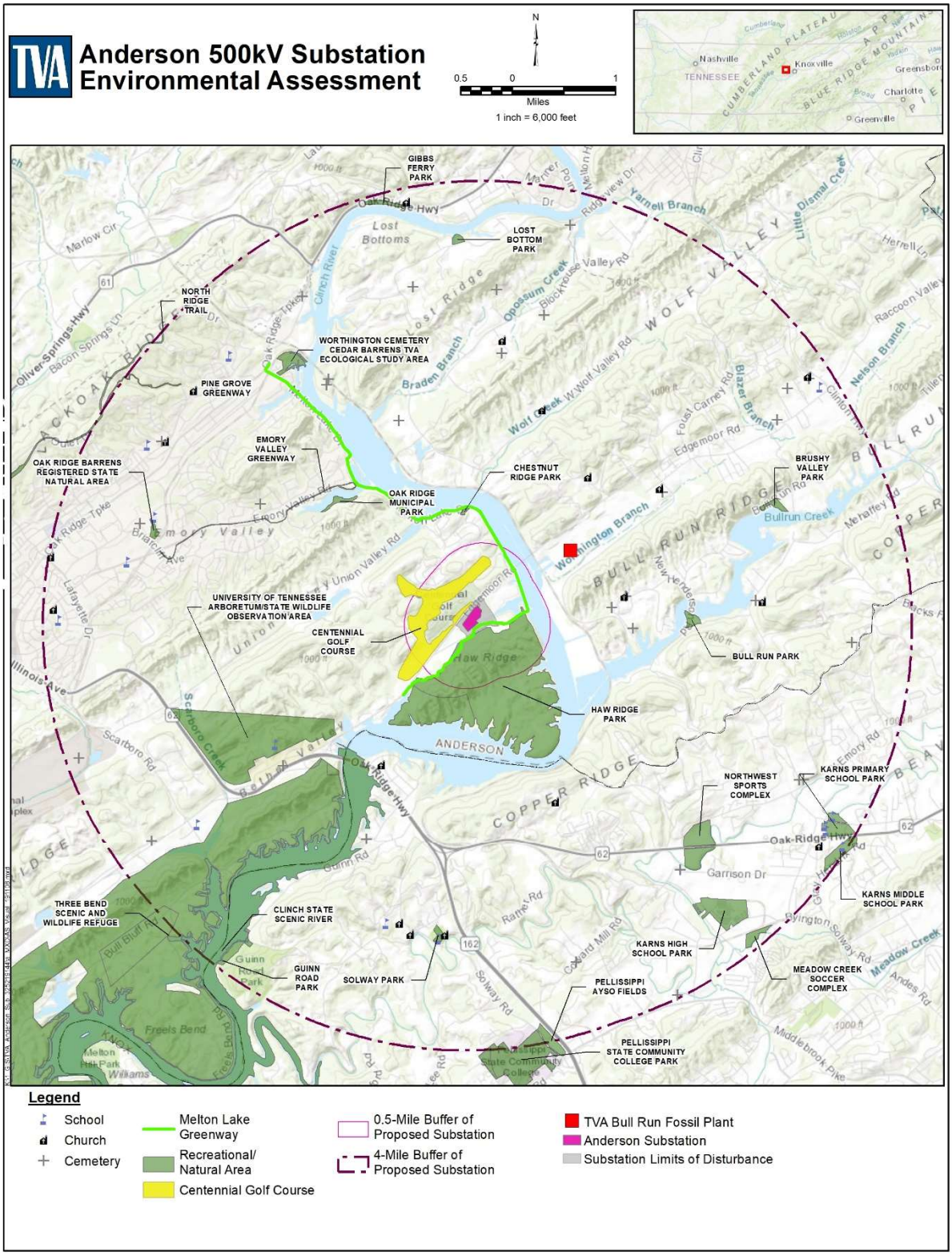

Figure 3-X. Sensitive Visual Receptors within Foreground and Middleground of Proposed Substation

Table 1-X. Visual Assessment Ratings for Project Area

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

3.1.3 Environmental Consequences

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.

3.1.3.1 No Action Alternative

Under the No Action Alternative, TVA would not construct the proposed 500-kV substation in Anderson County or make associated modifications to the existing transmission system. The landscape character and integrity would remain in its current state; therefore, there would be no impact to visual resources.

3.1.3.1 Action Alternative

Under the Action Alternative, construction of the proposed 500-kV substation and associated transmission system modifications would result in both short-term and long-term impacts to visual resources. During the approximately 3-year construction period, there would be some minor 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 surrounding areas have been 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.

Permanent impacts would include minor discernible alterations that would be viewed in the foreground of new substation. In more distant views, the substation would likely merge with the existing surrounding landscape, which is currently dominated by green and brown colors from the vegetation and vertical lines of trees and existing transmission structures against the horizon. The substation would primarily be visible in the foreground to users of Edgemoor Road as they pass north of the site. However, observers would be transient motorists who would only be exposed to these features for short periods of time.

Other visual receptors in the foreground include nearby residents and users of outdoor recreation sites such as the Melton Lake Greenway trail, Haw Ridge Park, and the Centennial Golf Course. The Melton Lake Greenway is a 5.7-mile paved trail that originates at Haw Ridge Park and travels generally north along the western shore of Melton Hill

Reservoir. Approximately one quarter mile of the trail is located north of Old Edgemoor Road on TVA property, just south of the proposed substation. Users of the trail would experience increased visual discord along this short segment, as they would have an unobstructed view of the substation. However, the viewshed from much of the Melton Lake Greenway has been considerably altered, as the portion on TVA property already parallels large, high-voltage transmission lines and much of the waterfront segment is dominated by views of the BRF and associated stacks. The addition of the substation would add another element that is discordant with the natural environment, but visually similar to the transmission towers and other structures currently seen from the Melton Lake Greenway trail. Haw Ridge Park is located immediately south of Old Edgemoor Road, and just south of the proposed substation site. The substation site may be visible from portions of the northernmost trails within the park, but due to the dense vegetation and varying topography, the substation would not be visible to the majority of the park users. The Centennial Golf Course is also located in the foreground, north of Edgemoor Road. The substation may be viewed by course users from several of the closest holes, as well as by residents that live in the neighborhood adjacent to the course. However, views would be largely buffered by intervening vegetation. Additionally, the current lines of sight from these locations are already altered by the existing transmission structures. The substation, which would have a maximum height of approximately 100 feet, would have a lower profile than the existing structures, as the 500-kV towers can reach heights of up to 150 feet. Overall, the construction and operation of the proposed substation would have minor visual impacts for area residents, motorists, and recreational users.

Based on the profile of the proposed substation and the topography and vegetation in the surrounding area, views from middleground and background distances would be minimal. Sensitive visual receptors in the middleground, such as schools, churches, and cemeteries, are located over one mile from the site, and thus would not experience direct visual impacts.

Necessary security lighting of the proposed substation would generate some additional local light during nighttime hours, which would cause a slight loss of dark sky conditions in the local area. Such lighting is designed to cast light downward and to minimize emissions above the horizontal plane. As described in *Tennessee Valley Authority Substation Lighting Guidelines*, TVA routinely designs substation lighting to accommodate the concerns of nearby residents. Although illumination from the proposed substation would contribute to the loss of dark sky conditions, this effect would be localized and minor.

Transmission structures tend to be the most common visible element of the electric transmission system, while the permanent removal of woody vegetation within the TL ROWs also create a visible corridor. The addition of lines on or near existing structures or ROW increases compatibility with the landscape and minimizes visual impacts. For this reason, where transmission line modifications such as the addition of a new fiber optic path or the replacement of existing structures are proposed, changes in the viewshed would be minimal and overall aesthetics would remain consistent with current conditions. Poles replaced along the Bull Run – Alcoa 161-kV TL are not anticipated to be more than 10 feet taller than existing poles, and the new ground wire pole proposed adjacent to the existing Ebenezer substation would be drastically shorter than those adjacent. There may be some minor visual discord along these alignments during the construction period due to an increase in personnel and equipment and the use of access roads. However, these minor visual obtrusions would be temporary, only lasting until the ROW has been restored.

The high-voltage TLs and associated structures already in place within the project area currently contribute some minor visual discord with the landscape. These elements contribute to the landscape's ability to absorb negative visual change. Additionally, forested areas bordering the substation site and variations in local topography would provide screening in the foreground allowing the landscape to absorb the visual changes associated with the proposed substation. Therefore, while the forms, colors, and textures of the landscape that make up the scenic attractiveness would be affected by the construction of the substation, it would still remain common or ordinary. However, in the foreground, the scenic integrity would be reduced to low as visually disruptive elements and human alterations would begin to dominate the landscape. Impacts to scenic integrity are anticipated to be greatest in the immediate foreground (0 to 300 feet) for motorists on Edgemoor Road and users of adjacent outdoor recreation sites, though these are minimized through vegetated buffers and visual compatibility with existing transmission system elements. There would be no change in the scenic integrity ratings for the middleground and background (Table 3-XX). 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 but remain classified as good in the middleground. While the construction of the proposed substation would contribute to a minor decrease in visual integrity of the landscape at the proposed site, 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 3-XX. 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

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Comment for CEC Part 4 Question 8 Potentially interfere with recreational or educational uses

Request ID 34211 – Anderson, TN 500kV Greenfield Substation
CEC level input
Recreation Resources
Robert A Marker (Recreation Planner)
2/29/2019

Part 4.8: Potentially interfere with recreational or educational uses? No
Commitments: No
Comments:
Centennial Golf Course is located just north of the proposed substation site. However, because Edgemoor Road separates the course from the substation site, development of the substation should not have an impact on use of the golf course. Solway Park is located approximately 1 mile from the project site. Because of the distance between this park and the substation site, no impact on park users are anticipated.
Transmission line work associated with the project could have some minor impact on two outdoor recreation areas. SEG 5657-3 and structures 26 and 27 are adjacent to AYSO Region 128 Soccer Fields and SEG 5657-1 and structure 20 are close to the Tennessee Rugby Park. Coordination with managers of these areas in advance of line or structure work should result in insignificant impacts on use of these areas.

Comment for CEC Part 4 Question 10 Potentially generate highway or railroad traffic problems

1.2 Transportation

1.2.1 Affected Environment

The proposed Anderson Substation site is located within southern Anderson County west of Melton Hill Reservoir near Clinch River Mile 48. State Route (SR) 170, also known as Edgemoor Road in this area, borders the site to the north and Old Edgemoor Road borders the site to the south. SR 170 crosses Melton Hill Reservoir just to the northeast of the site and continues into the town of Claxton. Nearby, major interstates include Interstate 75 (I-75) and I-40. The major traffic generator in the immediate area of the site is the TVA Bull Run Fossil Plant (BRF).

The road network near the proposed substation site, depicted in Figure 3-X, provides access to several higher capacity roadways that extend to the interstate highways, to Oak Ridge, to the greater Knoxville area, and beyond. The following provides descriptions of the local and regional roadways:

- SR 170 is a moderate volume two-lane roadway, with shoulders, which extends west to SR 62 near Oak Ridge, and east past I-75.
- Old Edgemoor Road is a low volume narrow two-lane roadway with no shoulders that intersects SR 170 just west of the proposed substation site and extends along the south boundary of the site.
- Melton Lake Drive connects SR 170 on the south end to SR 95 on the north end at the town of Elza.

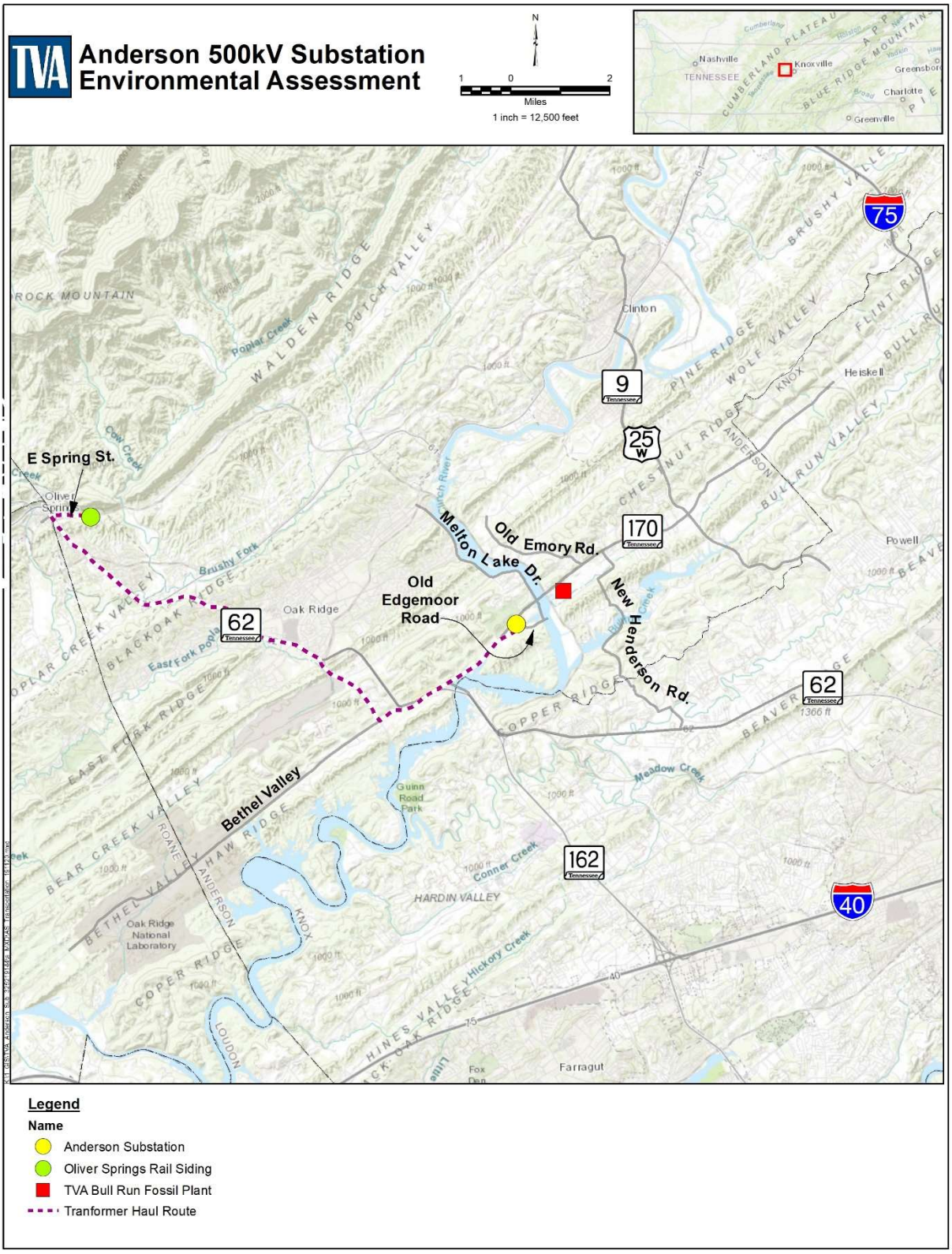

Figure 3-X. Regional Roadway Network and Proposed Transformer Haul Route

- Old Emory Road is a two-lane local road with no shoulders that intersects SR 170 opposite the Bull Run Fossil Plant and extends north into the local area on the east side of Melton Hill Reservoir.
- New Henderson Road is a two-lane local road with no shoulders that intersects SR 170 just east of the Bull Run Fossil Plant and extends south into the local area on the east side of Melton Hill Reservoir and to SR 62.
- SR 62 is a four-lane divided expressway that extends northwest to Oak Ridge, Oliver Springs and beyond and to the southeast across Melton Hill Reservoir. SR 62 connects to I-40 via SR 162.
- SR 9/US 25W is a four-lane undivided roadway that extends north past I-75 and to the south into Knoxville.

The road network in the vicinity of the proposed substation is rural in nature and the intersections are unsignalized with the exception of SR 170 at Melton Lake Greenway and SR 170 at SR 9 in Claxton.

Table 3-X presents the 2019 Average Annual Daily Traffic (AADT) measured in vehicles per day (veh/day) and functional roadway classification for all routes servicing the proposed substation site. Roadway functional classification is the process by which streets and highways are grouped into classes, or systems, according to the character of service they are intended to provide and is dependent upon factors related to access and mobility, roadway characteristics (number of lanes, shoulders), and setting (rural vs. urban).

Table 3-X. Average Annual Daily Traffic Counts and Functional Classification of Roadways in Proximity to the Proposed Substation Site

Roadway Segment	Estimate Maximum Travel Distance to Anderson Substation (miles)	Setting	Functional Classification[1]	2019 Average Daily Vehicle Use (veh/day)[2]	Number of Lanes
SR 170	0	Rural	Minor Arterial	15,154	2
Melton Lake Drive	0.5	Rural	Minor Collector	7,554	2
Old Emory Road	1.75	Rural	Local	1,709	2
New Henderson Road	2.25	Rural	Local	913	2
SR 62	2	Rural	Expressway	33,680	4
SR 9/US 25W	4	Rural	Principal Arterial	15,821	4

[1]FHWA 2013.
[2]TDOT 2019. Value shown is average of all available AADT data for impacted roadway segment.

1.2.2 Environmental Consequences

1.2.2.1 No Action Alternative

Under the No Action Alternative, there would be no construction activities or associated transport of borrow or spoil materials. Therefore, no changes to transportation would occur.

1.2.2.2 Action Alternative

Traffic generated by the proposed construction of the substation site would consist of the construction workforce, transport of spoil material from the site to BRF, transport of borrow material from an offsite location in the area to the project site and the shipment of equipment.

In general, direct roadway access to the substation site would be from a new access driveway on SR 170; however, the delivery of transformers, which would be oversized and overweight loads, would utilize Old Edgemoor Road, south of the site.

Construction-related vehicles (dozers, excavators, graders, loaders, etc.) would be delivered to the construction area on flatbed trailers during both the mobilization and demobilization stages of the project, causing an increase in truck traffic in the vicinity. However, as this increase would primarily occur during the mobilization and demobilization phases, impacts to the surrounding transportation network are not anticipated. Ongoing operations after construction would generate only occasional trips that would be minimal and would not have an impact on the surrounding traffic network.

The construction workforce traveling to and from the proposed substation site would contribute to the traffic on the local transportation network. The workforce needed to support the construction activities proposed under this alternative ranges from 10 to 35 throughout the approximately three-year construction period. This workforce would result in a traffic increase of up to 70 vehicles per day (35 vehicles entering the site in the morning and 35 vehicles leaving the site at the end of the workday) on the surrounding roadways during the construction period. It is assumed that workforce traffic would follow traffic patterns representative of the size of the communities near Anderson County; for instance, the highest percentage would travel from greater Knoxville, a lesser percentage from Oak Ridge, etc. However, some workers may use lower functioning roadways to access the site. For the purposes of this analysis it is assumed that 10 percent of the construction workforce would utilize local roadways (such as New Henderson Road and Old Emory Road) to access the site.

Spoil material generated at the project site during substation construction would be deposited in a designated spoil area located at BRF at a rate of approximately five to ten truckloads per day. As both the proposed substation site and BRF are located along SR 170, the spoils haul route would be limited to this single roadway. Similarly, borrow material may be required during construction and would be transported onsite from a previously developed and permitted borrow site at a rate of approximately five to ten truckloads per day. As a specific borrow location has not yet been identified, the haul route for borrow is undetermined. Vehicle movements more distant from the proposed substation location would disperse throughout the wider regional transportation network. Transport of both spoil and borrow materials would utilize typical over the road dump trucks at or less than legal weight limits.

Workforce travel and truck transport of spoil and borrow materials could have an effect on general traffic flow along local roadways and at intersections. The overall aggregate effects of the additional traffic from workforce traffic and transport of spoil and borrow material on the roadways in the project vicinity for the Action Alternative are summarized in Table 3-XX. The table illustrates the maximum increase in AADT for each roadway segment analyzed. To be conservative, the analysis assumes the peak of all aggregate traffic generated from the project on the roads within the vicinity of the proposed substation site and does not consider dispersal of traffic localized to the project vicinity.

Table 3-XX. Traffic Impacts to Roads in the Vicinity of Anderson from Workforce and Transport of Materials

Impacted Roadway Segment	Primary Project Use	2019 AADT[1]	Projected AADT	% Traffic increase	Impact Assessment
SR 170	Workforce Commute, Transport Spoils and Borrow	15,154	15,244	0.6%	Minor
Melton Lake Greenway	Workforce Commute, Transport Borrow	7,554	7,634	1%	Minor
Old Emory Road	Workforce Commute, Transport Borrow	1,709	1,726	1%	Minor
New Henderson Road	Workforce Commute, Transport Borrow	913	930	2%	Minor
SR 62	Workforce Commute, Transport Borrow	33,680	33,760	0.2%	Minor
SR 9/US 25W	Workforce Commute, Transport Borrow	15,821	15,901	0.5%	Minor

Source: TDOT 2019.
[1]Value shown is average of all available AADT data for impacted roadway segment.

The aggregate effect in traffic from the construction workforce and hauling of spoil and borrow materials would represent up to a 2 percent increase in annual average daily traffic on surrounding roadways. This increase is primarily attributable to the construction workforce. Workforce traffic is assumed to be distributed during peak morning period (to the site) and during a peak evening period (away from the site). This traffic volume is expected to disperse into the surrounding road network and have negligible effects on these roads and associated traffic conditions. In addition to typical workforce traffic, it is anticipated that construction related oversized loads and heavy equipment would be used to support initial development of the site. As required by the Tennessee Department of Transportation (TDOT), TVA would obtain and place proper safety and warning signs to inform drivers to be alert for construction traffic entering and exiting construction sites that would minimize the potential for accidents. However, any impacts to traffic operations due to these would be localized to the immediate site, intermittent and short-term in nature.

Substation construction would also include the haul and delivery of four to five large transformers. These oversized and overweight loads would be individually transported by rail to Oliver Springs, Tennessee, and then transported to the construction site via hydraulic platform trailer with heavy-duty trucks at each end in a push-pull configuration. The proposed over the road haul route for these transformers would begin at an Oliver Springs

rail siding and would continue on to East Spring Street, SR 62, SR 170 and Old Edgemoor Road. However, the height of the loaded transport would require avoiding the overpass that crosses the ramp from SR 62 to east bound SR 170. TVA has developed a transport plan (depicted in Figure 3-X) that proposes an alternate route that would utilize Bethel Valley Road to SR 62 heading east, cross over into the west bound lanes of SR 62, and then continue into the east bound lane of SR 170. To facilitate the crossing of west bound SR 62, traffic would be stopped with police assistance and message boards would be used to warn oncoming traffic of stopped traffic ahead. It is estimated that transport crossing would take less than five minutes once traffic is stopped. Appropriate permits, traffic control, temporary road adjustments, and other provisions such as timing the movements to coincide with minimal traffic would be made. For these reasons, and because these heavy haul events would occur just four to five times over the course of the substation construction, impacts of the transformer transport are considered minor.

For all types of roadways, the increase in AADT (2 percent or less) is not expected to adversely affect traffic conditions on the surrounding roadway network. As such, the impact of the Anderson substation construction on the transportation network would be minor and localized and would only occur during the estimated three-year construction period.

References

Federal Highway Administration (FHWA). 2013. Highway Functional Classification Concepts, Criteria and Procedures, Section 3 Criteria. Retrieved from: https://www.fhwa.dot.gov/planning/processes/statewide/related/highway_functional_classifications/section03.cfm#Toc336872985

Tennessee Department of Transportation (TDOT). 2017. TDOT Traffic History. Retrieved from https://www.arcgis.com/apps/webappviewer/index.html?id=075987cdae37474b88fa400d65681354

ATTACHMENT 2

Attachment 2: Stream Crossings within the Proposed Anderson, TN 500-kV Substation Site in Anderson County, Tennessee

Stream ID	Sequence ID	Stream Type	Streamside Management Zone Category	Stream Name	Field Notes
ab02	001	Intermittent	Category A (50 feet)	NA	TDEC score, 17, fish present in pool.
bwa02	002	Perennial	Category A (50 feet)	Ten Mile Creek	Fish observed in stream
ab04	003	Perennial	Category A (50 feet)	NA	Large population of blacknose dace present.
ab05	e001	Ephemeral	Best Management Practices (BMPs)	NA	TDEC score 17. DATOS.
ab01	e002	Ephemeral	BMPs	NA	Culverted under greenway. Channel mostly filled with upland veg.
ab03	e003	Ephemeral	BMPs	NA	s end at culvert
ab06	e004	Ephemeral	BMPs	NA	Mapped using LiDAR.

ATTACHMENT 3

The TVA Bat Strategy Form: Anderson Substation & Associated System Modifications:

Project Review Form – TVA Bat Strategy *(03/2019)*

*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: Anderson 500-kV Substation Project **Date:** May 22, 2019

Contact(s): Todd Liskey **CEC#:** **Project ID:** 440945

Project Location (City, County, State): Knoxville/Oak Ridge Area; Anderson, Knox, and Blount Counties; Tennessee

Project Description:

TVA proposes to build a new 500-kV Substation in Anderson County, Tennessee. The green-field site encompasses approximately 40 acres, and will be located on TVA owned property. In addition TVA would modify structures on the existing transmission system immediately adjacent to the site and install new OPGW on 18.5 miles of TL in the area. One TL will require 14 structure replacements.

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

Project Review Form – TVA Bat Strategy *(03/2019)*

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)**

Project Review Form - TVA Bat Strategy *(03/2019)*

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: [20] (●)**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**

For **PROJECT LEADS** whose projects will be reviewed by a Heritage Reviewer, **STOP HERE**. Click File/Save As, name form as "ProjectLead_BatForm_CEC-or-ProjectIDNo_Date", and submit with project information.

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** (Go to Step 13)

Info below completed by:
- ☐ **Heritage Reviewer** (name) [ ] Date [ ]
- ☐ **OSAR Reviewer** (name) [ ] Date [ ]
- ■ **Terrestrial Zoologist** (name) [Jesse Troxler] Date [Oct 3, 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): [10.4] (●)**ac** ( )**trees)*** ( )**N/A**

Project Review Form - TVA Bat Strategy *(03/2019)*

STEP 6) Provide any additional notes resulting from Heritage Reviewer records review in Notes box below then . . . . . Go to Step 13

Notes from Bat Records Review (e.g., historic record; bats not on landscape during action; DOT bridge survey with negative results):

Indiana and northern long-eared bats captured (mist net) 3.5 miles west of proposed SS site.

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 10.4 ◉ **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 Oct 4, 2019

TVA Action	Total 20-year	Winter	Volant Season	Non-Volant Season
8 Expand or Construct New Electric Transmission Assets	11,900	7,024.95	2,350.79	2,373.24

STEP 12) Amount contributed to TVA's Bat Conservation Fund upon activity completion: $ 7,800 OR ○ **N/A**

TERRESTRIAL ZOOLOGISTS, after completing SECTION 2, review Table 4, modify as needed, and then complete section for Terrestrial Zoologists at end of form.

SECTION 3: REQUIRED CONSERVATION MEASURES

STEP 13) Review Conservation Measures in Table 4 and ensure those selected are relevant to the project. If not, manually override and uncheck irrelevant measures, and explain why in ADDITIONAL NOTES below Table 4.

Did review of Table 4 result in ANY remaining Conservation Measures in **RED**?

- ○ **NO** (Go to Step 14)
- ◉ **YES** (STOP HERE; Submit for Terrestrial Zoology Review. Click File/Save As, name form as "ProjectLead_BatForm_CEC-or-ProjectIDNo_Date", and submit with project information).

Project Review Form - TVA Bat Strategy *(03/2019)*

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
		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.
		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.
		TR3* - Removal of suitable summer roosting habitat within documented bat habitat (i.e., within 10 miles of documented Indiana bat hibernacula, within 5 miles of documented northern long-eared bat hibernacula, within 2.5 miles of documented Indiana bat summer roost trees, within 5 miles of Indiana bat capture sites, within 1 mile of documented northern long-eared bat summer roost trees, within 3 miles of northern long-eared bat capture sites) will be tracked, documented, and included in annual reporting. Project will therefore communicate completion of tree removal to appropriate TVA staff.
		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.
		TR7 (**Existing Transmission ROW only**) - **Tree removal within 100 feet of existing transmission ROWs will be limited to hazard trees**. On or adjacent to TLs, a hazard tree is a tree that is tall enough to fall within an unsafe distance of TLs under maximum sag and blowout conditions and/or are also dead, diseased, dying, and/or leaning. Hazard tree removal includes removal of trees that 1) currently are tall enough to threaten the integrity of operation and maintenance of a TL or 2) have the ability in the future to threaten the integrity of operation and maintenance of a TL.
		TR8 (**TVA Reservoir Land only**) - Requests for removal of hazard trees on or adjacent to TVA reservoir land will be inspected by staff knowledgeable in identifying hazard trees per International Society of Arboriculture and TVA's checklist for hazard trees. Approval will be limited to trees with a defined target.
		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 *(03/2019)*

	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).
	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.
	SSPC6 - Herbicide use will be avoided **within 200 ft of portals associated with caves, cave collapse areas, mines and sinkholes** are capable of supporting cave-associated species. Herbicides are not applied to surface water or wetlands unless specifically labeled for aquatic use. Filter and buffer strips will conform at least to federal and state regulations and label requirements.
	SSPC7 - Clearing of vegetation **within a 200-ft radius of documented caves** will be limited to hand or small machinery clearing only (e.g., chainsaws, bush-hog, mowers). This will protect potential recharge areas of cave streams and other karst features that are connected hydrologically to caves.
	L1 - Direct temporary lighting away from suitable habitat during the active season.

Project Review Form - TVA Bat Strategy *(03/2019)*

	L2 - Evaluate the use of outdoor lighting during the active season and seek to minimize light pollution when installing new or replacing existing permanent lights by angling lights downward or via other light minimization measures (e.g., dimming, directed lighting, motion-sensitive lighting).

[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

Hide Table 4 Columns 1 and 2 to Facilitate Clean Copy and Paste

(•) HIDE
( ) UNHIDE

NOTES (additional info from field review, explanation of no impact or removal of conservation measures).

Project Review Form - TVA Bat Strategy *(03/2019)*

STEP 14) Save completed form (Click File/Save As, name form as "ProjectLead_BatForm_CEC-or-ProjectIDNo_Date") 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:

Joe Melton (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.

For Use by Terrestrial Zoologist Only

☒ Terrestrial Zoologist acknowledges that Project Lead/Contact (name) Joe Melton has been informed 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 10.4 (•) ac ( ) trees and that use of Take will require $ 7,800 contribution to TVA's Conservation Fund upon completion of activity (amount entered should be $0 if cleared in winter).

For Terrestrial Zoology Use Only. Finalize and Print to Noneditable PDF.

ATTACHMENT 4

Farmland Conversion Impact Rating – Form AD-1006

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*		Date Of Land Evaluation Request October 7, 2019	
Name of Project Anderson Substation EA		Federal Agency Involved TVA	
Proposed Land Use Electric Utilities (Substation)		County and State Oak Ridge, Anderson County, TN	
PART II *(To be completed by NRCS)*		Date Request Received By NRCS 10/14/19	Person Completing Form: DMc
Does the site contain Prime, Unique, Statewide or Local Important Farmland? *(If no, the FPPA does not apply - do not complete additional parts of this form)*	YES ☑ NO ☐	Acres Irrigated n/a	Average Farm Size 75
Major Crop(s) Corn	Farmable Land In Govt. Jurisdiction Acres: 68139 % 31	Amount of Farmland As Defined in FPPA Acres: 12473 % 6	
Name of Land Evaluation System Used LESA	Name of State or Local Site Assessment System n/a	Date Land Evaluation Returned by NRCS 11/14/19	

PART III *(To be completed by Federal Agency)*	Alternative Site Rating			
	Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	14			
B. Total Acres To Be Converted Indirectly				
C. Total Acres In Site	50.23			
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	2			
B. Total Acres Statewide Important or Local Important Farmland	0			
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted	.02			
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value	100			
PART V (To be completed by NRCS) Land Evaluation Criterion Relative Value of Farmland To Be Converted (Scale of 0 to 100 Points)	69			

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(Criteria are explained in 7 CFR 658.5 b. For Corridor project use form NRCS-CPA-106)*	Maximum Points	Site A	Site B	Site C	Site D
1. Area In Non-urban Use	(15)	13			
2. Perimeter In Non-urban Use	(10)	10			
3. Percent Of Site Being Farmed	(20)	0			
4. Protection Provided By State and Local Government	(20)	0			
5. Distance From Urban Built-up Area	(15)	12			
6. Distance To Urban Support Services	(15)	5			
7. Size Of Present Farm Unit Compared To Average	(10)	3			
8. Creation Of Non-farmable Farmland	(10)	0			
9. Availability Of Farm Support Services	(5)	5			
10. On-Farm Investments	(20)	0			
11. Effects Of Conversion On Farm Support Services	(10)	0			
12. Compatibility With Existing Agricultural Use	(10)	0			
TOTAL SITE ASSESSMENT POINTS	160	48	0	0	0
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100	69	0	0	0
Total Site Assessment *(From Part VI above or local site assessment)*	160	48	0	0	0
TOTAL POINTS *(Total of above 2 lines)*	260	117	0	0	0

Site Selected: Site A	Date Of Selection 11/18/2019	Was A Local Site Assessment Used? YES ☐ NO ☑

Reason For Selection:

Total points for Site A are below 160. Therefore, consideration of alternative sites is not required.

Name of Federal agency representative completing this form: Natalie Kleikamp	Date: 11/18/2019

(See Instructions on reverse side) Form AD-1006 (03-02)

STEPS IN THE PROCESSING THE FARMLAND AND CONVERSION IMPACT RATING FORM

Step 1 - Federal agencies (or Federally funded projects) involved in proposed projects that may convert farmland, as defined in the Farmland Protection Policy Act (FPPA) to nonagricultural uses, will initially complete Parts I and III of the form. For Corridor type projects, the Federal agency shall use form NRCS-CPA-106 in place of form AD-1006. The Land Evaluation and Site Assessment (LESA) process may also be accessed by visiting the FPPA website, http://fppa.nrcs.usda.gov/lesa/.

Step 2 - Originator (Federal Agency) will send one original copy of the form together with appropriate scaled maps indicating location(s)of project site(s), to the Natural Resources Conservation Service (NRCS) local Field Office or USDA Service Center and retain a copy for their files. (NRCS has offices in most counties in the U.S. The USDA Office Information Locator may be found at http://offices.usda.gov/scripts/ndISAPI.dll/oip_public/USA_map, or the offices can usually be found in the Phone Book under U.S. Government, Department of Agriculture. A list of field offices is available from the NRCS State Conservationist and State Office in each State.)

Step 3 - NRCS will, within 10 working days after receipt of the completed form, make a determination as to whether the site(s) of the proposed project contains prime, unique, statewide or local important farmland. (When a site visit or land evaluation system design is needed, NRCS will respond within 30 working days.

Step 4 - For sites where farmland covered by the FPPA will be converted by the proposed project, NRCS will complete Parts II, IV and V of the form.

Step 5 - NRCS will return the original copy of the form to the Federal agency involved in the project, and retain a file copy for NRCS records.

Step 6 - The Federal agency involved in the proposed project will complete Parts VI and VII of the form and return the form with the final selected site to the servicing NRCS office.

Step 7 - The Federal agency providing financial or technical assistance to the proposed project will make a determination as to whether the proposed conversion is consistent with the FPPA.

INSTRUCTIONS FOR COMPLETING THE FARMLAND CONVERSION IMPACT RATING FORM

(For Federal Agency)

Part I: When completing the "County and State" questions, list all the local governments that are responsible for local land use controls where site(s) are to be evaluated.

Part III: When completing item B (Total Acres To Be Converted Indirectly), include the following:

1. Acres not being directly converted but that would no longer be capable of being farmed after the conversion, because the conversion would restrict access to them or other major change in the ability to use the land for agriculture.
2. Acres planned to receive services from an infrastructure project as indicated in the project justification (e.g. highways, utilities planned build out capacity) that will cause a direct conversion.

Part VI: Do not complete Part VI using the standard format if a State or Local site assessment is used. With local and NRCS assistance, use the local Land Evaluation and Site Assessment (LESA).

1. Assign the maximum points for each site assessment criterion as shown in § 658.5(b) of CFR. In cases of corridor-type project such as transportation, power line and flood control, criteria #5 and #6 will not apply and will, be weighted zero, however, criterion #8 will be weighed a maximum of 25 points and criterion #11 a maximum of 25 points.

2. Federal agencies may assign relative weights among the 12 site assessment criteria other than those shown on the FPPA rule after submitting individual agency FPPA policy for review and comment to NRCS. In all cases where other weights are assigned, relative adjustments must be made to maintain the maximum total points at 160. For project sites where the total points equal or exceed 160, consider alternative actions, as appropriate, that could reduce adverse impacts (e.g. Alternative Sites, Modifications or Mitigation).

Part VII: In computing the "Total Site Assessment Points" where a State or local site assessment is used and the total maximum number of points is other than 160, convert the site assessment points to a base of 160.
Example: if the Site Assessment maximum is 200 points, and the alternative Site "A" is rated 180 points:

$$\frac{\text{Total points assigned Site A}}{\text{Maximum points possible}} = \frac{180}{200} \text{ X } 160 = 144 \text{ points for Site A}$$

For assistance in completing this form or FPPA process, contact the local NRCS Field Office or USDA Service Center.

NRCS employees, consult the FPPA Manual and/or policy for additional instructions to complete the AD-1006 form.

ATTACHMENT 5

Anderson 500-kV Substation Correspondence:

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

January 23, 2020

Mr. E. Patrick McIntyre, Jr.
Executive Director
and State Historic Preservation Officer
Tennessee Historical Commission
2941 Lebanon Pike
Nashville, Tennessee 37243-0442

Dear Mr. McIntyre:

PHASE I CULTURAL RESOURCES SURVEY FOR TENNESSEE VALLEY AUTHORITY'S (TVA) 500-KILOVOLT (kV) GREENFIELD SUBSTATION AND ASSOCIATED TRANSMISSION LINE (TL) WORK, ANDERSON, BLOUNT, AND KNOX COUNTIES, TENNESSEE (36.00062, -84.25860 to 35.96146, -83.95329)

TVA proposes to build a new 500-kV substation in Anderson County, Tennessee. The site would be within an approximately 40-acre TVA-owned parcel. Additionally, the project scope includes modifications to TVA's existing electrical transmission system in order to support the new station and installation of a new 18.5-mile fiber optic path on existing TLs around the Knoxville area. Specific activities would include:

1. Construction of the new substation west of the Bull Run Fossil Plant (BRF) in Anderson County, Tennessee (see Appendix I, Figure 2 in the attached report).
2. Adding 18.5 miles of optical ground wire (OPGW) to the existing Bull Run-Lonsdale TL. This line runs from BRF to the Lonsdale 161-kV Switching Station in Knox County, Tennessee (see Appendix I, Figures 2-9 in the attached report).
3. Adding OPGW to two existing structures to bring existing OPGW into the Oak Ridge, Tennessee 161-kV Switching Station (see Appendix I, Figure 1 in the attached report).
4. Adding 2.6 miles of OPGW and upgrading the existing Solway tap line by replacing 14 of the 29 structures on the line. The line runs from Structure 17 on the Bull Run-Lonsdale TL to the Solway, Tennessee 161-kV Switching Station in Knox County, Tennessee (see Appendix I, Figures 3-4 in the attached report).
5. Adding one ground wire structure (single steel pole) at the Ebenezer, Tennessee 161-kV Metering Station in Knox County, Tennessee (see Appendix I, Figure 2 in the attached report).
6. Replacement of a switch near the Denso, Tennessee 161-kV Metering Station in Blount County, Tennessee (see Appendix I, Figure 10 in the attached report).
7. In order to reach work areas, TVA would use 99 access routes (ARs). ARs would be 6 meters wide with variable lengths. Total length of all ARs would be 14.1 miles.

TVA finds that the proposed activities constitute an undertaking (as defined at 36 CFR § 800.16(y)) that has the potential to cause effects to historic properties. We are initiating consultation under Section 106 of the National Historic Preservation Act for this undertaking.

TVA determined the area of potential effects (APE) to be all areas of potential ground disturbance (project footprint) and areas within a one-half mile radius of the proposed substation and the ground wire structure at the Ebenezer Metering Station from which the new structures would be visible (viewshed). TVA contracted with TRC Environmental, Inc., to conduct a Cultural Resources survey of the APE. Enclosed is the resulting report titled *Draft Report: Phase I Cultural Resources Survey of the TVA 500kV Greenfield Substation and Associated Transmission Line Work, Anderson, Knox, and Blount Counties, Tennessee*. The archaeological survey area consists of the proposed substation footprint (14.2 acres), 30 meter by 60 meter areas around OPGW cable reel splice points on the Bull Run-Lonsdale TL, all structures on the Solway tap, an area around the switch location at the Denso metering station, and all ARs.

Architecture

In regard to activities 2, 3, 6, and 7 listed above, no structures would be replaced and the switch near the Denso Metering Station would be replaced with like materials. Therefore, there would be no change to the viewshed resulting from those activities.

Activity 4 would involve replacing 14 of the 29 structures on the line. This line went into service in 1963, although all of the structures on it post-date 1971 because the original structures were replaced as they deteriorated. The line is a combination of single-, double-, and triple-pole structures made of wood and steel; replacement structures would be steel poles. No replacement structures would be more than 10 feet higher than existing structures. Given the limited proposed change to the height of the replacement structures within an existing transmission line, TVA finds the change to the viewshed would not be an adverse effect to historic properties, should they be present.

Activities 1 (construction of a new substation) and 5 (installation of a single steel pole) have potential to cause adverse visual effects. The architectural survey consists of a half-mile radius surrounding the proposed new substation and steel pole.

Background research conducted prior to the survey noted that, within the APE, four resources (KN-3649, KN-3650, KN-3651, KN-3652) have been previously recorded by the Tennessee Historical Commission (THC) and three additional properties (Statesview, Ebenezer Mill, and the J.B. Jones house) have been listed in the National Register of Historic Places (NRHP). Fieldwork verified that all four of the THC-recorded properties have since been destroyed. The three NRHP-listed properties are extant and mostly unchanged. One newly recorded resource was also identified (HS-1). TRC recommended that the ca. 1966 contemporary style house is not eligible for the NRHP.

NRHP-listed Statesview and Ebenezer Mill are within view of the proposed new structure at the Ebenezer substation in suburban west Knoxville. Their viewsheds have been compromised by residential and commercial development, and existing TVA TLs and substations. Although the addition of minor elements in the form of a new ground wire pole structure will have an effect on the viewshed of both Statesview and Ebenezer Mill, the effect would not be adverse.

The NRHP-listed J.B. Jones house is located on Old Edgemoor Road and across the road from the proposed substation (see Figure 1 below and Figure 17 in the attached report). The property is a ca. 1920 Craftsman/bungalow residence and was listed in the NRHP under the *Historic and Architectural Resources of Oak Ridge* Multiple Property Submission document under Criterion A for its historical association with the settlement of rural Anderson County and as "the only remaining early 20th century house in Oak Ridge." At the time of TRC's Cultural Resources survey, TVA had not yet identified the exact location of the substation within the 40-acre parcel. Based on the proximity of the Jones house to the parcel, TRC recommended that construction of the substation would be an adverse effect. More recently, the precise location of the substation has been determined (Figure 1 below). There are wooded areas north and northwest of the house on TVA land. Multiple TLs, carried on metal towers, are in clear line of sight of the property to the southeast, east and northeast. Although over a mile away, the largest stack at the Bull Run Fossil Plant is also visible from the property. The newly proposed substation footprint and new transmission line structures will be constructed north of the wooded area. TVA has committed to leaving the wooded area in place as it will provide a visual buffer between the house and the new substation. The tops of new, taller structures in and around the substation may be visible from the Jones property. TVA finds that the undertaking will result in a minor change to the viewshed but will not compromise the historical significance for which the property has been determined eligible for the NRHP.

Archaeology

Background research conducted prior to the archaeological survey indicated that the 40-acre parcel where the substation will be located has been previously surveyed (Herrmann and Frankenberg 2000) and no sites were identified. This area was included in the current survey and no sites were identified. No sites have been previously identified within the APE.

Three areas in the project footprint were not surveyed. AR 2 and the TL structures along it are located on the left descending bank of the Clinch River on the BRF (see Appendix V, page 3). This AR was recently surveyed (de Gregory 2019). No sites were discovered here. Your office concurred with TVA's finding of no historic properties present in a letter dated November 12, 2019. Archaeologists were unable to access Structure 17 on the Solway tap line due to an aggressive bull in the surrounding pasture (see Figure 15 and Appendix V, page 10). The AR leading to Structure 17 was surveyed and no sites were identified. Finally, the area around Structure 95 on the Bull Run-Lonsdale TL was not surveyed. The structure is located within the fenced Lonsdale Switching Station (see Appendix V, page 32), which was graded at the time the Switching Station was built, likely resulting in the removal all soil that would have had potential for archaeological remains.

No archaeological sites were identified by the survey. Based on the results of the fieldwork, TRC recommended no additional investigations in connection with the undertaking as currently planned.

TVA has read the enclosed report and agrees with the recommendations of the authors. TVA finds that no historic properties would be adversely affected by the proposed undertaking. Pursuant to 36 CFR Part 800.5(c) we are notifying you of TVA's finding of no adverse effect, providing the documentation specified in § 800.11(e); 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 would have no adverse effects on historic properties.

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

Please contact Michael Angst by telephone. (865) 632-6257 or by email, mgangst@tva.gov with your comments.

Sincerely,

Edward W. Wilde

Clinton E. Jones
Manager
Cultural Compliance

MGA:ABM
Enclosures
cc (Enclosures):
Ms. Jennifer Barnett
Tennessee Division of Archaeology
1216 Foster Avenue, Cole Bldg. #3
Nashville, Tennessee 37210

References Cited

de Gregory, Heidi, Heather Bass, Jillian Rael, Hunter B. Johnson and Elinor Crook
2019 *A Phase I Archaeological Survey for Tennessee Valley Authority's Bull Run-North Knoxville 161-kV Overhead Ground Wire Replacement Project in Anderson and Knox counties, Tennessee*. Submitted to Tennessee Valley Authority by by Tennessee Valley Archaeological Research, Huntsville, Alabama.

Herrmann, Nicholas P., and Susan R. Frankenberg
2000 *Archaeological Reconnaissance Survey of Tennessee Valley Authority Lands on the Melton Hill Reservoir*. Submitted to Tennessee Valley Authority. Department of Anthropology, The University of Tennessee, Knoxville.

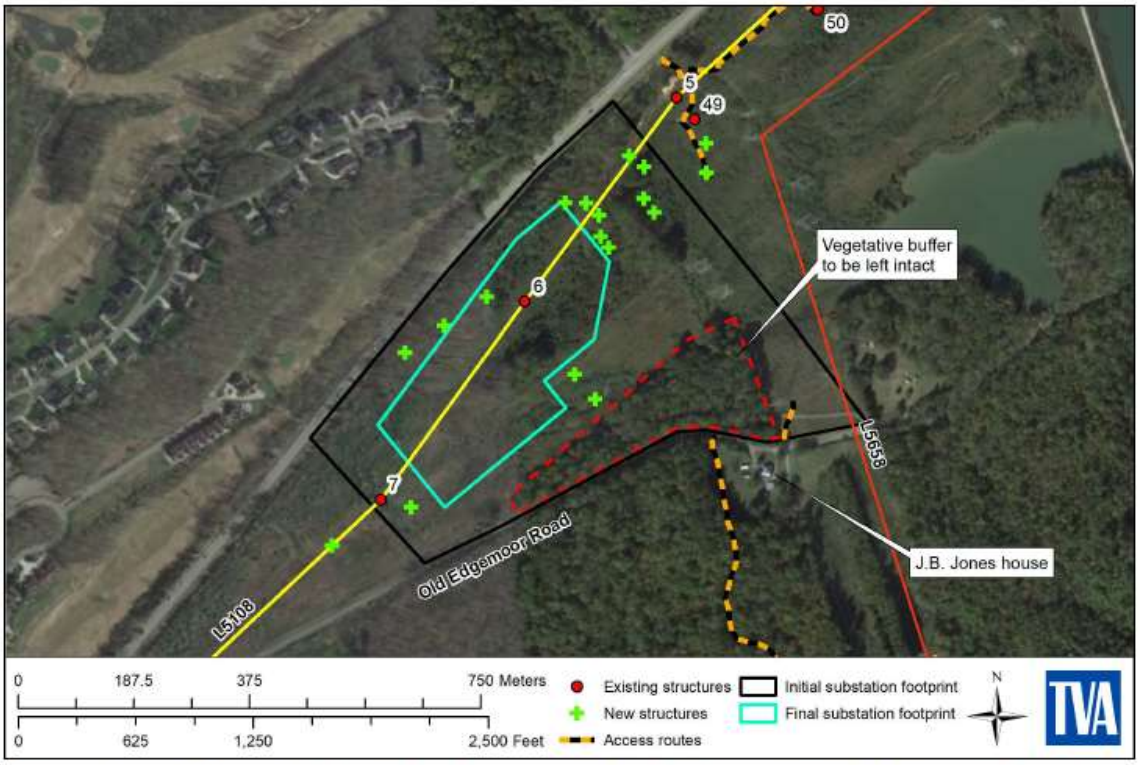

Figure 1. Map showing the location of existing lines, the proposed substation and it's proximity to the NRHP-listed J.B. Jones house.

TRC

Draft: Phase I Cultural Resources Survey

TRC Project Number: 362626

November 2019

TVA 500kV Greenfield Substation and Associated Transmission Line Work, Anderson, Knox, and Blount Counties, Tennessee

Prepared For:

Tennessee Valley Authority
400 W. Summit Hill Drive
Knoxville, TN 37902

Prepared By:

TRC
1865 Air Lane Drive
Nashville, Tennessee 37210

TENNESSEE HISTORICAL COMMISSION
STATE HISTORIC PRESERVATION OFFICE
2941 LEBANON PIKE
NASHVILLE, TENNESSEE 37243-0442
OFFICE: (615) 532-1550
www.tnhistoricalcommission.org

January 30, 2020

Mr. Clinton E. Jones
Tennessee Valley Authority
Biological and Cultural Compliance
400 West Summit Hill Drive
Knoxville, TN 37902

RE: TVA / Tennessee Valley Authority, 500-Kilovolt (kV) Greenfield Substation and Associated Transmission Line Work, , Multiple Counties County, TN

Dear Mr. Jones:

In response to your request, we have reviewed the documents submitted regarding your proposed undertaking. Our review of and comment on your proposed undertaking are among the requirements of Section 106 of the National Historic Preservation Act. This Act requires federal agencies or applicants for federal assistance to consult with the appropriate State Historic Preservation Office before they carry out their proposed undertakings. The Advisory Council on Historic Preservation has codified procedures for carrying out Section 106 review in 36 CFR 800 (Federal Register, December 12, 2000, 77698-77739) .

Considering available information, we concur that the project as currently proposed will adversely affect the J.B. Jones House which is listed in the National Register of Historic Places. We also concur that the project will not adversely affect Statesview and will not adversely affect the Ebenezer Mill.

You should continue to consult with our office to resolve the adverse effect. Please direct questions and comments to Claire Meyer (615-770-1099). We appreciate your cooperation.

Sincerely,

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

EPM/cem

Note:

The TN-SHPO replied to our January 23, 2020 consultation letter with a letter on January 30, 2020. That letter stated that TVA's project would result in an adverse effect to the J.B. Jones house, an NRHP-listed property. On February 4, 2020, I discussed the letter with Claire Meyer with the Tennessee Historical Commission (615-770-1099; claire.meyer@tn.gov), who wrote the letter for the SHPO's office. TN-SHPO's letter addressed the technical report as written, but did not respond to TVA's avoidance measures discussed in the consultation letter. After realizing a potential oversight in the review, Claire agreed to reassess the project and TVA's finding of no adverse effect. The TN-SHPO sent a second response letter dated February 6, 2020, that addressed the report and TVA's proposed avoidance measures and concurred that our actions would have no adverse effect on historic properties.

mga, February 11, 2020

TENNESSEE HISTORICAL COMMISSION
STATE HISTORIC PRESERVATION OFFICE
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February 6, 2020

Mr. Clinton E. Jones
Tennessee Valley Authority
Biological and Cultural Compliance
400 West Summit Hill Drive
Knoxville, TN 37902

RE: TVA / Tennessee Valley Authority, 500-Kilovolt (kV) Greenfield Substation and Associated Transmission Line Work, Multiple Counties County, TN

Dear Mr. Jones:

Pursuant to your request, this office has reviewed documentation concerning the above-referenced undertaking. Our review of and comment on your proposed undertaking are among the requirements of Section 106 of the National Historic Preservation Act. This Act requires federal agencies or applicants for federal assistance to consult with the appropriate State Historic Preservation Office before they carry out their proposed undertakings. The Advisory Council on Historic Preservation has codified procedures for carrying out Section 106 review in 36 CFR 800 (Federal Register, December 12, 2000, 77698-77739).

Based on the information provided, we concur that the project area contains a cultural resource eligible for listing in the National Register of Historic Places. We further concur that the project as currently proposed will not adversely affect the J.B. Jones House, Statesview, or the Ebenezer Mill.

This office has no objection to the implementation of this project as currently planned, including the retention of the wooded area in place as to provide a visual buffer between the J.B. Jones House and the proposed substation. If project plans are changed or previously unevaluated archaeological resources are discovered during project construction, please contact this office to determine what further action, if any, will be necessary to comply with Section 106 of the National Historic Preservation Act. Questions and comments may be directed to Claire Meyer (615-770-1099). We appreciate your cooperation.

Sincerely,

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

EPM/cem