Document Type: EA-Administrative Record
Index Field: Environmental Assessment
Project Name: TVA System Operations Center and Power System Supply
Project Number: 2019-1

TVA SYSTEM OPERATIONS CENTER AND POWER SYSTEM SUPPLY

FINAL ENVIRONMENTAL ASSESSMENT

Bradley, Hamilton, and Meigs Counties, Tennessee

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February 2020

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ACRONYMS, ABBREVIATIONS, AND GLOSSARY OF TERMS USED

AADT	Average Annual Daily Traffic
acre	A unit measure of land area equal to 43,560 square feet
access road	A dirt, gravel, or paved road that is either temporary or permanent, and is used to access the right-of-way and transmission line structures for construction, maintenance, or decommissioning activities
APE	Area of potential effect
ARAP	Aquatic Resource Alteration Permit
BES	Bulk Electric System
BMP	Best management practice or accepted construction practice designed to reduce environmental effects
bus	A conductor, which may be a solid bar or pipe, normally made of aluminum or copper, used to connect one or more circuits to a common interface. An example would be the bus used to connect a substation transformer to the outgoing circuits.
CAA	Clean Air Act
CFR	Code of Federal Regulation
circuit	A section of conductors (three conductors per circuit) capable of carrying electricity to various points
CIP	Critical Infrastructure Protection
CM	Compensatory mitigation
COC	Chattanooga Office Complex
conductors	Cables that carry electrical current
CWA	Clean Water Act
danger tree	A tree located outside the right-of-way that could pose a threat of grounding a line if allowed to fall near a transmission line or a structure
dB	Decibel
dBA	A-weighted decibel
DCH	Designated critical habitat
EA	Environmental Assessment
easement	A legal agreement that gives TVA the right to use property for a purpose such as a right-of-way for constructing and operating a transmission line
EIS	Environmental Impact Statement
EMF	Electromagnetic field
EMS	Energy Management System
endangered species	A species in danger of extinction throughout all or a significant part of its range
EO	Executive Order

ephemeral stream	Watercourses or ditches that only have water flowing after a rain event; also called a wet-weather conveyance
ESA	Endangered Species Act
extant	In existence; still existing; not destroyed or lost
feller-buncher	A piece of heavy equipment that grasps a tree while cutting it, which can then lift the tree and place it in a suitable location for disposal; this equipment is used to prevent trees from falling into sensitive areas, such as a wetland
FEMA	Federal Emergency Management Agency
FTA	Federal Transit Authority
GIS	Geographic Information System
gpd	Gallons per day
groundwater	Water located beneath the ground surface in the soil pore spaces or in the pores and crevices of rock formations
guy	A cable connecting a structure to an anchor that helps support the structure
hydric soil	A soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop conditions of having no free oxygen available in the upper part
HUC	Hydrologic unit code
HUD	U.S. Department of Housing and Urban Development
IPaC	Information for Planning and Consultation database (USFWS)
ISC	Interagency Security Committee
kV	Symbol for kilovolt (1 kV equals 1,000 volts)
Ldn	Day-Night Sound Level
LIDAR	Light Detection and Ranging
load	That portion of the entire electric power in a network consumed within a given area; also synonymous with “demand” in a given area
LOS	Level of Service
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
NESC	National Electric Safety Code
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
O-SAR	TVA’s “office-level sensitive area review” process used to identify the need for site-specific field surveys and particular tool use when an area contains documented sensitive environmental resources or has the potential for the presence of such resources.
outage	An interruption of the electric power supply to a user
PSA	Power Service Area
riparian	Related to or located on the banks of a river or stream
ROC	Regional Operations Center
ROW	Right-of-way, a corridor containing a transmission line
RTU	Remote Terminal Unit

runoff	That portion of total precipitation that eventually enters a stream or river
SCADA	Supervisory Control and Data Acquisition
SHPO	State Historic Preservation Office
SMZ	Streamside management zone
SOC	System Operations Center
SOP	State Operating Permit
SQT	Stream Quantification Tool
SRP	Survey Request Package
structure	A pole or tower that supports a transmission line
substation	A facility connected to a transmission line used to reduce voltage so that electric power may be delivered to a local power distributor or user
surface water	Water collecting on the ground or in a stream, river, lake, or wetland; it is naturally lost through evaporation and seepage into the groundwater
switch	A device used to complete or break an electrical connection
SWPPP	Storm Water Pollution Prevention Plan
TDEC	Tennessee Department of Environment and Conservation
TDOT	Tennessee Department of Transportation
threatened species	A species likely to become endangered within the foreseeable future
TL	Transmission line
TVA	Tennessee Valley Authority
TRAM	Tennessee Rapid Assessment Method, designed by the state of Tennessee to categorize wetland function
TVAR	Tennessee Valley Archaeological Research
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VdB	Vibration decibel
VEC	Volunteer Electric Cooperative
wetland	A marsh, swamp, or other area of land where the soil near the surface is saturated or covered with water, especially one that forms a habitat for wildlife
WHO	World Health Organization
WWC	Wet-weather conveyance (see ephemeral stream)

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CHAPTER 1 – PURPOSE AND NEED FOR ACTION

1.1 Proposed Action – Address the Current Physical and Reliability Risks Present in the Existing System Operations Center

The Tennessee Valley Authority (TVA) is committed to providing safe, reliable energy to its customers. To meet this commitment, TVA proposes to replace the existing System Operations Center (SOC) with a new standalone facility constructed approximately three-quarters of a mile northeast of the intersection of State Highways 58 and 60 in Meigs County in Georgetown, Tennessee (Figure 1-1). Figure 1-2 provides an artist's rendering of the proposed facility.

The proposed SOC site encompasses approximately 166 acres, of which approximately 22 acres would be utilized as an office complex inclusive of parking and support facilities. The SOC would receive power from the proposed Gunstocker Creek 161-kilovolt (kV) Substation, which would be located onsite. TVA proposes to build approximately 5.25 miles of double-circuit transmission line (TL) to power the new substation.

The proposed new TL would be built utilizing steel-pole structures extending northwest through portions of Bradley, Hamilton, and Meigs counties to the proposed Gunstocker Creek 161-kV Substation. Approximately 4.25 miles of the proposed TL would be located on existing 100-foot-wide right-of-way (ROW) currently occupied by TVA's East Cleveland Primary-Georgetown 69-kV TL. This TL would be torn down and rebuilt as double-circuit beginning at Structure 76 and ending at the new Gunstocker Creek 161-kV Substation. The remaining one-mile section of TL would be located on new 100-foot-wide ROW, with approximately 0.2 mile of the new TL being located on the proposed SOC site. Because the TL would be a double-circuit loop-line, one side would be named the Sequoyah Nuclear Plant-Gunstocker Creek 161-kV TL (L5062) and the other side would be named the Gunstocker Creek-Hiwassee 161-kV TL (L5437) to reflect the locations of the end of each TL.

The Gunstocker Creek 161-kV Substation would provide the primary power supply to the proposed SOC. Potable water service would be extended by Savannah Valley Utility District from its current endpoint along State Highway 58, 4,340 feet across a designated easement to the proposed SOC.

TVA would modify the relay protection scheme at Hiwassee 500-kV Substation. Protective relays at Sequoyah Nuclear Plant would require documentation changes to incorporate the new TL terminal at the Gunstocker Creek 161-kV Substation. Communications equipment would be upgraded at Montlake Microwave Station and the backup control center (Regional Operations Center [ROC]). Under the proposed schedule, construction of a replacement SOC and associated 161-kV substation and TL connection would be completed by the end of 2022.

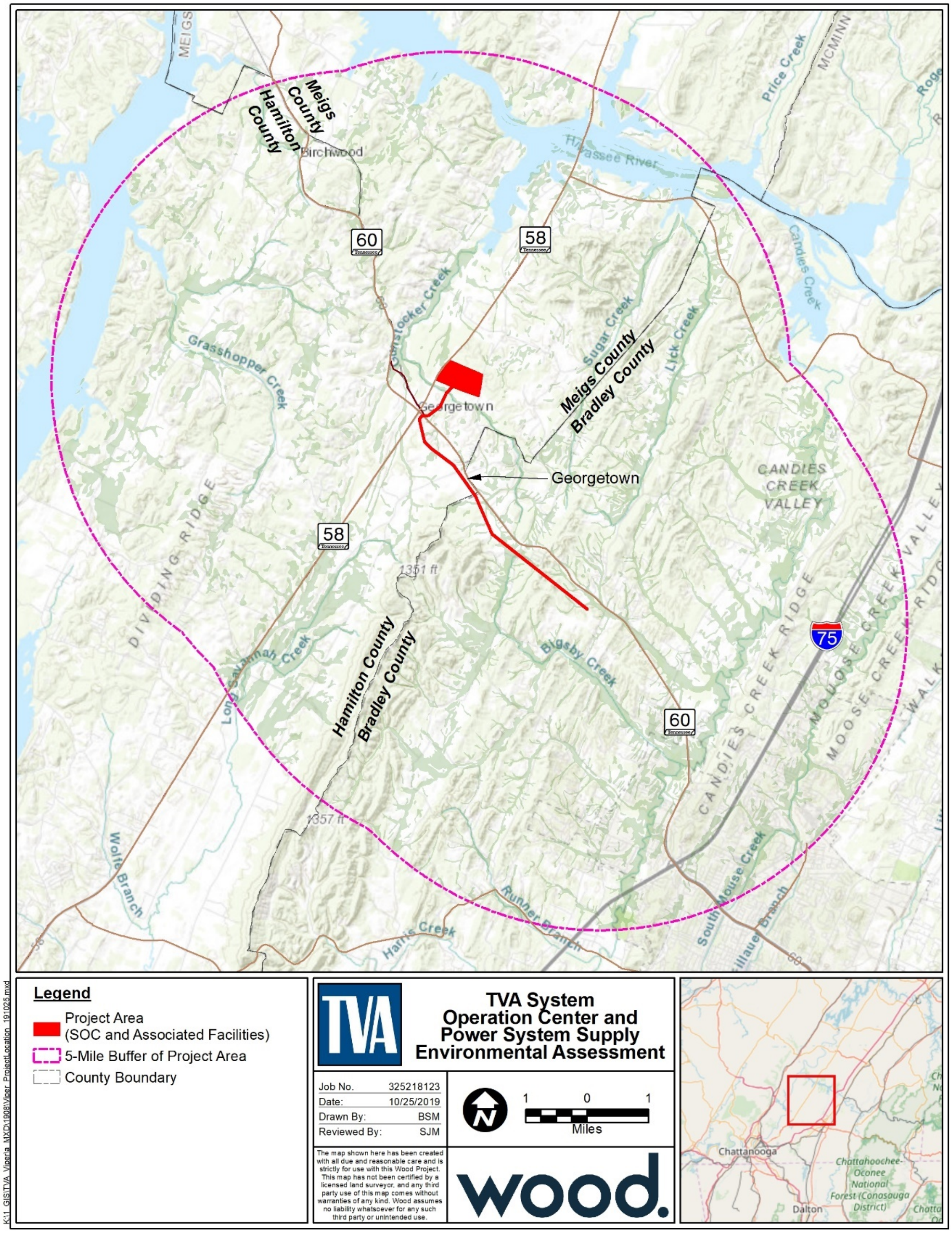

Figure 1-1. Project Location in Meigs County, Tennessee

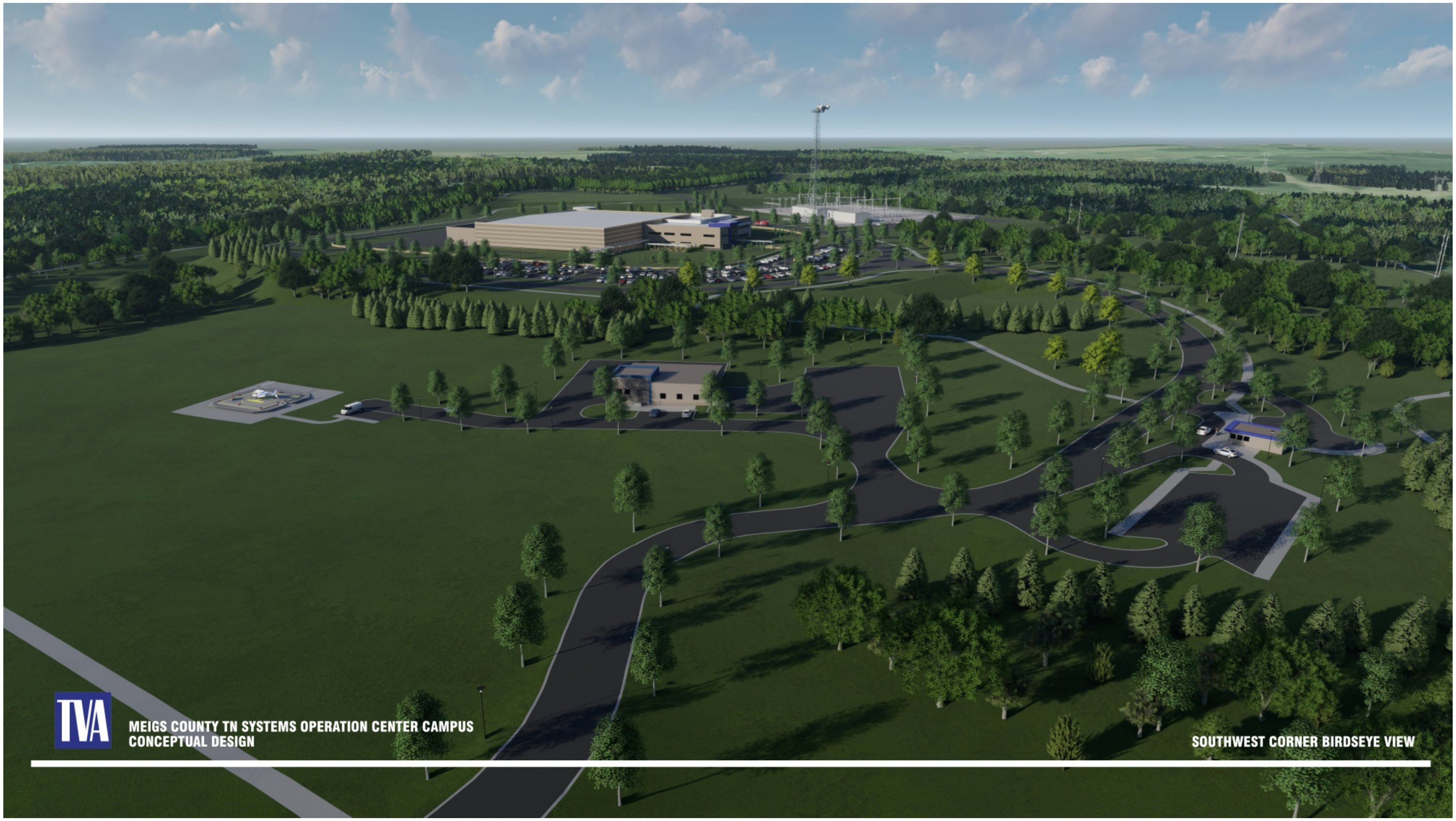

Figure 1-2. Conceptual Rendering of Proposed Tennessee Valley Authority System Operations Center in Meigs County, Tennessee

1.2 Need for the Proposed Action

TVA's transmission system serves approximately ten million residents in a more than 82,000-square-mile power service area (PSA) and is the Reliability Coordinator serving neighboring utilities outside of TVA, forming a critical part of the national bulk electric system. This system consists of a network of more than 16,200 miles of electric TLs and approximately 500 power substations. The system is continuously managed from the current SOC located in downtown Chattanooga, Tennessee (Figure 1-3) with backup from the ROC located approximately six miles away. The SOC is operated according to mandatory and enforceable North American Electric Reliability Corporation (NERC)/Critical Infrastructure Protection (CIP) standards. These standards state that the Bulk Electric System (BES)[1] must be planned to operate reliably over a broad spectrum of system conditions and following a wide range of probable conditions and circumstances with no loss of electric load. Additionally, critical infrastructure must be protected against physical[2] or cyber-attack and measures must be put in place to provide for emergency preparedness/response and catastrophic event recovery.

Critical functions performed by TVA in the SOC include, but are not limited to the following:

- Continuous balancing of electrical load and generation;
- Remote start and stop of electrical generation assets;
- Real time transmission grid operation and control;
- 24/7 monitoring for weather, physical, or security threats;
- Emergency response, dispatch and remediation; and
- Contingency planning, monitoring, and reliability coordination both TVA and for other utilities outside of TVA.

While in compliance with current NERC/CIP requirements, TVA anticipates greater regulatory focus on critical infrastructure. TVA also understands modernizing its operational systems would continue to build on key features that TVA customers have come to expect including reliability, emergency preparedness, and public and workforce safety. To further that effort, TVA retained a third party consultant with expertise in the planning and design of high-reliability, 24/7 facilities such as control and data centers to survey existing TVA facilities, identify significant gaps between the existing facilities and current industry standards, and develop future alternatives to provide TVA with modern, reliable, and secure facilities. Consultant recommendations coupled with internal review of NERC/CIP requirements resulted in the identification of both physical and reliability risk factors associated with the current SOC as described in the following sections.

[1] As used here, the bulk transmission system or bulk power system refers to the facilities and control systems necessary for operating an interconnected electric energy transmission network, as well as the electric energy (i.e., bulk electric power) from generation facilities needed to maintain the reliability of that transmission system.
[2] NERC-CIP-014-2 Standard governs physical security. The purpose of the Standard being to "Identify and protect transmission stations…, and their associated primary control centers, that if rendered inoperable or damaged as a result of a physical attack could result in instability, uncontrolled separation, or Cascading within an Interconnection."

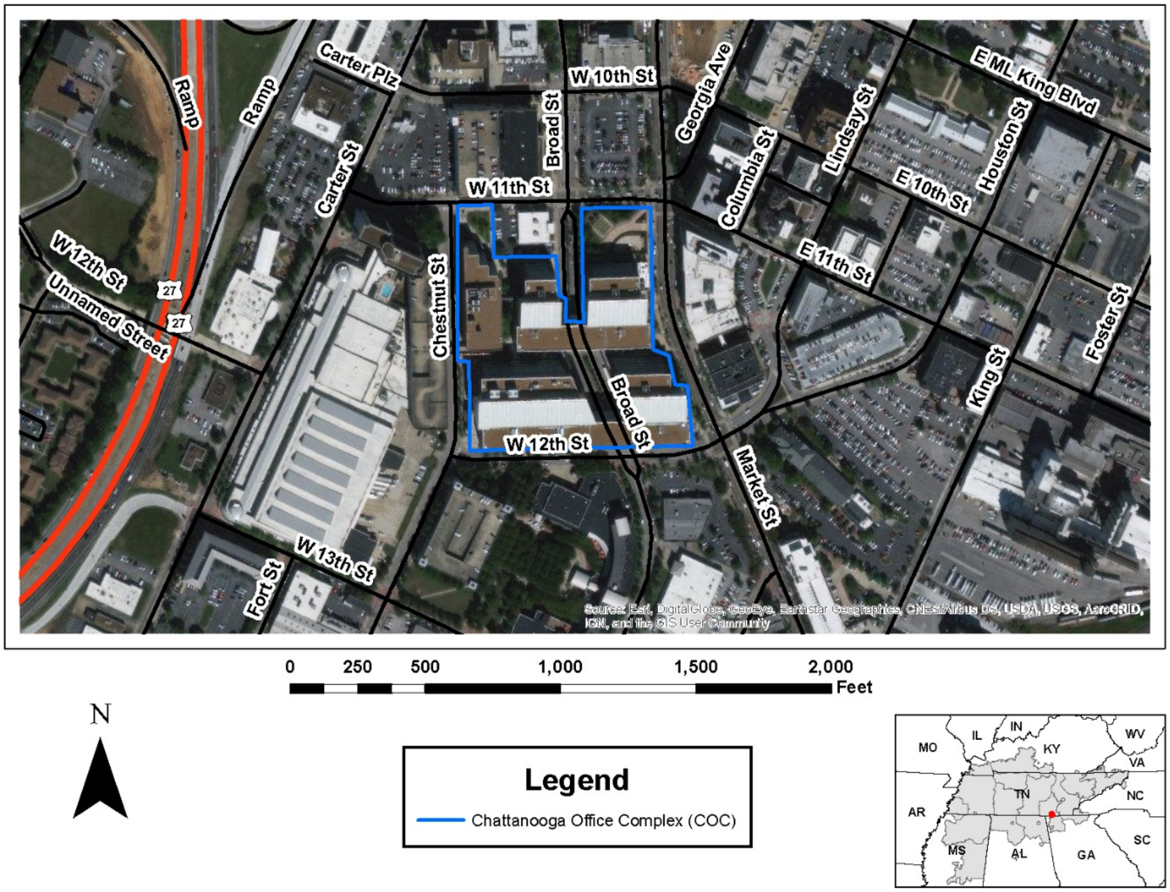

Figure 1-3. Existing Chattanooga Office Complex and System Operations Center, Downtown Chattanooga, Tennessee

1.2.1 Physical Risks

The Chattanooga Office Complex (COC) construction began in 1983 and the current SOC (housed within the COC complex) was completed in 1995. No minimum physical security standards were required for nonmilitary federally owned or leased facilities during this timeframe. On October 19, 1995, only months after the completion of the current SOC and in response to the bombing of the Alfred P. Murrah Federal Building in Oklahoma City, President Clinton issued Executive Order (EO) 12977, Interagency Security Committee. This EO created the Interagency Security Committee (ISC) to formally address and set standards for government-wide security for federal facilities.

While facility improvements have been made over the years as a result of ISC and NERC-CIP requirements, certain physical security vulnerabilities remain at the SOC simply by nature of its current urban location. The COC is located in downtown Chattanooga. Since the construction of the facility, Chattanooga has grown substantially and is now the fourth largest metropolitan area in Tennessee.

In the event of a natural disaster occurring in the Chattanooga area, the SOC would share emergency service resources with the general public and priority would be placed on preventing loss of life rather than restoring critical infrastructure. Additionally, for a facility tasked with 24/7 operation and being located in an urban environment, ingress and egress during an emergency situation would likely be compromised, thus further impeding the critical functions of the SOC. Providing physical security and ensuring NERC-CIP compliance is challenging due to the interconnected COC structures and numerous through-streets. In fact, Broad Street runs through and under the complex itself. Maintenance and expansion of existing utilities in Chattanooga, as well as the construction of new utilities in proximity to the COC have also resulted in increased risk to the facility. In 2009, for example, a 12-inch municipal waterline adjacent to the COC ruptured causing water to intrude into the facility mechanical-electrical room (Figure 1-4). While this room is located in a different section of the COC, portions of SOC electronic support infrastructure exist at a similar elevation and could have been impacted had the intrusion into the complex affected a different area.

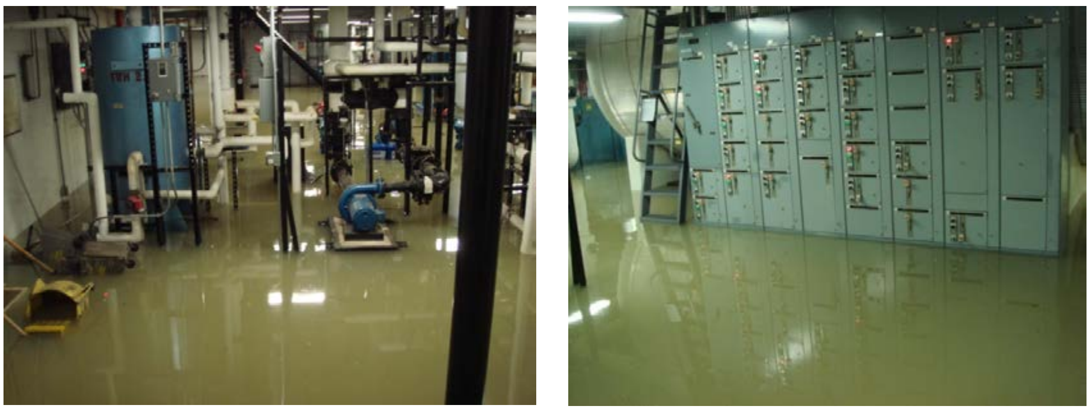

Figure 1-4. Existing Chattanooga Office Complex Mechanical/Electrical Room, Downtown Chattanooga, Tennessee

As an additional reference point, in 2011, three blocks away from the existing SOC, local businesses were flooded when a utility contractor installing underground fiber inadvertently damaged a 24-inch municipal waterline. Both of these events could have jeopardized SOC operations had the circumstances been slightly different. On September 12, 2019 a break occurred in a 36-inch main municipal water line leaving thousands of people in the Chattanooga area without water for days. Personnel in the SOC were relocated to the ROC to maintain system operations as the COC was closed with no potable water, or operating restroom facilities and limited air conditioning capability. As growth in downtown Chattanooga continues, the SOC will be at an increased risk for similar events that could occur without warning and with the timing of repair outside of TVA control.

Further, the COC is the primary work location for over 2,500 employees, and it received 13,140 visitors in the 2018 calendar year alone. Among those employees and visitors, however, only a fraction of these actually work and visit the SOC. While physical access to the SOC is controlled, its location, within the larger COC complex, results in additional unnecessary foot traffic around the SOC perimeter. In contrast, current industry trends for utility operations centers dictate that they are stand-alone facilities, located in areas with sufficient capacity to maintain a secure perimeter and limit onsite personnel to operators, critical support staff, and management. Benchmarking studies have shown that migration of primary control facilities and/or headquarters away from urban centers is becoming commonplace in the utility industry, with multiple national power-providers as recent examples.

1.2.2 Reliability Risks

TVA's transmission system is operated and managed utilizing a central Supervisory Control and Data Acquisition (SCADA) Energy Management System (EMS) located within the SOC. The SCADA/EMS is a computer system that gathers and analyzes information received from field units called Remote Terminal Units (RTU). This information is then used to monitor and control devices which maintain the reliability of the BES. This monitoring is performed both manually by System Operators and automatically by calculated values derived from information from RTUs. This constant 24/7 monitoring and automatic control ensure that a path is maintained to provide power to the customer and that the correct amount of power is produced.

Failure of the SCADA/EMS system forces System Operators to obtain the required information to maintain the BES reliability from other sources such as personnel in the field. This is a time-consuming process and greatly reduces the reliability of the BES. This type of operation can occur for a limited amount of time with success, but the outage duration exponentially decreases the reliability of the BES and increases the threat of large catastrophic blackouts.

Without the information provided by the SCADA/EMS, system interruption of service to customers could occur without the System Operators being aware. Restoration cannot occur until this information is known by the System Operator. This type of interruption can continue to propagate if action is not taken by the System Operator.

Just as the lack of information can cause an interruption to customers without the System Operator's knowledge, a large disparity between the amount of power produced and what is consumed can also affect the reliability of the BES, potentially resulting in a large-scale blackout. The North East Blackout of 2003 is an example of what can occur when the lack of correct information is received by System Operators. The current SCADA/EMS system is near end-of-life, and TVA has been officially informed by the system developer that no significant improvement of the existing system is forthcoming.

Modern energy generation, consumption, and management systems are vastly different today from when the existing systems were originally installed. The utility industry has been trending toward more diverse portfolios with energy resources such as solar, for example, taking a more prominent position. Likewise, energy consumption trends have had major shifts with the advent of more energy-efficient products. A modern SCADA/EMS would position TVA to better predict, control, aggregate and dispatch resources across the grid.

Both the SOC and ROC SCADA/EMS computer rooms are "at capacity" with existing equipment, leaving no space for the next generation of new servers. There is neither physical space nor electrical and mechanical system capacity to support simultaneous running of the current system hardware and the required parallel run and test time for the next generation system within the existing operations centers. To ensure reliability of the TVA system, and due to the critical function of SCADA/EMS, there can be no downtime while the new systems are installed – they must run in parallel while the new system is being tested. A loss of the SCADA/EMS system, even temporarily, would place at risk the fundamental ability to serve customer load at any level or reliability, which is a substantial enterprise risk to TVA. Replacement of the SCADA/EMS system in a standalone facility with one that is modern and fully supported by the developer eliminates this risk and puts TVA in a better position for the future. To ensure that TVA is positioned to continue to provide safe, reliable power to both the residents and businesses of the PSA as well as the neighboring utilities for which TVA is the Reliability Coordinator, TVA must address security and reliability risks associated with its current SOC. The construction of a new, highly reliable, standalone facility would address these risks by:

- Being located on a site with ample perimeter security, outside of a highly populated urban environment;
- Being constructed to high seismic standard and designed to withstand locally severe weather and man-made catastrophic events to further enhance TVA's disaster resiliency capability; and
- Featuring state-of-the-art SCADA/EMS service as well as redundant back-up systems for electrical, mechanical, and data to allow for continuous 24/7 operations.

1.3 Decisions to be Made

The primary decision before TVA is whether to address the current physical and reliability risks present in the existing SOC. If TVA addresses these risks, other secondary decisions will be involved. These include:

- Timing of the proposed improvements;
- Whether to construct a new facility or possibly augment the existing one;
- Most suitable power and communication routes; and
- Any necessary mitigation and/or monitoring to meet TVA standards and to minimize the potential for damage to environmental resources.

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

1.4 Related Environmental Reviews or Documentation

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

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

1.5 Scoping Process and Public Involvement

TVA contacted the following local governments, federal and state agencies, as well as federally recognized Indian tribes and other consulting parties, concerning the proposed action:

- 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
- Federal Aviation Administration
- Jena Band of Choctaw Indians
- Kialegee Tribal Town
- Shawnee Tribe
- The Muscogee (Creek) Nation
- Tennessee Department of Environment and Conservation (TDEC)
- Tennessee Department of Transportation (TDOT)
- Tennessee State Historic Preservation Office (SHPO)
- The Seminole Nation of Oklahoma
- Thlopthlocco Tribal Town
- United Keetoowah Band of Cherokee Indians in Oklahoma
- United States Army Corps of Engineers (USACE)
- United States Fish and Wildlife Service (USFWS)
- Mr. Greg Vital

TVA developed a public communication plan that included a website with information about the project, a map of the proposed TL route and substation location, and numerous feedback mechanisms for additional questions or information. TVA held a public information day at the Cedar Ridge Seventh-Day Adventist Fellowship Hall in Georgetown, Tennessee on August 30, 2018 to inform officials and the public of TVA's proposal and to seek public and agency input on the scope of the proposed action, specifically with regard to the proposed TL and supporting substation. Seventy-four letters were sent to property owners in the area, as well as eight elected officials in invitation to the public information day. TVA also used local news outlets and notices placed in local newspapers to notify other interested members of the public.

There were a few inquiries from property owners prior to the information day. One involved an owner with a pool house encroachment on the existing TL, another was from an owner who could not attend and wanted to know information about the project in relation to her property. Several others were from companies making general inquiries about the project. One of the property owners affected by the proposed new TL construction began to utilize social and traditional media outlets to discuss the project. This public information day was attended by 150 people of which about thirty-three were invited property owners.

At the public information day meeting, TVA presented maps with the proposed TL route and substation location. Larger scale tax maps were located throughout the meeting-space to allow attendees to review specific locations and properties within the project area. A variety of TVA personnel were in attendance to answer questions about the project ranging from details concerning the secure SOC complex, new TL easement purchase process, as well as the construction of the proposed TL route. A summary of the proposed TL route was given to participants along with a toll-free phone number, facsimile number, and an email address to facilitate additional questions.

A variety of interests were expressed by those who attended the public information day and are summarized below.

- Owners along the existing TL were interested in what the rebuild would involve, including confirmation that no new ROW would be required and whether existing structures could be relocated as a part of the rebuild.
- Concern was expressed about the possibility of farmland use being hindered by the project and whether environmental reviews were being completed for the proposal.
- Opposition was voiced by two property owners in particular that would be affected by the construction of the proposed TL. Concerns were expressed about the timing of property owner notification and also questions about why the proposed new TL was routed across private property instead of alongside State Highway 58.

Following the public information day, TVA began contacting owners in order to begin survey activities for the proposed TL. TVA met with several owners along the portion of new TL route who had requests. The majority of the feedback received came from one individual who was concerned about re-routing the proposed TL off of individual tracts such that the route paralleled State Highway 58, and the additional concern for potential of the TL to impact cultural resources.

As a result of information from environmental field surveys and property owner requests, TVA made adjustments to the proposed TL route. Adjustments only occurred to the proposed new portion of proposed ROW. These adjustments are described in Section 2.3 and the overall TL alignment and substation location depicted in Figure 1-5.

Figure 1-5. Proposed Gunstocker Creek 161-kV Transmission Line Located in Bradley, Hamilton, and Meigs Counties, Tennessee

1.6 Issues to be Addressed

TVA prepared this environmental assessment (EA) to comply with the National Environmental Policy Act (NEPA) and regulations promulgated by the Council of Environmental Quality and TVA to implement NEPA (TVA 1983). The EA investigates the construction, operation, and maintenance of a new SOC, the Gunstocker Creek 161-kV Substation and the associated 161-kV TL, including the purchase of TL ROW easements, comparing the impacts of those actions to the No Action alternative.

TVA has determined the resources listed below are potentially affected by construction and operation of the proposed SOC and associated facilities, as well as alternatives to the proposed SOC that were considered. These resources were identified based on internal scoping as well as comments received during the scoping period.

- Water quality (surface waters and groundwater)
- Air Quality
- Climate Change
- Aquatic ecology
- Vegetation
- Wildlife
- Endangered and threatened species and their critical habitats
- Floodplains
- Wetlands
- Aesthetic resources (including visual, noise, and odors)
- Archaeological and historic resources
- Land use
- Recreation, parks, and managed areas
- Socioeconomics and environmental justice
- Transportation
- Solid and Hazardous Waste
- Health and Safety

TVA's action would satisfy the requirements of 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 (CAA), and the Clean Water Act (CWA). Necessary permits and licenses are discussed in Section 1.8.

Potential effects on health and safety were considered in conjunction with related assessments included in this EA for resources such as air quality, water quality, environmental justice, transportation, solid and hazardous waste, and transmission line post-construction effects.

1.7 Public and Agency Involvement

The System Operations Center and Power System Supply Draft EA was released for a 30-day public comment period on October 29, 2019. The availability of the Draft EA was announced through area media outlets and the Draft EA was posted on TVA's website. TVA's agency involvement included notification of the availability of the Draft EA to local, state, and federal agencies, and federally recognized tribes as part of the review. Chapter 5 provides a list of agencies, tribes, and organizations notified of the availability of the Draft EA. Comments on the Draft EA were accepted from October 29, 2019 through November 29, 2019 via TVA's website, mail, and e-mail.

TVA received two comment letters from members of the public. TVA carefully reviewed all of the comments and edited the text of the final EA as appropriate. Appendix A contains the comments on the Draft EA and TVA's responses to those comments.

1.8 Necessary Permits and Licenses

A permit would be required from the State of Tennessee for the discharge of construction site storm water associated with the construction of the SOC, substation and TL. TVA would prepare the required erosion and sedimentation control plans and coordinate them with the appropriate state authorities. A permit may also be required if removed trees or other vegetation are disposed of through burning and for other combustible materials removed during construction of the proposed SOC and associated substation and TL. A Section 401 Water Quality Certification would be obtained as required for physical alterations to waters of the State. A Section 404 nationwide permit would be obtained from the USACE if construction activities result in the discharge of dredge or fill into waters of the United States. A permit would be obtained from TDOT for any modification or crossing of state highways or federal interstates during the proposed construction of the SOC and TL. A general permit for application of pesticides, as part of construction or maintenance activities, would be obtained from TDEC. Air permitting regulations under CAA require TVA to secure an Air Pollution Control Permit to operate stationary emergency internal combustion engines. A State Operating Permit (SOP) and an Underground Injection Control Permit would be required for the operation of wastewater treatment facilities. This system would also require Tennessee water and wastewater operator certification for those operating the wastewater treatment system. Correspondence received from agencies related to these and other approvals is included in Appendix B.

CHAPTER 2 – ALTERNATIVES INCLUDING THE PROPOSED ACTION

As described in Chapter 1, TVA proposes to replace the existing SOC in Chattanooga with a new standalone facility in Meigs County in Georgetown, Tennessee. Additionally, TVA proposes to build the Gunstocker Creek 161-kV Substation as well as approximately 5.25 miles of double-circuit TL to power the new SOC. A description of the proposed action is provided below in Section 2.1.2. Additional background information about the construction, operation, and maintenance of a TL is also provided and would be applicable if TVA undertakes the proposed action.

This chapter has seven major sections:

1. A description of alternatives;
2. A description of the Initial SOC Siting Study;
3. An explanation of the TL siting process;
4. An explanation of the construction, operation, and maintenance of the proposed SOC and TL;
5. A comparison of anticipated environmental effects by alternative;
6. Identification of mitigation measures; and
7. Identification of the preferred alternative.

2.1 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 standalone SOC and Gunstocker Creek 161-kV Substation as well as the purchase of easements for ROW and the construction, operation, and maintenance of the proposed TL.

2.1.1 Alternative A: The No Action Alternative

Under Alternative A, TVA would not construct a new standalone SOC, Gunstocker Creek 161-kV Substation, or the associated 161-kV TL. As a result, the existing SOC would remain in operation under current conditions, increasing the exposure to both man-made and weather-related physical security events as well as vulnerabilities associated with aged SCADA/EMS service and the existing electrical, mechanical and data systems that affect reliability. TVA's ability to provide reliable service within the PSA 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.

2.1.2 Alternative B – TVA Constructs a New Standalone System Operations Control Center, Gunstocker Creek 161-kV Substation, and Associated 161-kV Transmission Line

Under Alternative B, TVA would construct, operate, and maintain a new standalone SOC facility located northeast of the intersection of State Highways 58 and 60 in Meigs County in Georgetown, Tennessee (see Figure 1-1). The campus would be located on a 166-acre parcel of which approximately 22 acres would accommodate an approximately 176,193-square-foot two-story SOC building in addition to a Receiving/Maintenance building, Entrance Guard House, Fire Pump House, 18,703-square-foot protected equipment yard helipad, walkway canopies and parking areas. The SOC facilities would employ, when fully staffed, a total of between 210 and 220 people. Of these, 80 to 85 percent would be there during weekdays from 8 a.m. to 5 p.m., and the remainder would be there during nights and weekends.

A manned Entrance Guardhouse would be located at a gated entrance from State Highway 58, which would serve as the primary entrance for the facility. The location of this westerly entrance would access State Highway 58 at the high point of the existing road to maximize visibility at the newly created intersection for vehicle ingress/egress. The entrance road would be 28 feet wide and would curve to the left upon entering the site. The entrance road would lead to a 28-foot-wide perimeter road around the building.

The SOC and Technical Support Buildings would be surrounded by an oval-shaped access road, in addition to a parking lot and other select ancillary/support structures. The parking lot would have two points of access to the perimeter road and accommodate approximately 280 vehicles, including accessible spaces to comply with the Americans with Disabilities Act and electric vehicle charging stations. Covered 8-foot-wide walkways are incorporated from the parking lot to the main and employee entrances of the Technical Support Building and SOC, respectively. A separate 24-foot-wide emergency access drive would access the perimeter road from Old Highway 58 from the east.

The SOC would be powered by the new Gunstocker Creek 161-kV Substation constructed on the same 166-acre parcel, and the associated 5.25 miles of double-circuit TL. The TL would be a combination of an approximately one-mile section of new construction centered on 100-foot-wide ROW and 4.25 miles of existing 100-foot-wide TL ROW from which TVA would be removing the existing TL and construct a new TL. Temporary access roads would be required for construction and maintenance of the proposed TL. Primary electrical back-up power would be provided by four emergency generators (two 2,500 kW, one 1,500kW, and one 60 kW). Additionally, TVA would modify the relay protection scheme at Hiwassee 500-kV Substation. Protective relays at Sequoyah Nuclear Plant would only require documentation changes to incorporate the new TL terminal at the Gunstocker Creek 161-kV Substation. Communications equipment would also be upgraded at the Montlake Microwave Station as well as the ROC. The TVA map board displays would be updated to reflect the new transmission assets.

Sanitary Waste Service would be established within the 166-acre parcel and would consist of a sewage treatment system with a drip dispersal system discharge. This sewage treatment system would include a primary settling tank, an aerated equalization tank, two biological treatment tanks, a dosing tank and several storage tanks before being discharged by sub-surface drip dispersion for disposal. Potable water service would be extended across a designated easement to the new SOC from Savannah Valley Utility District's current location along State Highway 58. In the event of a disruption to local water service, TVA may elect to treat and utilize onsite well water in the event of an emergency situation for potable consumption. Use would be limited to approximately 800 gallons per day.

Additional information describing implementation of the proposed Action Alternative and how the most suitable TL connection was determined is provided below in Sections 2.3.1 through 2.3.6.

2.1.3 Alternatives Considered but Eliminated from Further Discussion

During the development of this proposal, alternatives other than a new standalone SOC facility were considered. However, upon further study, TVA determined that these options would not meet the project needs or had unacceptable levels of risk associated with maintaining reliable operations during construction.

2.1.3.1 The ROC Becomes Primary Control Center/SOC Becomes Backup (Option 1)

Under this option, TVA would retrofit the existing ROC to become the primary Operations Center. Option 1 included the construction of an additional story to the ROC where a new control room would be housed on top of the existing structure. Operations, workforce safety, as well as physical security would be at risk during a large-scale renovation project such as this. As such, a new temporary control center would be required to be constructed to remain compliant with NERC standard EOP-008[3], related to BES applications, data/communication and power requirements, as well as physical and cyber security. For these reasons, Option 1 was removed from further evaluation.

2.1.3.2 Retrofit COC for New SOC Space (Option 2)

This option included the expansion of the existing SOC into an adjacent space presently occupied by the COC auditorium. Several constructability challenges were present with the implementation of this option, as well as operational and physical security challenges. The existing SOC must remain in operation throughout the construction and expansion while the adjacent auditorium is completely demolished and rebuilt with a new two- or three-story structure above grade. Major construction adjacent to the SOC poses significant risk to existing operations from flooded excavations and utility disruption.

Additional utility feeds and upgrades to HVAC systems would be required as the existing SOC does not have additional capacity. Further, this option does not mitigate the current locational risks. For these reasons, Option 2 was removed from further evaluation.

[3] EOP-008 “Loss of Control Center Functionality” requires a Reliability Coordinator, Balancing Authority, and Transmission Operator like TVA to continue to meet its functional obligations with regard to the reliable operations of the BES in the event its primary control center functionality is lost.

2.1.3.3 Underground Utility Lines

In the case of a new standalone facility, new TL infrastructure must be constructed to power the site. A frequent objection to the construction of new TLs involves their adverse visual effects. Thus, a frequently suggested alternative is the installation of underground TLs.

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

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

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

2.2 Initial SOC Siting Study

In 2016, TVA performed a Siting Study to evaluate suitable locations to construct a secure system operations center utilizing the existing ROC location as a back-up control center. The goal of the study was to identify a single, primary site that would meet the transmission needs and technical requirements of a new SOC while having the least overall impact when considering environmental, engineering, and social factors.

2.2.1 Definition and Description of the Study Area

The initial step of the process established the limits of the study area based upon a 15- to 45-minute drive time from the existing ROC. This was computed utilizing ESRI ArcGIS geoprocessing tools and resulted in the irregular “donut” shaped area shown in Figure 2-1.

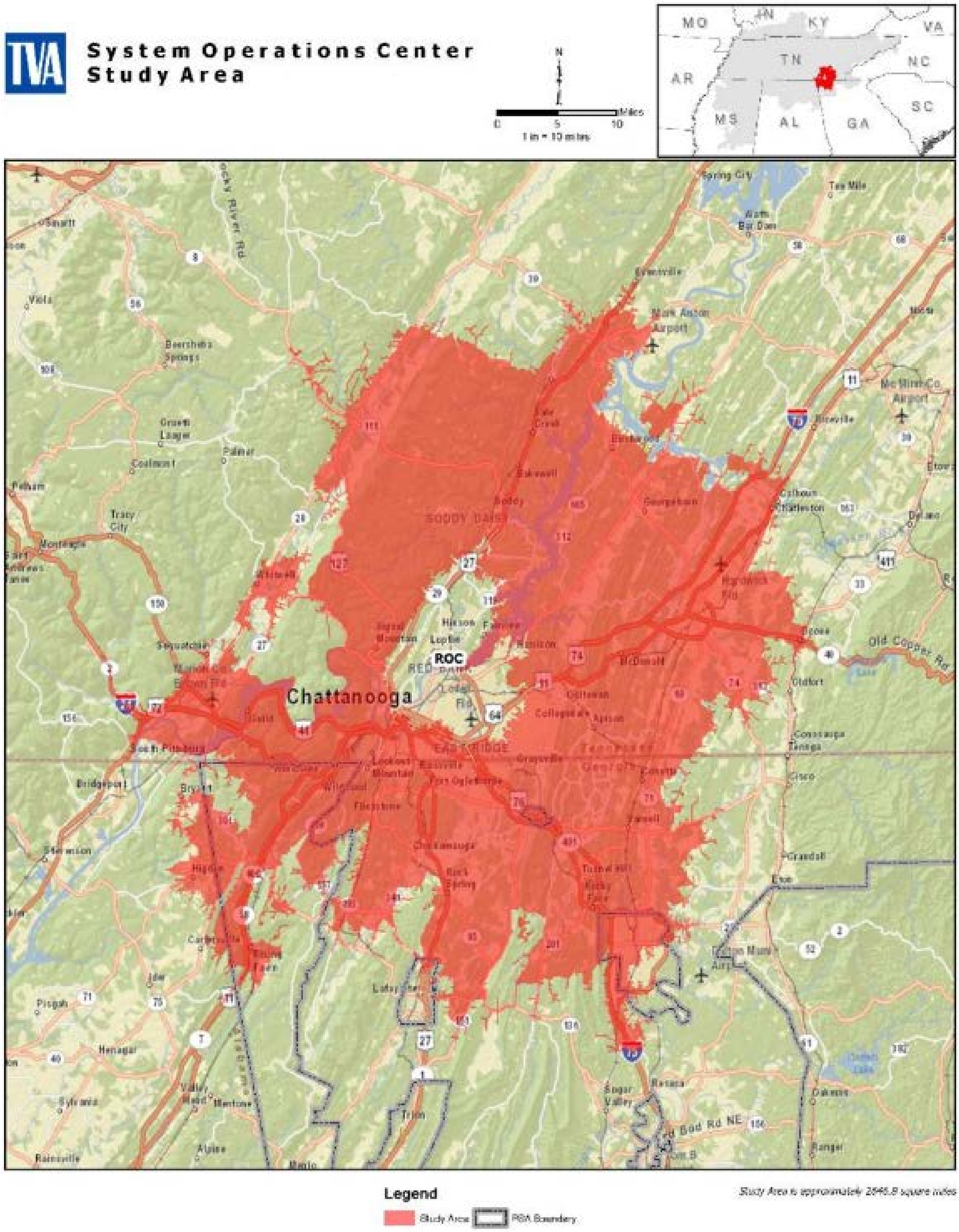

Figure 2-1. Regional Study Area for the Proposed System Operations Center Near Chattanooga, Tennessee

To ensure system reliability, the best practice within the industry is for primary and back-up sites not to be subjected to the same geographic and/or weather hazards such that a single event could affect both facilities. By setting a lower drive-time threshold of 15 minutes, TVA was able to minimize the probability of a single event affecting both primary and back-up site locations. This effectively created an approximate 173 square-mile area buffer around the ROC. TVA established a higher drive-time threshold of 45 minutes to ensure TVA personnel could reach both facilities in a reasonable amount of time should one facility be impacted. The resulting study area encompassed 2,647 square miles, as shown in red in Figure 2-1, extending into seventeen counties across Tennessee, Alabama, and Georgia and contained virtually every type of land use present from metropolitan and industrial to residential and farmland areas. The major transportation arteries within the study area include interstates I-24 entering from the west, I-59 entering from the southwest, and I-75 entering from the northeast and exiting from the southeast. All of these interstate routes converge to the center of the study area in Chattanooga. The study area also had significant variation geographically as it was interspersed with mountains, valleys, open land, as well as water resources varying in size from streams to major water bodies like Chickamauga and Nickajack Reservoirs on the Tennessee River.

2.2.2 Data Collection

Information sources used in the initial SOC siting study included geographic data, such as topography, land use, transportation, environmental features, and cultural resources for the study area. TVA also evaluated TL locations, U.S. Geological Survey (USGS) digital line graphs, National Wetland Inventory maps, and county tax maps. Various proprietary data maintained by TVA in a corporate geo-referenced database (i.e., TVA Regional Natural Heritage file data on sensitive plants and animals and archaeological and historical resources) were also utilized.

Data were analyzed manually and with Geographic Information System (GIS). The use of GIS allows substantial flexibility in examining various types of spatially superimposed information. This system allowed a multitude of study area factors to be examined both simultaneously and in series for developing and evaluating numerous options and scenarios to select a SOC site that would best meet project needs. GIS-based resources and other maps and drawings were utilized. Field reconnaissance was incorporated into the evaluation as well.

2.2.3 Establishment and Application of Siting Criteria

To complete a screening-level evaluation for such a large study area, exclusionary criteria and/or siting requirements were first identified. A GIS database was developed using the information in Section 2.2.2 and the exclusionary constraints and siting requirements applied to create a two-tier review process. Tier I included non-negotiable constraints, whose presence immediately excluded potential sites from further evaluation. These constraints included:

- Parcels less than 50 acres
- Federal Emergency Management Agency (FEMA) flood zones
- Emergency Action Plan flood inundation zones for dam failures and Probable Maximum Flood
- Economic development industrial sites
- Areas within a 1-mile buffer of a TVA Dam
- Nuclear emergency evacuation sectors

- Areas within a 1-mile buffer of sites designated on the U.S. Environmental Protection Agency (USEPA) Toxic Release Inventory - i.e. Chemical Plants
- Areas within a 1-mile buffer of a railroad

After these exclusionary constraints had been applied, 1,992 parcels remained for further evaluation. The following Tier II constraints were established such that sites that did not meet the following constraints were evaluated for exclusion:

- Minimum of 50 continuous acres in areas with less than a 20 percent slope
- Minimum of 50 continuous acres areas with no wetlands
- Minimum of 50 continuous acres not divided by pipelines
- Minimum of 50 continuous acres not divided by streams

Additionally, the following Tier II Requirements were applied such that the site met the following constraints:

- Within 2 miles of two TVA TLs (use for multiple fiber paths)
- Within 2 miles of a TVA TL with fiber optic

Once these constraints were applied, 350 parcels remained for further evaluation. Within the Tier II evaluation, those remaining sites were reviewed individually within the GIS model and the following additional constraints applied and evaluated:

- Current land use to be avoided:
    - Active Farm/Ranch with an occupied dwelling
    - Quarry or Landfill use
    - Recreational use (i.e., sports fields, golf-courses, etc.)
- Parcel shape – parcels with odd shapes were rejected if sufficient stand-off distance could not be achieved between building areas and property lines (i.e., 50 acres available but very narrow).
- Suitable construction area shape and size – consideration of the suitable building area within the site (i.e., large enough to facilitate construction and not encumbered or intersected by other attributes like streams or pipelines, for example). Sometimes there were 50-acre parcels available, but encroachment by steep slopes (greater than 20 percent) formed an undesirable shaped area for construction.
- Surrounding areas – it was not desirable to have a site that would be entirely surrounded by high density activity. For example, sites surrounded by neighborhoods, industrial sites, or recreational areas.
- Miscellaneous constraints such as pivot irrigation systems and large sinkholes.

After this additional screening review was completed, 42 potentially suitable sites remained.

A cross-functional team of TVA personnel reviewed and evaluated these remaining sites in a group setting. This team considered additional characteristics to eliminate potential sites from further consideration. Factors that contributed to this evaluation included: input from employees who would be stationed at the site (including out-of-state income taxes for employees, if located in Georgia or Alabama), identification of potential obstacles to the most direct route to the site (bridges, flooding, railroad crossings, etc.), and consideration of issues with alternative access routes to the site.

It was observed in this review that the remaining sites within the study area could be divided into four quadrant areas (Figure 2-2).

Area 1

Sites in Area 1 were eliminated largely due to locations being outside or near the edge of the TVA PSA. Because of the necessity of having the main control center for the TVA system firmly inside the PSA, many of the sites in this section were unsuitable as they are located on the periphery of the TVA transmission system. Also, transportation concerns due to the terrain and traffic delays that frequently occur along I-75 and the Tennessee River at Moccasin Bend were raised. Delays in these thoroughfares could cause back-up drive times to increase significantly due to the smaller roads through mountainous terrain. An additional factor considered related to the state income tax implications for employees currently living in Tennessee, but who would be assigned to an out-of-state work site.

Area 2

Sites in Area 2 were eliminated due to transportation routes to the sites. Sites to the west would encounter the traffic restrictions as mentioned in the above paragraph. Sites to the east were more remote, which caused concerns with routes to these sites and the obstacles encountered. The bulk of these sites were within a triangular area bordered by mainline railroad tracks.

Area 3

Area 3 had no sites within its area. One observation by the team was that the fiber infrastructure along the TLs in this section was limited and communication paths to the new control center are critical.

Area 4

Five sites in Area 4 located north of the Hiwassee River were a concern due to the propensity of heavy fog near the I-75 corridor. These sites also were near the furthest extent of the 45-minute drive time that dictated the study area. Two additional sites were eliminated due to their location near the glide path of the Cleveland Municipal Airport. Five more sites were eliminated primarily due to access concerns and terrain. The final six sites identified from this assessment are shown in Table 2-1 showing some of the characteristics considered. Site 15 was removed from the list after a drive-by assessment and a review of the GIS data discovered an exclusionary constraint.

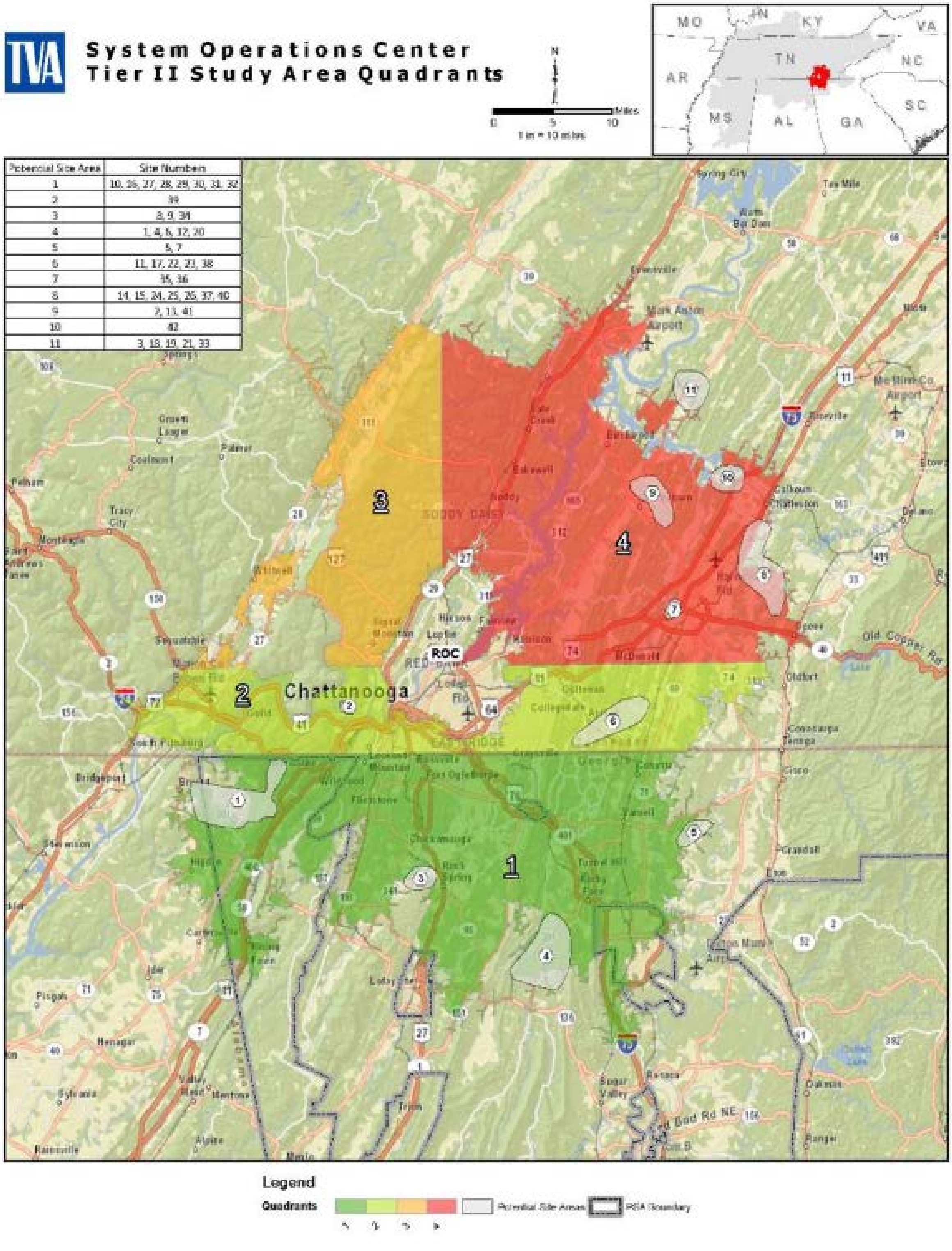

Figure 2-2. Tier II Study Area Quadrants Near TVA's Regional Operational Center Located in Chattanooga, Tennessee

Table 2-1. Alternative Site Ranking

Rank	Site	Acres	Pros	Cons
1	41	147	Good accessibility, Property for sale, constructability ranked as A	Several blue line streams (wet-weather conveyances) present in eastern portion of property, but a vast majority of these streams could be avoided by proper location of the 22--acre SOC site within the extended 166-acre site.
2	13	63	Relatively flat terrain, bridge needed for access on east side (good for security), and constructability ranked as A-	A bridge would be needed for the eastern side of the property. Access easement would be needed for western side of the property Limited area onsite for future expansion.
3	2	185	Secluded site and constructability B	Streams and ridges present restrictions and limitations on how the site could be developed. Because the site is entirely forested, it could result in greater environmental impacts.
4	35	77	Close to amenities, sewer, and water. Constructability B-	Capability to expand the site is limited by the topography, the presence of a natural gas pipeline on the site, and a high school and urbanized area adjacent to the site.
5	42	670	Close to amenities, sewer, and water, TL assets onsite.	Site presents several challenges such as the topography, fully forested condition, proximity to the Bowater area that is prone to severe fogging, and adjacent environmentally sensitive areas. Moreover, the lower constructability rating of the site (B- to C) makes it much less adaptable for construction of the SOC.
Eliminated	15	209	69kV TL on property	Site has poor access, is located close to the Bowater area that is prone to severe fogging, and does not meet siting requirements for a railroad buffer.

Site 41 was determined to meet all of the stringent siting criteria for a proposed SOC location. As summarized in Table 2-1, desktop and windshield review of each of the five sites identified critical characteristics that were taken into consideration in selecting a site for further evaluation. Site 41 was ranked as the preferred site due to acreage, accessibility, availability of land, constructability, and lower potential for environmental impacts compared to most of the other sites. Also, it must be noted that a smaller parcel adjacent to Site 41 was available for purchase thereby increasing the area of the site to about 166 acres.

2.3 Transmission Line Siting Process

Transmission improvements are needed to supply power to the proposed SOC and supporting onsite facilities. These improvements would also provide for future power system connections to ensure reliability and additional capacity for growth in the area. To maintain operational control over the power source for this critical infrastructure, TVA elected for primary power to the facility to come from an existing TVA TL. The process of siting the proposed substation and associated TL connection included the following steps and are described further in the following sections:

1. Consider potential substation location
2. Determine existing TL power source for connection to the proposed substation.
3. Characterization of TL project area
4. Siting Tools Utilized
5. Route development and Public Information Day
6. Finalization of substation location and associated TL route

2.3.1 Consider Potential Substation Location

As a result of the TVA SOC Siting Study described above in Section 2.2, options were evaluated for the substation location within the 166-acre parcel depicted in Figure 1-1. The natural topography and land cover of the area favored development of the western side as opposed to the eastern side of the parcel, which was more heavily wooded and would have resulted in greater earthwork requirements. As such, the substation was proposed to be located on the eastern side of the SOC complex.

2.3.2 Determine Existing Transmission Line Power Source to Proposed Substation

Two possible sources were considered to provide power to the proposed SOC and supporting onsite facilities.

2.3.2.1 Option One: Sequoyah-Watts Bar Hydro 161-kV TL

Under Option One, TVA would tap the TVA Sequoyah-Watts Bar HP 161-kV TL west of State Highway 58 and construct a new double-circuit 161-kV TL, looping into the Gunstocker Creek 161-kV Substation to power the SOC and supporting facilities (Figure 2-3). The new TL would be approximately 1.5 to 2 miles in length, depending on the tapping point for the parent TL. Redundant fiber paths would be available to the proposed SOC utilizing this option.

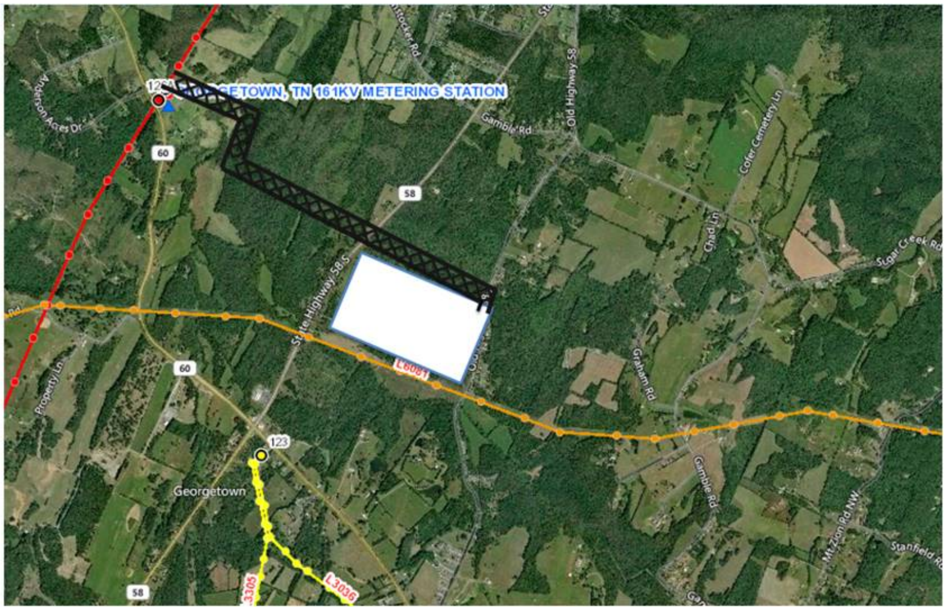

Figure 2-3. Option One: Sequoyah-Watts Bar Hydro 161-kV TL

2.3.2.2 Option Two: Sequoyah-Nuclear Plant–Hiawassee No. 1 161-kV TL

Under Option Two, TVA would utilize the Sequoyah Nuclear Plant-Hiwassee No1. 161-kV TL located southeast of the proposed SOC site to power the SOC and supporting facilities (Figure 2-4). TVA would loop approximately 5 to 5.25 miles of new double-circuit 161-kV TL into the Gunstocker Creek 161-kV Substation. Approximately 4.25 miles of the proposed TL would be on existing 100-foot-wide ROW of TVA's East Cleveland Primary-Georgetown 69-kV TL which would be rebuilt to 161-kV operation. The remaining one mile of TL would be on new 100-foot-wide ROW, terminating into the Gunstocker Creek 161-kV Substation. Redundant fiber paths would be available to the proposed SOC utilizing this option.

Figure 2-4. Option Two: Sequoyah Nuclear Plant–Hiawassee No.1 161-kV TL

The reliability of the Sequoyah Nuclear Plant–Hiwassee No. 1 161-kV TL as well as the fact there were no additional feeds or taps from this TL made Option Two better for consideration of a power source for the proposed SOC and supporting facilities. Additionally, the source power for the local utility's back-up 26-kV TL to the SOC is the Sequoyah-Watts Bar Hydro 161-kV TL. From a reliability standpoint, it is best practice for primary and back-up power to come from different sources. For those reasons, Option One was eliminated from further review.

2.3.3 Characterization of Transmission Line Project Area

The area reviewed for the TL route largely encompassed land paralleling the existing TVA's East Cleveland Primary-Georgetown 69-kV TL which parallels State Highway 60. The area starts where TVA's East Cleveland Primary-Georgetown 69-kV TL crosses under the Sequoyah–Hiwassee No. 1 and No, 2 double-circuit 161-kV TL and extends to the proposed Gunstocker Creek Substation about 4 miles directly northwest. The area contains portions of Bradley, Hamilton, and Meigs counties in Tennessee.

2.3.3.1 Transportation

There are two State Highways present in the area, Highway 58 and 60. Highway 60 passes through the Georgetown, Tennessee community and runs in a northwestern direction bisecting the project area. State Highway 58 runs in a northeastern direction and intersects State Highway 60 near the northwestern corner of the project area (see Figure 1-1). There are also several county and minor roads in the area, the following which are detailed as a matter of reference and can be seen on Figure 1-5. Ooltewah-Georgetown Road connects to Georgetown from the southwest. Old Highway 58 enters Georgetown from the northeast. Mt. Zion Road and White Oak Valley Road both intersect State Highway 60 near the southeast corner of the project area. Mt. Zion Road travels in a northeastern direction along the base of Mt. Zion Ridge. White Oak Valley Road enters State Highway 60 from a southwestern direction and runs through a valley between White Mountain and Mt. Zion Ridge.

2.3.3.2 Natural Areas and Cultural Features

The southern portion of the study area is occupied by White Oak Mountain to the west and Mt. Zion Ridge that runs to the northeast. The terrain then slopes to more moderate undulating hills and knolls with areas of level ground to the northwest. Predominant water features in the area are the Gunstocker, Sugar, and Bigsby Creeks with Gunstocker Creek draining a significant amount of the middle and northern portions of the study area and follows northwest and turns north before entering the Hiwassee River (see Figure 1-5). Wetland resources are present within the study area and are generally located along streams and within pockets of low areas typically around ponds. A natural area identified as Gunstocker Glade occurs within the study area. It incorporates an approximate 60-acre area near the intersection of State Highways 58 and 60 but is not within any new TL ROW required for this project. Additionally, State Highway 60 follows the general path of the Cherokee forced relocation route known as the "Trail of Tears."

There are two conservation easements registered for two properties within the proposed study area. One is referenced as the Circle G Conservation Easement and the other is the Circle V Farm Conservation Easement. Both properties are adjacent to each other separated by State Highway 60. The existing ROW for TVA's East Cleveland Primary–Georgetown 69-kV TL predates the establishment of the Circle V Farm Conservation Easement and would be utilized for this project as a part of the proposed TL rebuild. No new ROW would be required for the rebuilt portion of TL. New and existing TL ROW for the project would avoid the Circle G Conservation Easement.

Ten cemeteries were identified within the project area and generally occurred alongside roads and highways. The sites in closest proximity to where work would occur are the Barger and Hinkle cemeteries. The Barger cemetery site is off White Oak Valley Road and is approximately 1,000 feet southwest of the East Cleveland Primary-Georgetown 69-kV TL. The Hinkle cemetery site is in a wooded area near a dirt field southwest of State Highway 60 and is about 500 feet from the same TL. Data gathered via desktop survey identified nine archaeological and twenty-five architectural sites in the area with varying National Register of Historic Places (NRHP) eligibility.

2.3.3.3 Land Use

The study area is largely rural with a mixture of larger tracts of farmland with scattered subdivisions and tracts subdivided into smaller lots for potential future residences. The farmland in the area largely consists of cattle farming or dairy operations, although a buffalo farm is located north of Georgetown alongside State Highway 60 (the Circle V Conservation Easement referenced above). Hay appears to be the major crop planted in the area although what appears to be a tree farm was noted along the north side of Ooltewah-Georgetown Road. An area along White Oak Mountain and Mt. Zion ridge is largely forested as the terrain is less conducive to farming or development. The unincorporated community of Georgetown is located near the junction of Bradley, Hamilton, and Meigs counties and is at the crossroads of Ooltewah-Georgetown Road and Old Highway 58 and State Highway 60.

Residential dwellings and neighborhoods are scattered throughout the area along the county roads and highways. The neighborhoods of Will Springs and Georgetown Village are both located on the western side of State Highway 60 and have existing ROW for TVA's East Cleveland Primary–Georgetown 69-kV TL through the back portions of their development. Additionally, there are approximately sixty homes located in a neighborhood on the western side of State Highway 60 near the base of Mt. Zion Road whose development also backs up to the existing ROW for the TVA's East Cleveland Primary–Georgetown 69-kV TL. There is a concentration of larger lots with homes along White Oak Valley Road located in the valley between Mt. Zion Ridge and White Oak Mountain. The existing ROW for the same TL also runs between a few of these lots with homes.

There are several TVA high-voltage TLs present in the study area. The Sequoyah-Hiwassee 500-kV TL aligns east to west near the northern portion of project area. This TL is approximately 500 feet from and parallels the 166-acre site proposed for the SOC. There are two 69-kV TLs which once connected to the old Georgetown Substation located near the intersection of State Highways 60 and 58. The old Georgetown Substation does not operate as a substation now and is currently owned by the local utility provider, Volunteer Electric Cooperative (VEC). The East Cleveland Primary-Georgetown 69-kV TL essentially parallels the west side of State Highway 60 and currently ends approximately 1,900 feet short of the substation where it ties to the Georgetown-McDonald 69-kv TL. The Georgetown-McDonald 69-kV TL runs in more of a northern slightly east direction and is located on the western side of the project area.

2.3.4 Siting Tools Utilized

A GIS database was utilized and an electronic map was developed to define the proposed TL connection. Additionally, existing aerial photography alongside topographical map overlays as well as other layers in the GIS database were used such as wetlands, streams and rivers, floodplains, open water/ponds, highways, cemeteries, open land, and property boundaries to refine the route. Data from the SOC Regional Study Area, as collected and described previously in Section 2.2.2, were consolidated and Light Detection and Ranging (LiDAR) imagery was obtained. These GIS layers along with imagery showing other features such as homes, barns, bridges, and other constraints as well as field reconnaissance were utilized to establish the proposed TL route.

There were several general guidelines used when establishing the new portion of the proposed TL route for this project. These included the avoidance of major constraints such as residences, residential developments, and other structures. Rivers and streams were to be crossed at 90 degrees where possible to reduce the amount of clearing of the stream bank vegetative cover. Also, rivers and streams were not paralleled at a distance that would require clearing of this vegetated cover. Environmental and historic areas were also considered and outlined as constraints and avoided where possible. Access to the TL for construction and maintenance is typically a consideration as well. Other factors considered were engineering requirements, and where possible, utilizing an existing TVA ROW easement, and working to incorporate landowner requests during the final routing.

2.3.5 Route Development and Public Information Day

The TL route was developed using current aerial photography of the area, 7.5-minute USGS topographical maps, and a GIS-based map as described in Section 2.3.4. The GIS-based map was a key tool, as well as multiple mobilizations for field reconnaissance to the area, in locating the proposed route that would best meet the project needs while avoiding or reducing conflict with any constraints. The objective was to connect the future power source from the existing TVA Sequoyah Nuclear Plant-Hiwassee No. 1 161-kV TL to the proposed TVA Gunstocker Creek 161-kV Substation.

A major consideration for this project was to utilize the existing TVA ROW of the East Cleveland Primary-Georgetown 69-kV TL. This TL previously fed the old Georgetown 69-kV Substation which was replaced in 2014 with the new Georgetown 161-kV Substation further to the northwest. This TL already has a 100-foot-wide ROW easement required for a double-circuit 161-kV TL. Utilizing the compatible ROW width already in place for the existing East Cleveland Primary-Georgetown 69-kV TL limits the need for additional new TL ROW and reduces the length and area of new ROW on additional landowners. The existing 69-kV TL also has the benefit of crossing under TVA's Sequoyah Nuclear Plant-Hiwassee No. 1 161-kV TL which is the power source needed for the project.

The East Cleveland Primary-Georgetown 69-kV TL route and ROW were reviewed from the Sequoyah Nuclear Plant-Hiwassee No. 1 161-kV TL crossing up to the Georgetown 69-kV Substation. There were a few congested areas where the existing TL ROW went between residential lots. One area was off White Oak Valley Road NW where the existing TL passed between some lots with homes. Another more congested area was where the existing TL passed through the Georgetown Village subdivision. The existing TL passed between four lots with homes in the neighborhood and two lots with homes off Ooltewah-Georgetown Road before reaching the neighborhood. A pool house for a swimming pool encroached upon the TL ROW in the neighborhood. Upon review of the existing TL and ROW, TVA determined that a double-circuit 161-kV TL could be designed on the existing 100-foot-wide

ROW and proper clearances could be maintained even in the area of the encroachment. The owner with the encroachment decided to sign a Permits and Covenant with TVA rather than remove the pool house. Based on this review, TVA decided to utilize the existing 4.25 miles of East Cleveland Primary-Georgetown 69-kV TL ROW to its fullest extent.

The next step was to develop the proposed route for the remaining one-mile TL to connect to the proposed Gunstocker Creek Substation. Initially, consideration was given for the proposed new TL route to cross over the old Georgetown 69-kV Substation property. However, even though this site is not currently operating as a substation, existing infrastructure is being utilized by VEC, and VEC stated there were future plans for operation at this site. Multiple dwellings on the southwest side of State Highway 60 precluded exiting the existing TL ROW before the Georgetown 69-kV Substation to cross State Highway 60. As such, TVA proposed to exit the existing TVA East Cleveland–Georgetown 69-kV TL ROW along the northwest side of the old Georgetown 69-kV Substation property. The proposed TL route had to cross the highway in a northeastern direction to avoid an existing cell tower located on the opposite side of State Highway 60.

Upon crossing State Highway 60, the proposed TL would continue in an eastern direction for approximately 300 feet before turning in a northeastern direction and heading to the 500-KV TL crossing point. This turn was located in an effort to place it at the edge of one owner’s field. At this point the new TL would turn northeast and extend approximately 1,300 feet, traversing a property to a point located as close as practicable to a property line. This was requested by an owner associated with the two parcels on either side of the property line. The TL route would then turn slightly more north and parallel to a point that aligns with the 500-kV TL crossing location.

The proposed crossing of the TL under the existing TVA Sequoyah-Hiwassee 500-kV TL was particularly challenging. Careful consideration was given to its location to ensure the clearance of all new conductors and other wires, such as overhead ground wires or optical ground wires, with the existing 500-kV conductors. The terrain, natural features (i.e. streams, ponds, etc.), and the structure heights of both TLs involved at the crossing were evaluated. If adequate clearances could not be maintained, then modifications would be required to the existing 500-kV TL that is proposed to be crossed under. In order to accommodate an acceptable 500-kV crossing, TVA initially proposed that the new 161-kV TL would be reconfigured from a vertical to horizontal configuration requiring a ROW width of 150 feet in the proximity of the crossing. Review of the Sequoyah-Hiwassee 500-kV TL indicated the optimum crossing location of the existing 500-kV TL was on the east side of Structure 151. This location would allow a new TL crossing without requirements for modification to the 500-kV structure or lengthy outage. During the course of subsequent environmental field reviews, however, potential cultural resources were identified that necessitated a westward shift of the proposed TL alignment. In order to maintain proper clearance, a tower extension at Structure 151 and the addition of a prop structure between Structures 151 and 152 of the Sequoyah-Hiwassee 500-kV TL was determined to be required. The proposed TL route would then turn slightly east, cross under the 500-kV TL and enter TVA property. The new TL ROW length would be approximately 1 mile with 0.8 mile being on private property. The new ROW would be 100 feet wide.

Based upon the descriptions in the above paragraphs, a summary of the proposed TL is provided here. The proposed TL would begin at TVA's Sequoyah Nuclear Plant-Hiwassee No. 1 161-kV TL at a point just northwest of the Hopewell 161-kV Metering Station near the intersection of Rabbit Valley Road Northwest and State Highway 60 (Georgetown Pike) northwest of Cleveland, Tennessee.

The proposed TL would extend northwest for about 5.25 miles (through portions of Bradley, Hamilton, and Meigs counties) to the proposed Gunstocker Creek 161-kV Substation northeast of the intersection of State Highways 58 and 60 in Meigs County. About 4.25 miles of the new TL would be on existing 100-foot-wide ROW of TVA's East Cleveland Primary-Georgetown 69-kV TL. This line would be torn down and rebuilt as double-circuit from Structure 76 to the old Georgetown Substation. The remaining one-mile section of TL would be on new 100-foot-wide ROW. The proposed substation location and TL route was presented at a Public Information Day as described previously in Section 1.5.

2.3.6 Finalization of Substation Location and Transmission Line Route

Section 2.3.6 explains the process of changes developed between the proposed TL route and the final preferred route that was surveyed, including a summary of meetings with various property owners. Defining the preferred route to be surveyed was a process that was affected by owners' discussion and requests (a summary of which is included in Appendix C) and field survey findings. As a result of both, the preferred route was adjusted where practicable. Adjustments occurred in only the new portion of the proposed TL ROW. Figure 2-5 shows a close-up of the proposed new TL route as presented at the Public Information Day. Figure 2-6 shows the close-up route presented at the Public Information Day as well as an additional route slightly east of the original. Figure 2-7 represents a close-up of the final Proposed Preferred 161-kV TL Route.

After the Public Information Day, the next task was to develop a Survey Request Package (SRP). The SRP is the document developed to support the preferred route survey. There are 36 parcels and 31 owners identified along the existing TL ROW, and 8 parcels and 7 owners along the proposed new TL ROW. TVA contacted each of the owners with property on the existing, as well as the proposed new TL ROW concerning the survey. As a part of the SRP, these owners were notified by mail. Two of the owners on the proposed new TL ROW also own property on the existing ROW route. These owners were also contacted by phone. Permission to survey was requested from owners on the proposed new TL. Letters were also sent to owners along a portion of the TVA Sequoyah-Hiwassee 500-kV TL where fiber is proposed to be added.

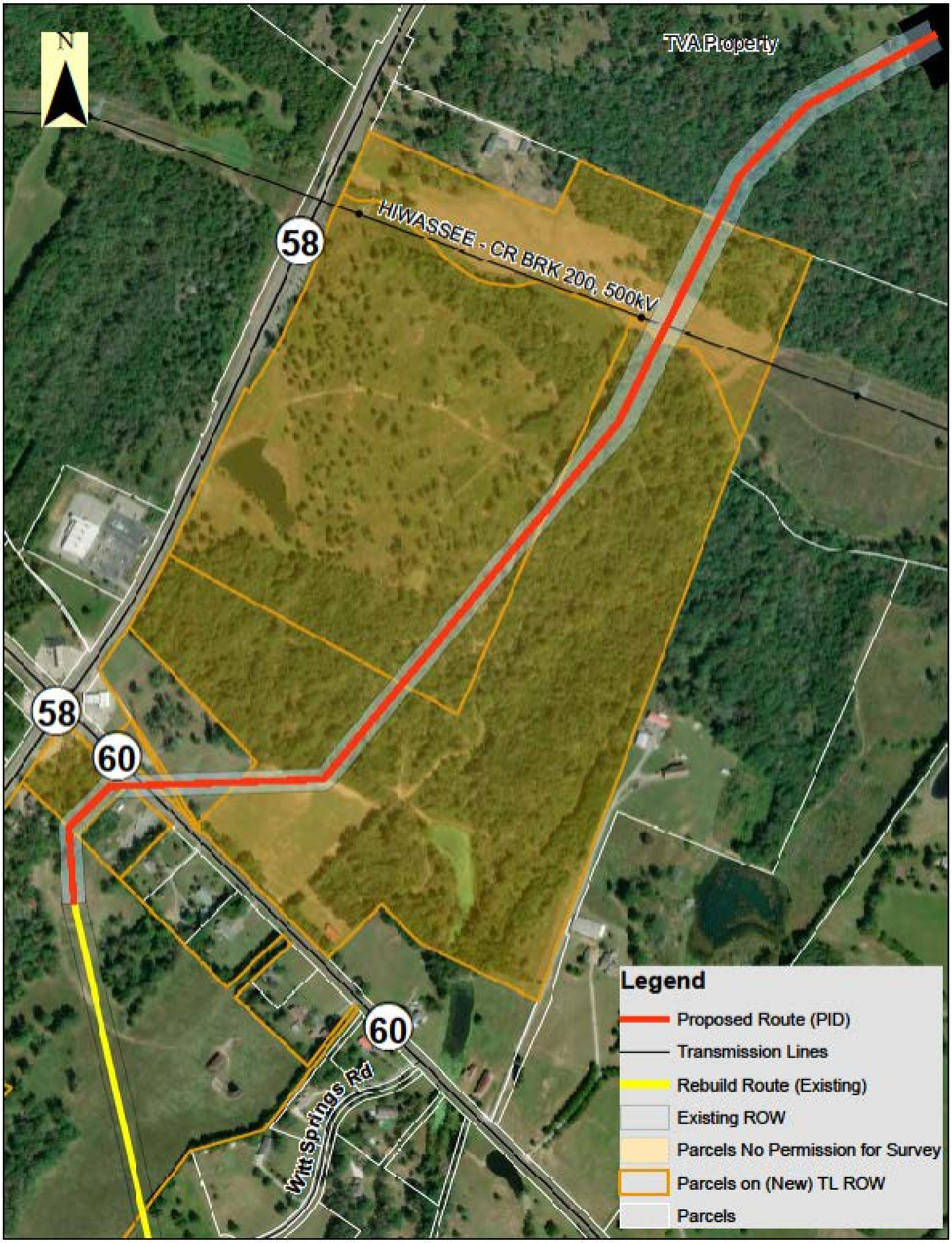

Figure 2-5. Close-up of Proposed Gunstocker Creek 161-kV Transmission Line Route Presented at Public Information Day

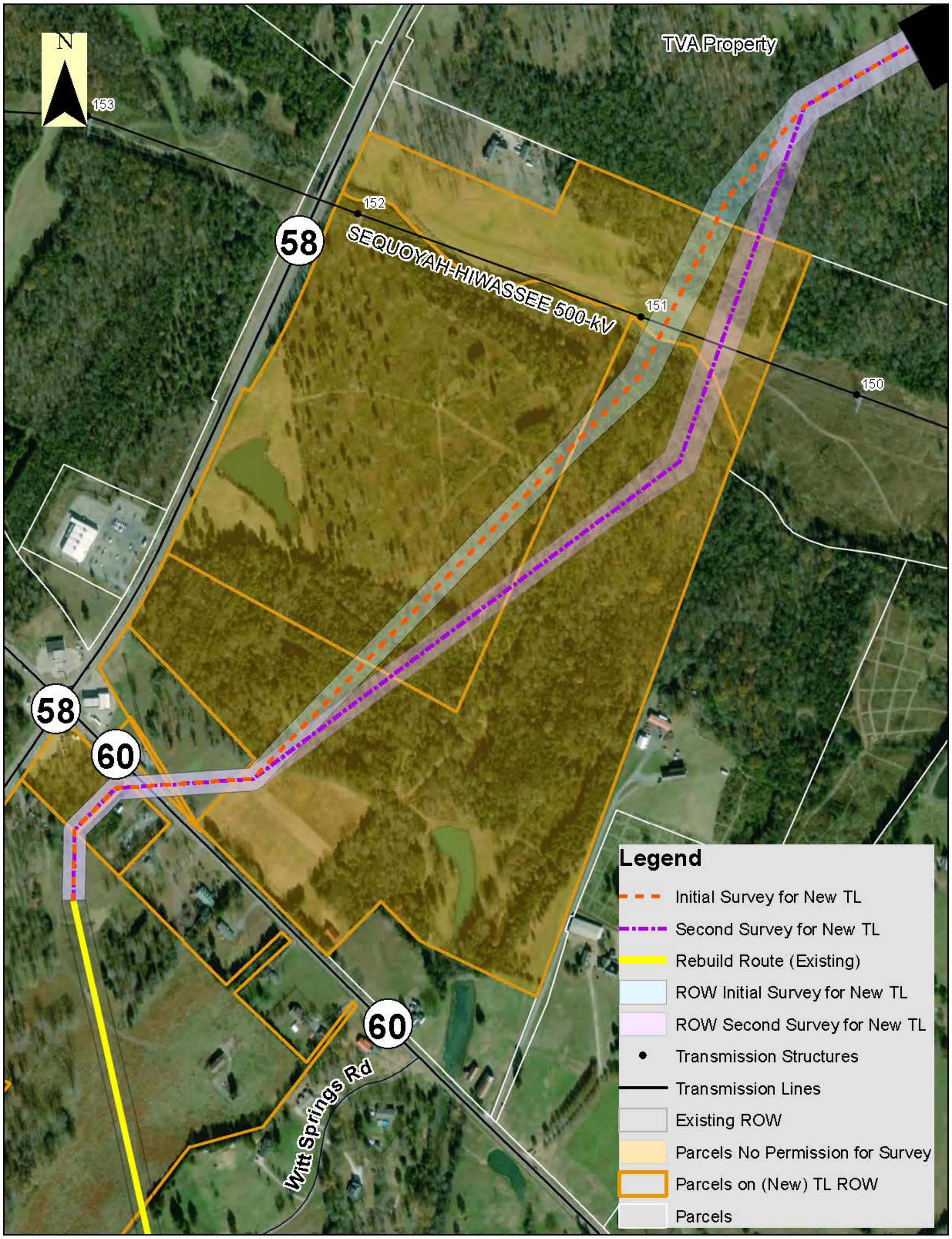

Figure 2-6. Close-up of the Initial Surveyed Area for the Proposed Gunstocker Creek 161-kV Transmission Line Route

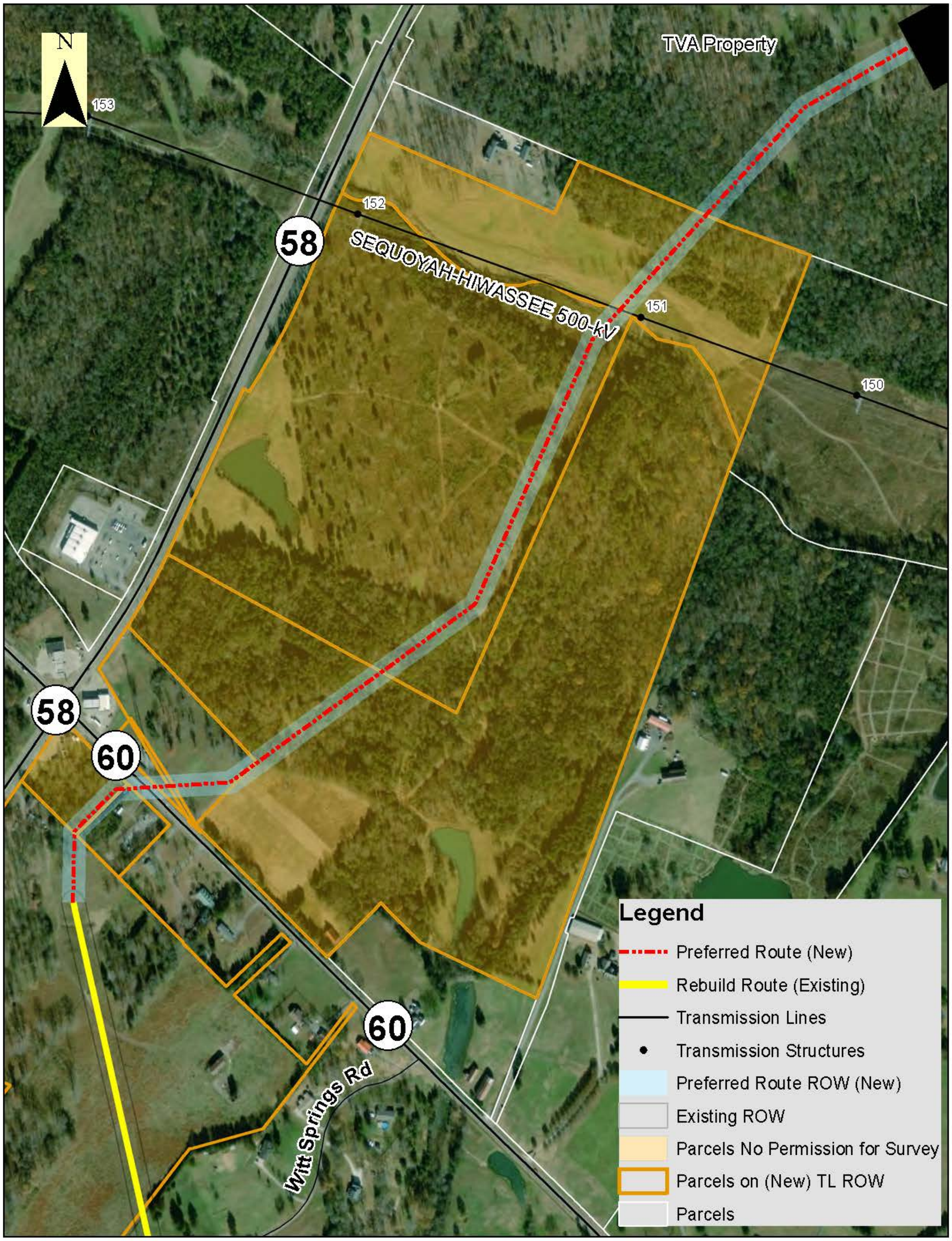

Figure 2-7. Close-up of Proposed Preferred Gunstocker Creek 161-kV Transmission Line Route

Once contact was made with the owners and the SRP was completed, field surveys began along the proposed 1 mile of new TL ROW as shown in red in Figure 2-6. Surveys were also performed along the 4.25 miles of the rebuild route on existing TL ROW as shown in its entirety in yellow in Figure 1-5.

Environmental field surveys identified an above-ground cultural resource on the proposed new TL route. Measures were taken to avoid impacting this resource by adjusting the new TL route. Due to various issues such as the terrain, location of Gunstocker Creek, construction tolerances, TL clearances, and consideration of an occupied dwelling, the new TL route was moved further east (see Figure 2-6). Environmental field surveys were performed on this adjustment and similar potential cultural resources were identified that necessitated further avoidance. Through review of historical imagery and property owner interviews TVA confirmed previous land disturbance had occurred west of both the originally proposed Initial Survey and Second Survey TL Routes. TVA archeologists and contractors completed cursory field reconnaissance to screen the area for similar above-ground cultural resources. Given the level of previous disturbance and lack of potential above-ground cultural resources, TVA proposed a western re-route for further engineering and environmental analysis. Also, there were further discussions with the property owner associated with the two large parcels between Highway 60 and the SOC property. Input from this owner was incorporated into this re-route. TVA determined that the proposed 500-kV TL crossing would be redesigned as discussed in section 2.3.5 above and no significant environmental or cultural features were identified along the centerline or ROW width. Physical surveys of the TL centerline were performed afterwards. This final preferred route is shown in red on Figure 2-7.

2.4 Construction, Operation, and Maintenance of the Proposed System Operations Center and Substation

2.4.1 SOC Property Acquisition, Clearing and Development

As described in Section 2.2, TVA completed an extensive siting study to screen potential parcels for suitability of a proposed standalone SOC facility. The proposed site was ranked the highest of five additional sites and was being actively marketed for sale towards the conclusion of the study period. TVA also reviewed an additional 18.64 acres bordering the northern edge Site 41. In an effort to preserve options moving forward and to allow for additional site testing and field review, TVA purchased the property in 2017 under Categorical Exclusion 5.2.25 of TVA’s NEPA Procedures (TVA 1983). This purchase of property is an environmentally neutral action and is not a permanent commitment of TVA resources as it may be sold if additional analysis and NEPA review warrant.[4]

TVA would clear vegetation, remove topsoil, and grade in accordance with both of TVA’s *Site Clearing and Grading Specifications* (TVA 2019c). Approximately 77.5 acres of the 166-acre property are proposed to be disturbed over the life of the project, but work would be broken into four phases such that no more than 50 acres are disturbed at any one time as detailed in the site-specific Storm Water Pollution Prevention Plan (SWPPP). Each

[4] Categorical exclusions (CE) are categories of “actions which do not individually or cumulatively have a significant effect on the human environment and which have been found to have no such effect in procedures adopted by a federal agency in implementation of these regulations and which, therefore, neither an environmental assessment nor an environmental impact statement is required” (CEQ 1507.3; CEQ 1508.4). TVA’s CE 5.2.25 excludes from further review the purchase, sale, abandonment, or exchange of minor tracts of land, mineral rights, or land rights.

phase pertains to a specific area of the site (further detailed in the Erosion and Sediment Control drawings located in the SWPPP) and would include the following subset of activities:

- Best Management Practices (BMP) installation;
- clearing;
- grading;
- infrastructure construction; and
- stabilization/restoration.

Equipment used during clearing would include chain saws, skidders, bulldozers, tractors, and/or low ground-pressure feller-bunchers. Marketable timber would be salvaged where feasible; otherwise, woody debris and other vegetation would be piled and burned, chipped, or taken off site. In some instances, vegetation may be windrowed along the edge of the project site to serve as sediment barriers. Implementation of *TVA ROW Clearing Specifications*, *Environmental Quality Protection Specifications for Transmission Line Construction*, *Transmission Construction Guidelines Near Streams* (TVA 2019c), and *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities – Rev 3, 2017* (TVA 2017a) provide further guidance for clearing and construction activities.

Following clearing, grading and construction, disturbed areas on the property (excluding approximately 22 acres which would be utilized for the SOC, parking and ancillary facilities) would be restored to approximate pre-construction conditions, to the extent practicable, utilizing appropriate seed mixtures as described in TVA (2017b). Erosion controls would remain in place for each phase until that portion of the project is stabilized in accordance with the Tennessee General Stormwater Permit.

2.4.2 SOC and Substation Site Preparation and Infrastructure

The site would be leveled through a cut and fill process. The areas of the site that are too high (sloped) must be “cut” down to a level elevation, and other areas that are too low require “fill” to raise the elevation. Any additional fill required would be obtained from an approved/permitted borrow area. Additionally, construction of the new SOC would require the relocation of a portion of an intermittent to ephemeral stream, installation of three open bottom culverts in an intermittent stream to allow flow under an access road for the facility, and filling of one small wetland (0.17 acres).

Temporary spoil storage, if required would be located onsite in several designated areas. Total disturbance, including grading and spoil material and any necessary detention basins would be approximately 77.5 acres, but phased such that no more than 50 acres is ever exposed at any one time.

During construction activities, rock removal may require explosive blasting depending upon site specific geologic conditions. In the event blasting is required, the blasting contractor supervisor would be responsible for all explosives handling and transport, blasting operations, and adhering to the requirements of National Fire Protection Association (NFPA) 495, Explosives Material Code. The site would be secured via a walk-through performed by the blasting contractor, safety coordinator, and TVA security and management staff prior to explosives being delivered to the site. Security surveillance and theft prevention procedures would then be maintained for the duration of onsite explosive handling, storage, and use. Thorough record keeping, including receiving and dispensing logs, blasting record logs, and blast data sheets, would be maintained at all times. Adherence to these measures, detailed in the site-specific safety plan, would ensure proper management and storage of explosives onsite and minimize safety risks.

Silt fences, site drainage structures, and detention ponds would be installed in each phase of construction and maintained throughout the project. The substation yard would be covered with crushed stone and enclosed with chain link fencing. With the exception of the Guard House and Maintenance/Receiving Building, the SOC complex would be enclosed within additional security fencing. Primary access to the site, both during construction and operation, would be via a new graveled access road constructed from State Highway 58 to the SOC and connecting to the substation, a distance of approximately 1,584 feet. This road would be paved during the final stages of the project. A secondary access road, approximately 1,542 feet in length, would be established via Old Highway 58 and used for emergency access once the facility is operational.

Major infrastructure for the SOC site would include the 176,193-square-foot SOC, Entrance Guard-House, Receiving/Maintenance Building, Fire Pump House, 18,703-square-foot protected equipment yard helipad, walkway canopies and parking areas. Major equipment for the SOC would consist of four emergency diesel generators, two 20,000-gallon and one 6,000-gallon diesel storage tanks, one 800-gallon potable water storage tank, and one 150,000-gallon water storage tank for fire emergencies. Equipment at the substation would include two 10 MVA transformers, several SF-6 circuit breakers, connecting bus work, a supporting steel superstructure, communications tower and switch house.

Oil containment at both the SOC and substation would include a subsurface oil catchment area and associated piping to an oil/water separator to capture any oil from the transformer bank area. The oil/water separator would be designed to retain any oil. If the oil should build up, the oil would then be pumped and hauled to an approved waste receiving facility. Both the SOC and the substation switch house would connect to the local water supply via a new waterline extending along State Highway 58. In the event of a disruption to local water service, TVA may elect to treat and utilize onsite well water in the event of an emergency situation for potable consumption. If required in an emergency, use would be limited to approximately 800 gallons per day. Wastewater generated from the SOC and substation would be treated by on onsite sewage treatment facility, permitted by TDEC. No surface water release would occur.

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

2.5 Construction, Operation, and Maintenance of the Proposed Transmission Line

2.5.1 Transmission Line Construction

2.5.1.1 Right-of-Way Acquisition and Clearing

TVA would obtain ROW easements that would be designated for a TL and associated assets. The easements would encompass maintenance to avoid the risk of fires and other accidents, and to ensure reliable operation. The ROW provides a safety margin between the high-voltage conductors and surrounding structures and vegetation. The ROW for this project is described in Section 2.3.5.

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

Because of the need to maintain adequate clearance between tall vegetation and TL conductors, as well as to provide access for construction equipment, all trees and most shrubs would be removed from the entire width of the ROW.

Equipment used during this ROW clearing would include chain saws, skidders, bulldozers, tractors, and/or low ground-pressure feller-bunchers[5]. Marketable timber would be salvaged where feasible; otherwise, woody debris and other vegetation would be piled and burned, chipped, or taken off-site. Prior to burning, TVA would obtain any necessary permits (see Section 1.7). In some instances, vegetation may be windrowed along the edge of the ROW to serve as sediment barriers.

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

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

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[5] A feller-buncher is a self-propelled machine with a cutting head that is capable of holding more than one stem at a time. Tracked feller-bunchers are capable of operating on wet and loose soils, have a lower ground-pressure than wheeled equipment, and are less prone to rutting and compaction.

1. *TVA ROW Clearing Specifications*
2. *Environmental Quality Protection Specifications for Transmission Line Construction*
3. *Transmission Construction Guidelines Near Streams*
4. *Environmental Quality Protection Specifications for Transmission Substation or Communications Construction*
5. *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities* (hereafter referred to as "TVA 2017a")
6. *Transmission Environmental Protection Procedures Right-of-Way Vegetation Management Guidelines*

The emission of criteria pollutants or their precursors would not exceed *de minimis* levels specified in 40 Code of Federal Regulations (CFR) § 93.153(b). Thus, consistent with Section 176(c) of the CAA, project activities would conform to the requirements of Tennessee's state implementation plan for attaining air quality standards.

Following clearing and construction, an appropriate vegetative cover on the ROW would be restored. TVA would utilize appropriate seed mixtures as described in TVA's 2017 BMP manual or work with property owners with impacted cropland to ensure restoration supports or minimizes impacts to production (TVA 2017a). Erosion controls would remain in place until the plant communities become fully established.

Streamside areas would be revegetated as described in the above documents. Failure to maintain adequate clearance can result in dangerous situations, including ground faults. As such, native vegetation or plants with favorable growth patterns (slow growth and low mature heights) would be maintained within the ROW following construction per BMPs.

2.5.1.2 Access Roads

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

Culverts and other drainage devices, fences, and gates would be installed as necessary. Culverts installed in any perennial streams would be removed following construction. However, in ephemeral[6] 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. Additional applicable ROW clearing and environmental quality protection specifications are listed in *TVA ROW Clearing Specifications, Environmental Quality Protection Specifications for Transmission Line Construction,* and *Transmission Construction Guidelines Near Streams* (TVA 2019c).

[6] Ephemeral streams are also known as wet-weather conveyances or streams that run only following a rainfall.

2.5.1.3 Construction Assembly Areas

Offsite construction assembly areas (or “laydown yards”) for worker assembly, vehicle parking, and material storage are not anticipated at this time. If conditions change in the future and offsite construction assemble areas are required, these areas are typically leased from a private landowner for the duration of the construction period. Depending on site conditions, some minor grading and installation of drainage structures, such as culverts, may be required. The areas would be graveled, as needed, and fenced. Trailers used during the construction process for material storage and office space could be parked at these locations. Following completion of construction activities, all trailers, unused materials, and construction debris would be removed from the sites. Removal of TVA-installed fencing and site restoration would be performed by TVA at the discretion of the landowners. Any offsite construction assembly areas would be subject to additional environmental review prior to approval and development.

2.5.1.4 Structures and Conductors

The proposed TL would consist of double-circuit steel-pole structures centered on both existing and new 100-foot-wide ROW. Examples of these structure types are shown in Figure 2-8. Structure heights would vary according to the terrain but would range between 90 and 120 feet above ground.

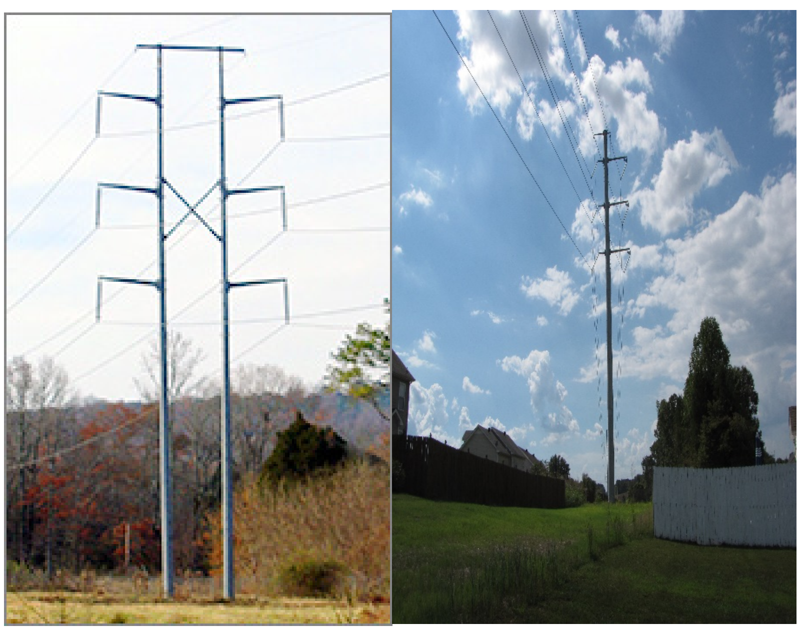


Figure 2-8. Typical Double-Circuit Steel-Pole and Double-Circuit Self-Supporting Structure

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

Poles at angles (angle points) in the TL may require supporting screw, rock, or log-anchored guys. Most poles would be directly imbedded in holes augured into the ground to a depth equal to 10 percent of the pole's length plus an additional two feet. Normally, the holes would be backfilled with the excavated material, but, in some cases, gravel or a concrete-and-gravel mixture would be used, depending on local soil conditions.

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

2.5.1.5 Conductor and Ground Wire Installation

Reels of conductor and ground wire would be delivered to the construction assembly area(s), and temporary clearance poles would be installed at road crossings to reduce interference with traffic. A small rope would be pulled from structure to structure. The rope would be connected to the conductor and ground wire and used to pull them down the TL through pulleys suspended from the insulators. A bulldozer and specialized tensioning equipment would be used to pull conductors and ground wires to the proper tension. Crews would then clamp the wires to the insulators and remove the pulleys.

2.5.2 Operation and Maintenance

2.5.2.1 Inspection

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

2.5.2.2 Vegetation Management

Management of vegetation along the ROW would be necessary to ensure access to structures and to maintain an adequate distance between TL conductors and vegetation. Adequate ground clearance is important to account for construction, design, and survey tolerances (e.g., conductor sagging). TVA uses more conservative distances than National Electric Safety Code (NESC) requirements in order to ensure reliability. TVA uses a minimum ground clearance of 24 feet for a 161-kV TL at the maximum TL operating temperature. TVA released the final Transmission System Vegetation Management Programmatic EIS in 2019, which outlines TVA's preferred vegetation management alternative moving forward (TVA 2019b). Current vegetation management practices are restricted under the injunction currently in place in the *Sherwood v. TVA* litigation under which TVA has stopped removing woody vegetation except for trees that are an immediate hazard. Under the Transmission System Vegetation Management Programmatic EIS, vegetation management along the ROW would consist of two different activities: felling danger trees adjacent to the cleared ROW (as described in Section 2.5.1.1) and controlling vegetation within the total width of the cleared ROW. These activities would occur periodically as identified by LiDAR inspections.

After tall trees and other tall-growing vegetation are removed from the ROW during construction, routine management of vegetation within the cleared ROW would include an integrated vegetation management approach designed to encourage the low-growing plant species and discourage tall-growing plant species. TVA divides its entire transmission system into discrete geographic areas called “sectors” and develops a vegetation maintenance plan for each TL sector, based on the results of the periodic inspections described above. Vegetation control methods or tools and their appropriate uses for various TL ROW conditions have been described in TVA’s final Transmission System Vegetation Management Programmatic EIS (TVA 2019b). These methods include manual (chainsaw, machete, brush hooks, axes, bush blades), mechanical cutting or trimming (mower or brush hog, bulldozer, track-hoe, skid steer, shears [e.g., feller-buncher], mulcher/chipper, Hydro-ax [including various other attachments], tracked equipment such as compact track loader, helicopter tree saw, Jarraff & Kershaw line trimmers, or aerial lifts) and herbicide spraying and growth regulators. Herbicides are normally applied in areas where heavy growth of woody vegetation is occurring on the ROW and mechanical or manual methods are not practical.

Herbicides can be applied in a variety of ways; however, all herbicides would be applied under the supervision of a licensed applicator in accordance with applicable state and federal laws and regulations. Additionally, only TVA-approved herbicides registered with the USEPA or those approved by another managing agency as appropriate are used and applied in accordance with manufacturers’ label directions. A list of the herbicides currently used by TVA in ROW vegetation control and pre-emergent herbicides TVA currently uses on bare ground areas in TL ROWs is presented in TVA’s *Transmission Environmental Protection Procedures Right-Of- Way Vegetation Management Guidelines* (TVA 2017b). This list may change over time as new herbicides are developed or new information on presently approved herbicides becomes available.

2.5.2.3 Structure Replacement

TVA would rebuild 4.25 miles of existing TL beginning at Structure 76 to the old Georgetown Substation located adjacent to Highway 60. Any retired wooden poles would be offered to VEC 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 2019c). Likewise, any lead pins removed from the retired insulators would be handled according to TVA’s Environmental Protection Procedures (TVA 2019c).

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

2.6 Comparison of Environmental Effects by Alternative

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

Table 2-2. 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 SOC 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. Impacts to groundwater resources from installation and use of an onsite well at the SOC are expected to be minor because the well is not the primary water source.
Soils and Prime Farmland	No effects to soils and prime farmland are expected.	The minor loss of prime farmland within the SOC footprint (1.9 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.
Surface Water	No changes in local surface water quality are anticipated.	Two intermittent streams identified within the 166-acre SOC property would be directly impacted. Proper implementation of BMPs and mitigation measures identified in the permitting process are expected to result in only minor and insignificant impacts to surface waters.
Aquatic Ecology	Aquatic life in local streams would not be affected.	With the implementation of BMPs, effects to aquatic life in local surface waters are expected to be minor and insignificant.
Vegetation	Local vegetation would not be affected at the proposed SOC site or proposed TL. Routine maintenance of existing TL vegetation would continue, but overall impacts to vegetation are considered minor.	Site preparation and clearing of the proposed SOC and TL ROW would have a minor, temporary effect on most local vegetation. There would be substantial direct long-term effects to approximately 40 acres of forest habitat and less than 5 acres of prairie habitat on the SOC site and the TL ROW. With implementation of mitigation commitments, project-related effects to these habitats would be insignificant.
Wildlife	Local wildlife would not be affected at the proposed SOC site or proposed TL. Routine maintenance of existing TL vegetation would continue, but overall impacts to wildlife are considered minor.	Wildlife inhabiting onsite forest, prairie, early successional, and edge habitats within the proposed SOC site and along the proposed TL ROW would be displaced. Because there are sufficient adjacent local habitats, any effects to wildlife are expected to be minor and 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 SOC and new TL. Routine maintenance of existing TL 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, the proposed TVA action is expected to have only a minor effect on federally or state-listed species. The federally endangered Cumberland bean may occur within Gunstocker Creek. However, the proposed TL route would span the stream and not result in in-stream impacts. Probable absence of Indiana and northern long-eared bat from the SOC site was established using mist net surveys in 2018. Tree clearing in the TL ROW would remove about 4 acres of potentially suitable summer roosting habitat for the federally threatened northern long-eared bat. To remove any potential for direct effects to the northern long-eared bat, TVA would follow the guidelines in its programmatic biological assessment for bats (TVA 2017c).
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.
Wetlands	No changes in local wetland extent or function are expected.	Under Alternative B, the proposed project would result in permanent wetland impacts associated with the filling of a 0.17-acre wetland present on the SOC parcel and clearing of a 0.04-acre forested wetland. Temporary wetland impacts associated with vehicular access along the TL ROW would occur to three additional wetlands. The remainder of the wetlands within the project footprint are anticipated to be avoided by the proposed project activities. With the implementation of BMPs and identified minimization and mitigation measures, there would be insignificant 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 SOC and TL 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 SOC and TL ROW would not be constructed. Routine maintenance of existing TL vegetation would continue, but overall noise emissions are considered minor.	Minor noise above ambient levels would be produced during construction and maintenance activities. The proposed SOC and TL would present a minor, long-term noise effect. In the event explosive blasting is required during construction, vibration impacts would be temporary and minor.
Archaeological and Historic Resources	No effects to archaeological or historic resources are anticipated.	TVA determined, in consultation with the TN SHPO and federally recognized Indian tribes, that no historic properties would be affected by the proposed SOC construction. In regard to the proposed new TL and existing TL rebuild, Tennessee SHPO and tribal comments provided concurrence on the finding of “no historic properties adversely affected”. Thus, TVA finds that the proposed undertaking would result in no adverse effects on historic properties.
Recreation, Parks, and Natural Areas	No changes in local recreation opportunities or natural areas are expected.	There would be no significant direct or indirect impacts to natural areas and parks from construction or operation of the SOC. Construction of the proposed TL and associated access roads could cause minor and insignificant recreation impacts.
Socioeconomics and Environmental Justice	Changes to economics within the project area would continue to follow current trends as the population changes. However, no additional changes to economic conditions in the project area would occur as a result of TVA actions.	There would be minor temporary increases in tax revenue from the construction workforce during construction of the SOC and TL, which could benefit local low-income communities. Operation of the SOC would continue to benefit the local tax base. During construction there would be temporary and minor impacts from the use of the Adventist Church driveway for construction of the TL. 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.

Resource Area	Impacts from Implementing the No Action Alternative	Impacts from Implementing the Action Alternative
Transportation	Existing travel patterns of TVA workforce in support of the SOC would remain unchanged. The TVA commuter traffic would continue to contribute to traffic and parking in the Chattanooga central business district and there would be no change in the existing transportation networks.	Traffic generated during the construction phase is expected to disperse into the surrounding road network and have negligible effects on these roads and associated traffic conditions. Any impacts to traffic operations would be localized to the immediate site and would be intermittent and short-term in nature. Impacts due to the operations of the SOC would include a minor delay for the northbound traffic at State Highway 60 and Old Highway 58. While this results in a change in LOS from B to C, the maximum increase is only 1.2 seconds. Therefore, Alternative B would result in minor impacts to traffic patterns near the SOC site.
Transmission Line Post-Construction	There would be no TL constructed for the SOC therefore no impacts.	Public exposure to EMFs would be minimal, and no significant impacts from EMFs are anticipated. NESC standards are strictly followed when installing, repairing, or upgrading TVA TLs or equipment. Therefore, touching a structure supporting a TL poses no inherent shock hazard. The proposed structures do not pose any significant physical danger.

2.7 Identification of Mitigation Measures

TVA employs standard practices when constructing, operating, and maintaining TLs, 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 2019c). Some of the more specific routine measures which would be applied to reduce the potential for adverse environmental effects during the construction, operation, and maintenance of the proposed SOC, TL, and access roads are as follows:

- TVA would utilize standard BMPs, as described in the BMP manual (TVA 2017a), to minimize erosion during construction, operation, and maintenance activities.
- To minimize the introduction and spread of invasive species in the ROW, access roads and adjacent areas, TVA would follow standard operating procedures consistent with EO 13112 as amended by 13751 (Invasive Species) for revegetating with noninvasive plant species as defined in the BMP manual (TVA 2017a).
- Ephemeral streams that could be affected by the proposed construction would be protected by implementing standard BMPs as identified in the BMP manual (TVA 2017a).
- Perennial and intermittent streams would be protected by the implementation of standard stream protection (Category A) as defined in the BMP manual (TVA 2017a).
- 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 2019c), and the 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.
- To minimize adverse impacts on natural and beneficial floodplain values, the following standard mitigation measures would be implemented:
    - BMPs would be used during construction activities
    - Construction would adhere to the TVA subclass review criteria for TL location in floodplains
    - Road construction or improvements would be done in such a manner that upstream flood elevations would not be increased by more than 1 foot
- 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 VEC 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 2019c).
- Any lead pins removed from the retired insulators would be handled according to TVA's Environmental Protection Procedures (TVA 2019c).

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

- Spanning of streams and aquatic habitats potentially suitable for use by the Cumberland bean.
- 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 2017c).
- A protective buffer of 200-foot-radius would be implemented during TL construction and maintenance activities around the opening of a possible cave observed in the existing TL ROW to prevent vehicle use outside of access roads, herbicide use, and heavy machinery operation.

- To minimize impacts to ground nesting birds, when practicable, mowing within the SOC parcel would be avoided during the height of the breeding season (May 1 to July 15) and would ideally occur before mid-March and after August. Grassland nesting species designated by USFWS as Birds of Conservation Concern in this area are Henslow's sparrow and prairie warbler. Other ground nesting birds in the region include field sparrow, grasshopper sparrow, eastern meadowlark, dickcissel, and northern bobwhite.
- To minimize impacts to wetlands, TVA would implement standard BMPs across all delineated wetlands (TVA 2017a). This includes the use of low ground-pressure equipment, mats, no rutting greater than 12 inches, dry season work, etc. for access across three delineated wetlands along the proposed TL ROW. TVA would incorporate the mapped wetlands into a sensitive area database to ensure wetland BMPs are implemented during future ROW vegetation maintenance activities within the delineated wetland boundaries (TVA 2019b).
- To compensate for impacts to wetlands, the USACE and TDEC would require mitigation for the 0.17-acre wetland fill via purchase of wetland credits from Tennessee's approved wetland in-lieu-fee program. Similar jurisdictional authority and compliance measures for the 0.04-acre forested wetland habitat conversion could be required at agency discretion.
- There are currently no stream restoration credits available at local mitigation banks. As such, to compensate for direct impacts to streams identified within the SOC site, TVA would contract with a 3rd party to complete a Permittee Responsible Mitigation project scaled to account for 331 Stream Quantification Tool (SQT) stream credits.

The following measures would be taken to compensate for impacts to prairie habitat at the proposed SOC site:

- Revegetate disturbed areas on the SOC parcel using native or non-invasive species and would not use species identified by the Tennessee Invasive Plant Council as Emerging or Established invasive threats in Tennessee;
- Restore pollinator friendly, prairie habitat on at least 10 acres of currently unforested land on the SOC parcel using purchased local-genotype native seed and seed collected from the SOC site;
- Maintain restored prairie in the long-term by using selective application of herbicide to control encroachment of woody plants and invasive species and/or by mowing only between November and March 15, unless otherwise approved by the TVA botanist; and
- Demarcate prairie restoration areas using temporary fencing or other comparable methods before work begins to exclude equipment and prevent disturbance during construction.

2.8 The Preferred Alternative

Alternative B—TVA Constructs a New Standalone SOC, Gunstocker Creek 161-kV Substation, and Associated Gunstocker Creek 161-kV TL—is TVA's preferred alternative for this proposed project. TVA would purchase ROW easements to accommodate the construction of a new 161-kV TL.

CHAPTER 3 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

The existing condition of environmental resources that could be affected by the proposed Action Alternative during construction, operation, or maintenance of the proposed 5.25-mile TL, access roads and SOC is described in this chapter. The descriptions below of the potentially affected environment are based on field surveys conducted between November 2016 and July 2019, on published and unpublished reports, and on personal communications with resource experts. This information establishes the baseline conditions against which TVA decision-makers and the public can compare the potential effects of implementing the alternatives under consideration.

The potential effects of adopting and implementing the No Action Alternative and Alternative B on the various resources were analyzed, and the findings are also documented in this chapter. Cumulative effects are discussed, as appropriate and necessary, in Section 3.18.

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[7] (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 SOC, substation, ROW and associated access roads. The area of potential effect (APE) for architectural resources included all areas within a 0.5-mile radius from the proposed SOC, substation, and TL route, as well as any areas where the project would alter existing topography or vegetation in view of a historic resource. The APE for archaeological resources is the ROW width for the proposed transmission line route and access roads, and the footprint of the proposed SOC and the proposed substation for the SOC site.

Potential effects related to climate change, public health and safety, and to hazardous and nonhazardous wastes were also considered and are discussed in various sections of this EA. However, because of the nature of the action and measures in place dictated by standard operating procedures, the potential for effects to these resources is extremely low. Thus, potential effects to these resources were not analyzed in detail.

3.1 Air Quality

3.1.1 Affected Environment

In accordance with the CAA Amendments of 1990, all counties are designated with respect to compliance, or degree of noncompliance, with the National Ambient Air Quality Standards (NAAQS). These designations are either attainment, nonattainment, or unclassifiable. An area with air quality better than the NAAQS is designated as “attainment;” whereas an area with air quality worse than the NAAQS is designated as “non-attainment.” Non-attainment areas are further classified as extreme, severe, serious, moderate, and marginal. An area may be designated as unclassifiable when there is a lack of data to form a basis of attainment status. New or expanded emissions sources located in areas

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

designated as nonattainment for a pollutant are subject to more stringent air permitting requirements.

The three counties within the project area (Meigs, Hamilton, and Bradley) are all in attainment with applicable NAAQS (USEPA 2019b) and ambient air quality standards referenced in Rule 1200-3-9-.02(11) of the Tennessee Air Pollution Control Regulations. The proposed development would be subject to both federal and state regulations. These regulations impose permitting requirements and specific standards for expected air emissions.

3.1.2 Environmental Consequences

3.1.2.1 Alternative A – The No Action Alternative

Because construction, operation, and maintenance of the proposed project components would not occur under the No Action Alternative, no impacts to air quality in the project area would occur as a result of TVA actions associated with the proposed project.

3.1.2.2 Alternative B – TVA Constructs a New Standalone SOC, Gunstocker Creek 161-kV Substation, and Associated 161-kV Transmission Line

Potential air quality impacts associated with Alternative B include those associated with dust and emissions from construction phase equipment, earth-moving activities (dozing, grading, and fill placement), and emissions from operation of facility backup equipment. Fugitive dust produced from construction activities would be temporary and controlled by BMPs (e.g., wet suppression) as needed.

The proposed action would include installation of four diesel engines to support the SOC in emergency situations where primary electrical power is unavailable. Two of the engines are 2,500 kW generator sets, one engine is 1,500 kW supporting the technical services building, and one engine is 60 kW supporting the sanitary wastewater system. Each engine is permitted to run up to 500 hours per year. Potential emissions from this source are such that this would not be a major source. TDEC issued a permit under the Permit-by-Rule provisions of Tenn. Comp. R. & Regs. 1200-03-09-.07 for stationary emergency internal combustion engines based on the following:

1. The source does not have the potential to emit 100 tons per year of any air pollutant subject to regulation and has not taken limits to reduce its potential to emit below this threshold.
2. The facility does not have the potential to emit 10 tons per year or more of a single hazardous air pollutant or 25 tons per year of any combination of hazardous air pollutants and has not taken limits to reduce its potential to emit below these thresholds.
3. The facility is not located in a county designated serious, severe, or extreme non-attainment for ozone.

While use of the engines would increase emissions in the area during use, any effects would be minimal, justifiable, and necessary for testing and emergency service only. When considering that the engines proposed to be installed would run infrequently for manufacturer recommended short testing periods and during emergency situations, the impact to local air quality would be *de minimis* and not lead to any exceedance or violation of any applicable air quality standard. Therefore, under Alternative B impacts to air quality would be minor and would not result in significant impacts.

3.2 Groundwater and Geology

3.2.1 Affected Environment

The project area is located in the Valley and Ridge Physiographic Province and according to available mapping is underlain by Ordovician aged rocks (Wilson 2011). 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 associated with aquifers in the Valley and Ridge Province is primarily 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 transport rates of dissolved constituents 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 both 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 Bradley and Hamilton Counties is primarily provided by surface water, whereas Meigs County is supplied by groundwater sources (USEPA 2019a). The population in the project area is supplied by these public water systems; however, some residences also have private wells. There is one private well located within one-half mile of the project site and four additional private wells within a one-mile radius from the project site.

3.2.2 Environmental Consequences

3.2.2.1 Alternative A – The No Action Alternative

Because construction, operation, and maintenance of the proposed project components would not occur under the No Action Alternative, no impacts to groundwater and geologic resources in the project area would occur as a result of TVA actions associated with the proposed project.

3.2.2.2 Alternative B – TVA Constructs a New Standalone SOC, Gunstocker Creek 161-kV Substation, and Associated 161-kV Transmission Line

Under Alternative B, construction of the proposed SOC and TL would include ground disturbing activities. However, no impacts to geologic resources are anticipated.

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, but the site has been oriented in a way that avoids direct impacts to these features. 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. BMPs as described in *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority* (TVA 2017a) 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 associated with runoff from the proposed action would be insignificant.

As part of this project, TVA proposes to install a water well advanced into the upper bedrock water bearing unit underlying the site. Current plans for this well could include incremental use as a source of water for hydrostatic testing or for dust suppression during construction; however, it could also be utilized in the future as an emergency/backup potable source (approximately 800 gallons per day [gpd]) for short durations only if needed after construction is complete. Given the planned uses for the proposed onsite well, groundwater impacts are anticipated to be minimal.

In summary, with use of BMPs, potential impacts to groundwater during construction and operation are expected to be minor. Likewise, impacts to groundwater resources from installation and use of an onsite well are expected to be minor because the well is not the primary water source, thus use of the well water for operation and maintenance is expected to be low.

3.3 Soils and Prime Farmland

3.3.1 Affected Environment

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 period, and are protected from frequent flooding.

Soils mapped within the approximate proposed project area are summarized in Table 3-1. Eleven soils types, comprising approximately 15.9 acres within the project area are classified as prime farmland, with the Hamblen-Tupelo complex, 0 to 3 percent slopes, occasionally flooded map unit comprising the largest area (Table 3-1). Prime farmland soils mapped within the project area are illustrated in Figure 3-1. Within a 5-mile radius of the project area, prime farmland soils comprise approximately 19 percent of the soil types by area with the majority located south of the project area (Figure 3-2). Prime farmland soils are limited to the relatively flat and narrow valleys associated with streams and rivers in the project vicinity.

Table 3-1. Mapped Soils Types within the Project Area

Soil Map Unit Name	Acres in Project Components		Prime Farmland Y/N
	SOC	Transmission Lines and Access Roads	
Capshaw silt loam, 2 to 6 percent slopes		0.2	Y
Capshaw-Lyerly complex 5 to 12 percent slopes, eroded	5.8		N
Colbert and Lyerly soils, 2 to 12 percent slopes, very rocky	1.8	1.9	N
Colbert silt loam, 2 to 12 percent slopes		5.0	N
Colbert-Rock outcrop complex, 5 to 20 percent slopes		3.8	N
Collegedale-Talbott complex, 2 to 5 percent slopes, eroded, rocky	0.8	10.9	N
Collegedale-Talbott complex, 5 to 12 percent slopes, eroded, rocky	10.2	1.6	N
Collegedale-Talbott complex, 12 to 20 percent slopes, eroded, rocky	5.0		N
Cotaco loam		2.1	Y
Emory silt loam, 0 to 4 percent slopes		0.9	Y
Enders silt loam, 2 to 12 percent slopes		0.5	N
Etowah silt loam, eroded rolling phase		1.5	Y
Etowah silt loam, eroded undulating phase		1.8	Y
Fullerton gravelly silt loam, 15 to 25 percent slopes		0.8	N
Hamblen silt loam, 0 to 2 percent slopes, occasionally flooded, hydric minor component		2.7	Y
Hamblen-Tupelo complex, 0 to 3 percent slopes, occasionally flooded	3.1	1.2	Y
Holston loam, 12 to 20 percent slopes		0.2	N
Holston loam, 2 to 5 percent slopes		0.2	Y
Jefferson loam, eroded undulating phase		1.0	Y
Jefferson loam, rolling phase		0.6	N

Soil Map Unit Name	Acres in Project Components: SOC	Acres in Project Components: Transmission Lines and Access Roads	Prime Farmland Y/N
Lee-hamblen complex, frequently flooded		0.5	N
Lehew-Montevallo loams, hilly phases		1.9	N
Lehew-Montevallo loams, rolling phases		3.1	N
Lehew-Montevallo loams, steep phases		3.5	N
Lindside silt loam, 0 to 3 percent slopes, occasionally flooded, warm		1.1	Y
Loyston-Talbott-Rock outcrop complex, 5 to 25 percent slopes	139.4	3.6	N
Melvin silt loam, 0 to 2 percent slopes, frequently flooded, warm		0.0	N
Minvale silt loam, eroded rolling phase		1.9	N
Montevallo channery silt loam, 5 to 12 percent slopes		0.5	N
Montevallo shaly silt loam, eroded hilly phase		0.3	N
Montevallo shaly silt loam, eroded rolling phase		2.4	N
Montevallo shaly silt loam, eroded undulating phase		1.6	N
Montevallo shaly silt loam, hilly phase		0.7	N
Muse silt loam, eroded rolling phase		1.9	N
Muse silt loam, rolling phase		0.5	N
Roane cherty loam, 0 to 2 percent slopes		0.1	N
Sequoia silty clay loam, eroded rolling phase		1.7	N
Staser loam		0.1	Y
Stony rolling and hilly land, limestone (rock outcrop)		1.6	N
Talbott silt loam, 2 to 12 percent slopes		12.6	N
Talbott silty clay loam, eroded rolling phase		3.0	N
Talbott silty clay loam, eroded undulating phase		1.1	N
Talbott silty clay, severely eroded rolling phase		1.0	N
Talbott-Rock outcrop complex, 5 to 25 percent slopes		0.8	N
Total	**166.1**	**82.3**	

Source: NRCS 2019

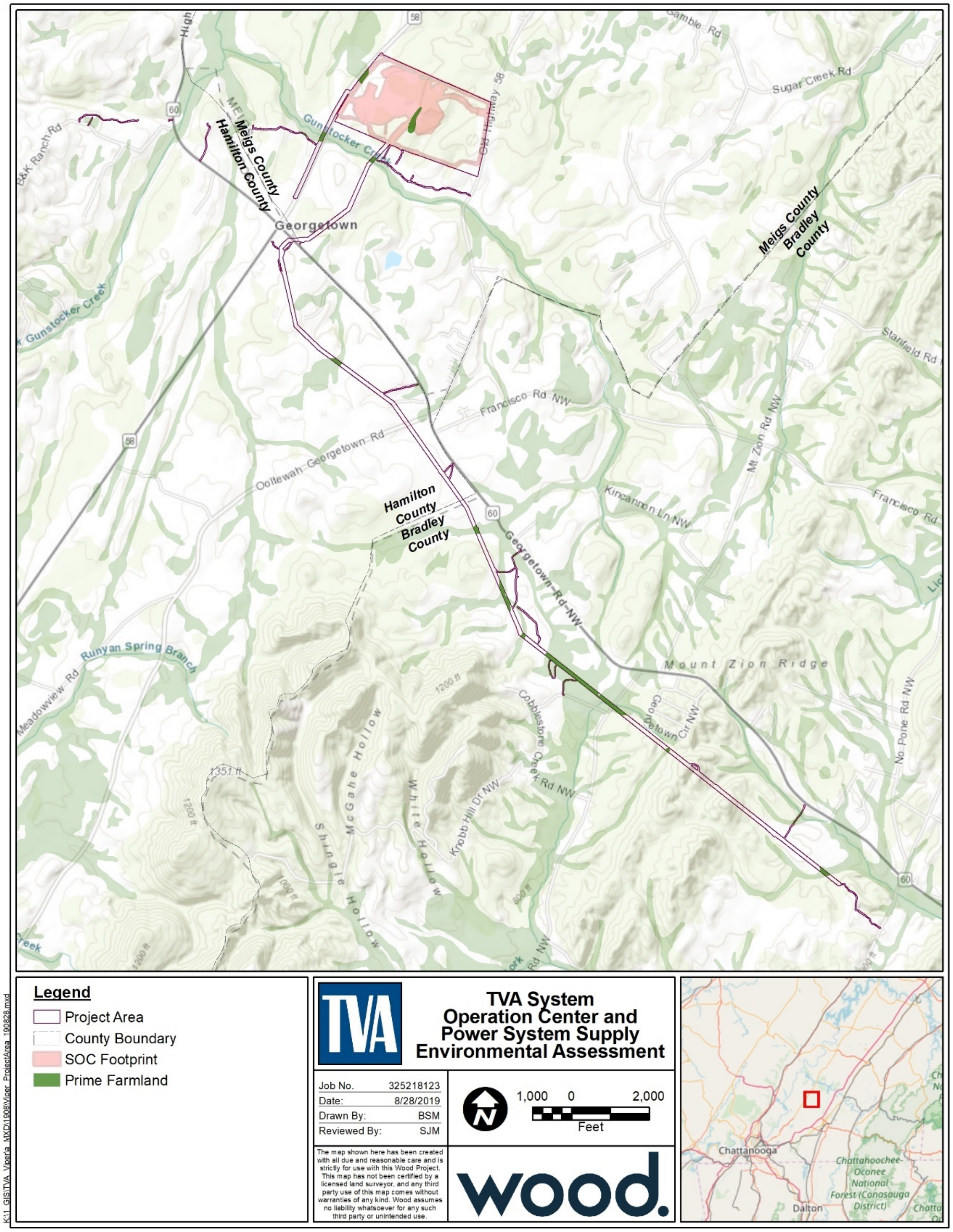


Figure 3-1. Prime Farmland Soils Within the Project Area

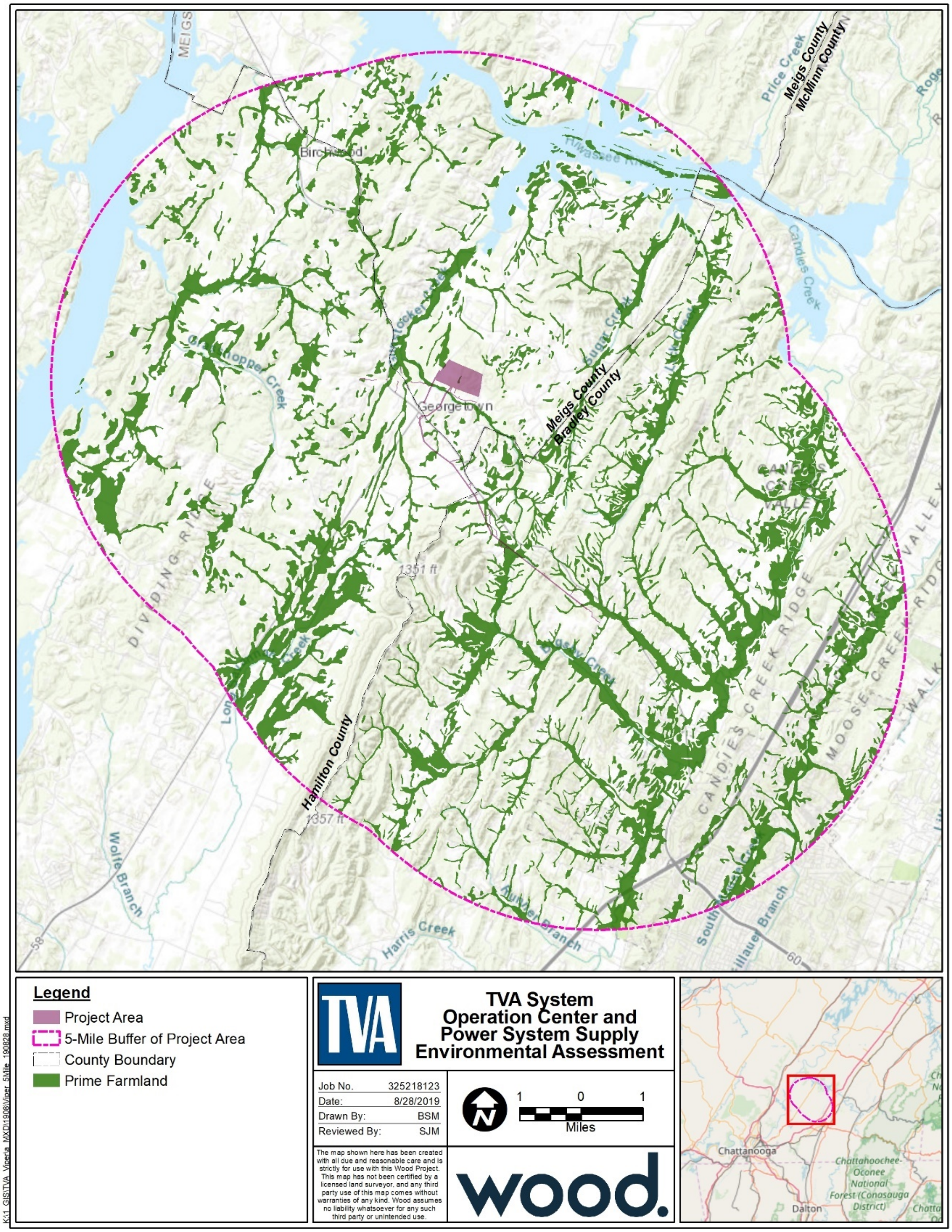


Figure 3-2. Prime Farmland Soils Within a 5-Mile Radius

3.3.2 Environmental Consequences

3.3.2.1 Alternative A – The No Action Alternative

Because construction, operation, and maintenance of the proposed project components would not occur under the No Action Alternative, no impacts to soils and prime farmland resources in the project area would occur as a result of TVA actions associated with the proposed project.

3.3.2.2 Alternative B – TVA Constructs a New Standalone SOC, Gunstocker Creek 161-kV Substation, and Associated 161-kV Transmission Line

The Action Alternative would result in minor temporary and permanent impacts to soils identified by the NRCS as prime farmland. The site is located within an area zoned by Meigs County as the forestry, agriculture, and residential district; however, the site is largely forested, and no farming operations are occurring onsite. Within the project area, there are 15.9 acres of prime farmland soils (Table 3-2). However, the majority of this area (14.0 acres) would not experience ground disturbance activities and therefore, the soils in these areas would not lose their prime farmland attributes. Additionally, since areas within the TL ROW would not be excluded from farming, no prime farmland areas within TL ROW would be taken out of production. Therefore, Alternative B would result in a loss of approximately 1.9 acres of prime farmland soils, all of which are located within the proposed footprint for the SOC.

Table 3-2. Impacts to Prime Farmland Soils Within Project Area

Project Area	Prime Farmland Soils (acres)
Impacted Area[1]	1.9
Non-Impacted Area[2]	14.0
Totals	**15.9**

Source: NRCS 2019

[1] Includes development footprint for SOC and Gunstocker Substation

[2] Includes non-development portion of SOC, TL ROWs and access roads

Approximately 17,489 acres (19 percent) of the area within a 5-mile vicinity have soils classified as prime farmland. The minor loss of prime farmland within the SOC footprint (1.9 acres) is negligible when compared to the amount of land designated as prime farmland within the surrounding region. Therefore, impacts to prime farmland soils as a result of Alternative B would be minor.

3.4 Surface Water

3.4.1 Affected Environment

This proposed project is located in Meigs, Hamilton and Bradley counties, with the SOC located in Meigs County. This project area drains to water ways within the Chickamauga Lake-Hiwassee River (0602000214), part of the Tennessee River, and Candies Creek (0602000213) 10-digit HUC watersheds.

Field and desktop surveys resulted in the identification of a total of 39 watercourse intersections within the project area which includes the transmission expansion and the

SOC. These features included 4 perennial, 11 intermittent (one of which is a spring), one pond and 21 ephemeral/wet-weather conveyances (WWCs) streams. Of these aquatic features, 3 intermittent streams and 4 WWC/ephemeral streams were found in the SOC perimeter. The surface water streams in the project area and the vicinity of this project are listed in Appendix D.

Precipitation in the general area of the proposed project averages about 54 inches per year. The wettest month is December with approximately 5.0 inches of precipitation, and the driest month is October with 3.31 inches. The average annual air temperature is 58.8 degrees Fahrenheit, ranging from a monthly average of 46.9 degrees Fahrenheit to 70.7 degrees Fahrenheit (US Climate Data 2019). Stream flow varies with rainfall and averages about 28.56 inches of runoff per year (i.e., approximately 2.10 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 USEPA. The term "303(d) list" refers to the list of impaired and threatened streams and water bodies identified by the state. Gunstocker Creek currently flows into the Hiwassee River. The Hiwassee River is currently listed as impaired for mercury due to industrial point source discharges and atmospheric deposition. Gunstocker Creek is currently listed as impaired for alteration in stream-side or littoral vegetative cover and *E Coli*, due to grazing in riparian or shoreline zones (TDEC 2018a). A fish consumption advisory has been issued for the Hiwassee River for the consumption of largemouth bass due to mercury contamination (TDEC 2018b). Additionally, a portion of the Hiwassee River is listed as Exceptional Tennessee Waters. Table 3-3 provides a listing of local streams with their state (TDEC 2013) designated uses.

Table 3-3. Designations for Streams in the Vicinity of the Project Area

Stream	Use Classification[1]						
	NAV	DOM	IWS	FAL	REC	LWW	IRR
Hiwassee River[2]	X	X	X	X	X	X	X
Gunstocker Creek				X	X	X	X
West Fork Gunstocker Creek				X	X	X	X
Unnamed Tributaries of Gunstocker and West Fork Gunstocker Creek				X	X	X	X
Greasy Creek and Unnamed Tributaries				X	X	X	X
Tennessee River[2]	X	X	X	X	X	X	X
Bigsby Creek				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

[2] Not in project area, shown for flow network.

3.4.2 Environmental Consequences

3.4.2.1 Alternative A – The No Action Alternative

Under the No Action Alternative, the proposed SOC and associated facilities would not be constructed, operated, or maintained. Consequently, no impacts to surface water systems would occur in the project area as a result of TVA actions associated with the proposed project.

3.4.2.2 Alternative B – TVA Constructs a New Standalone SOC, Gunstocker Creek 161-kV Substation, and Associated 161-kV Transmission Line

3.4.2.2.1 Surface Runoff

Three intermittent streams occur within the footprint of the SOC. One stream (SMZ01 in Appendix E) would not be impacted by construction of the proposed project, other than potential for temporary impacts from surface runoff, as described below. One stream (SMZ02 in Appendix E) would be rerouted to allow for continued drainage. The 621 feet of the 988 feet stretch of stream would be redesigned to flow around SOC structures, resulting in a direct, permanent impact to this stretch of stream. The third stream (SMZ03 in Appendix E) would be impacted by installation of three open bottom culverts to allow flow under an access road for the facility. This would include 20 feet of temporary impact during construction and 328 feet of permanent impact through spanning by the culverts. Thus, a total of 949 feet of intermittent stream would be directly and permanently impacted by the footprint of the SOC and 20 feet would be temporarily impacted during construction. Please see Section 3.5 (Aquatic Ecology) for additional information and Appendix D for all stream crossings and buffer zones.

Construction activities have the potential to temporarily affect surface water via storm water runoff. Additionally, soil erosion from construction sites has the potential to result in sedimentation within receiving streams that can alter habitat and threaten aquatic life. TVA would comply with all appropriate state and federal permit requirements. Appropriate BMPs would be followed, and all proposed project activities would be conducted in a manner to ensure that waste materials are contained, and the introduction of pollution materials to the receiving waters would be minimized. A general construction storm water permit would be needed as more than 1 acre is planned for disturbance. This permit also requires the development and implementation of a SWPPP. Additionally, Aquatic Resource Alteration Permit (ARAP)/Section 401 Water Quality Certifications and Section 404 USACE would be required for stream crossings and impacts.

The SWPPP would identify specific BMPs to address construction-related activities that would be adopted to minimize storm water impacts. Due to the size of the project (greater than 50 acres) construction phasing would be required.

Further, BMPs, as described in the Tennessee Erosion and Sediment Control Handbook (TDEC 2012) and TVA 2017a, would be used to avoid contamination of surface water in the project area. Proper implementation of these controls would be expected to result in only minor, temporary impacts to surface waters.

Additionally, impervious buildings and infrastructure prevent rain from percolating through the soil, which results in additional runoff of water and pollutants into storm drains, ditches, and streams. Because the construction of this building would be implemented in an area lacking impervious cover, there would be an increase of impervious cover with the implementation of the proposed action. For this reason, this project would be expected to notably increase the concentrated storm water flow from the project sites. These flows would need to be properly treated with either implementation of the proper BMPs and/or by diverting and controlling the storm water discharges appropriately. With proper implementation of controls, only minor, temporary construction impacts to local surface waters are expected.

3.4.2.2.2 Domestic Sewage

Portable toilets would be provided for the construction workforce as needed. These toilets would be pumped out regularly, and the sewage would be transported by tanker truck to a publicly-owned wastewater treatment works that accepts pump out. The proposed facility would have restroom facilities to accommodate the staff of the finished facility. These details can be found in the Operating Impacts Section 3.4.2.2.7.

3.4.2.2.3 Equipment Washing and Dust Control

Equipment washing and dust control discharges would be managed using BMPs described in the SWPPP for water-only cleaning. An onsite well would be established and may be used for hydrostatic testing, flushing, and dust suppression during construction, where potable water would not be appropriate to discharge to waters of the State (see Section 3.2.2.2 and Section 3.4.2.2.7 for additional information).

TVA routinely includes precautions in the design, construction, and maintenance of its TL 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 TVA requirements as described in TVA 2017a. ROW maintenance 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.

3.4.2.2.4 Hydrostatic Testing

These discharges, if any, would be handled in accordance with TDEC General NPDES Permit for Discharges of Hydrostatic Test Water (TN670000).

3.4.2.2.5 SOC Stream Impacts

A characterization of aquatic features was conducted of the 166-acre TVA parcel proposed for the location of the SOC facility and 161-kV substation as well as along the proposed TL project area. These features included four perennial, 12 intermittent (one of which is a spring), one pond and 22 WWCs/ephemeral streams. Of these aquatic features, four intermittent streams and five WWC/ephemeral streams were found within the SOC perimeter. The USACE issued a Preliminary Jurisdictional Determination to identify wetland and stream features that would require mitigation within the limits of disturbance of the proposed project. In addition, TDEC Hydrologic Determination and a SQT were performed to evaluate mitigation requirements. Of these onsite features, two intermittent streams and one wetland would have direct adverse permanent impacts and would require mitigation. See Table 3-4 and Figure 3-3 for impact and SQT details.

Table 3-4. Stream Impacts to Surface Water Features on the SOC Site

Stream ID	Flow Type	Length of Impact	HD Score	Watershed Area	Impact Type
SMZ 02	Intermittent	621	25	0.08 sq mi	Reroute
SMZ 03	Intermittent	328	29.5	0.18 sq mi	Span

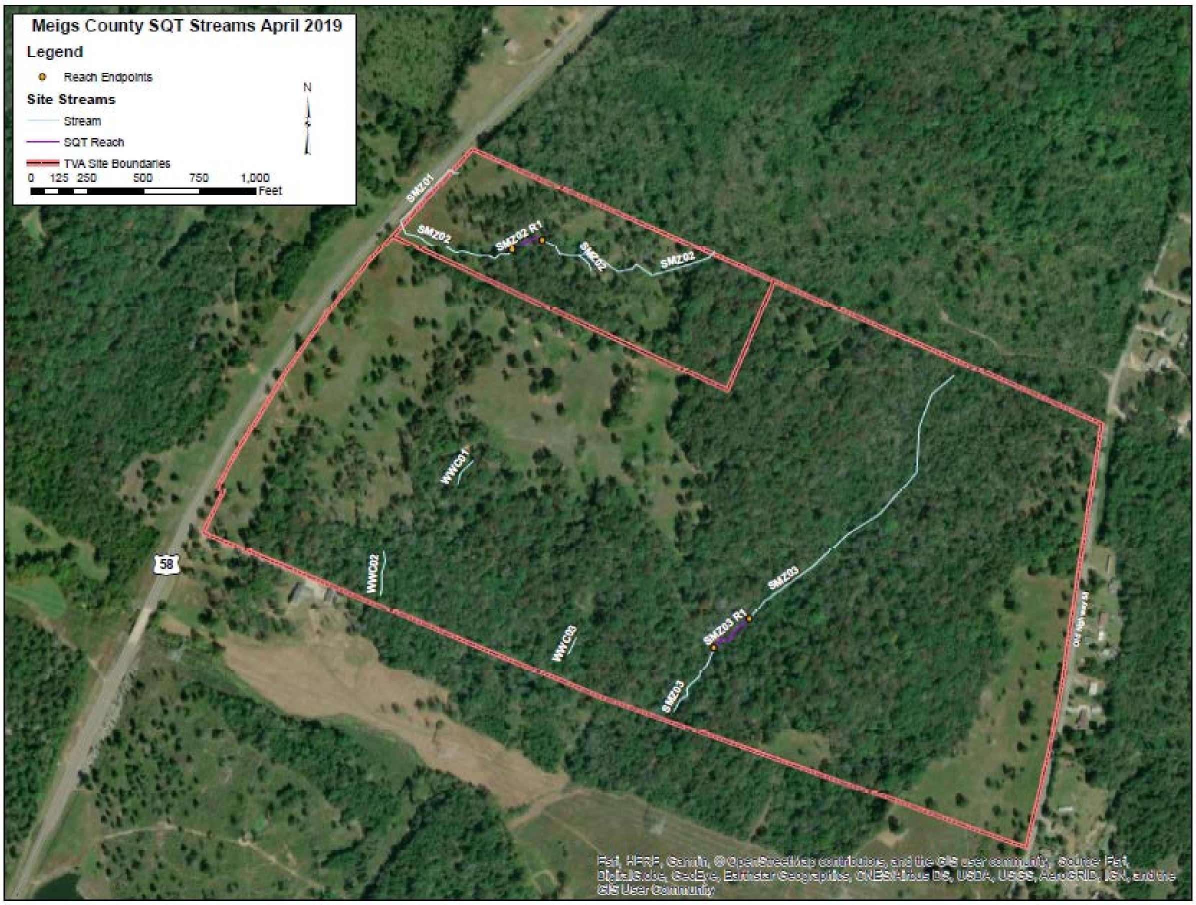


Figure 3-3. Stream and Wet Weather Conveyance Features Within the System Operations Center Site

The requirement of either an individual or general ARAP permit/TDEC 401 water quality certification and federal 404 permits to be obtained from the USACE for any stream/wetland alteration and the terms and conditions of these permits would likely require mitigation from these proposed activities, detailed below.

The SQT results indicated a need for 331 functional feet debits to offset stream impacts. Proposed stream impacts would be offset through permittee responsible mitigation as there are no credits available within watershed of this HUC. To accomplish this, TVA would enter into a turnkey contract with a qualified firm that would implement a permittee-responsible mitigation project, on TVA's behalf. The contractor would assume all liability for all aspects of the project implementation including planning permitting, construction, establishment, monitoring, maintenance, and long-term stewardship activities. The mitigation project would be conducted off-site but would be located within the same 12-digit HUC sub-watershed

(060200021408) as the site of the impacts. The objective would be to create, enhance, and/or restore one or more degraded stream segments as described in an approved compensatory mitigation (CM) plan, meeting the requirements of 33 CFR 332, a Section 404 permit issued by the USACE, an ARAP issued by TDEC, and applicable USACE and TDEC guidance. The functional lift of these enhancements would be sufficient to offset the functional loss of impacted streams at the project site. The enhancements could include, but would not be limited to the following:

- Establishing or enhancing a vegetated riparian buffer;
- Re-establishment of a natural channel geomorphology;
- Removing or excluding existing livestock from the stream and riparian buffer using fencing or other means;
- Dam and culvert removal;
- Vegetative bank stabilization; or
- Other mitigation activities such as storm water retention and restoration of flow (e.g., losses to sewer lines).

The impacts from these activities would be temporary and would be mitigated through the use of BMPs such as those specified in the 404 permit, ARAP [WAC1], and SWPPP (if applicable). However, the long-term condition and function of the stream(s) would be improved.

A legal instrument, such as a restrictive covenant or deed restriction, would be used to ensure the long-term protection of the CM site and, to the extent practicable, prohibit incompatible uses that might otherwise jeopardize the objectives of the CM project. Prohibited uses may include but are not limited to the following:

- Clearing, cutting, and mowing of native vegetation;
- Earthmoving, grading, filling, topography change;
- Construction of permanent or temporary structures;
- Mining, drilling;
- Draining, diking;
- Diverting or affecting the flow of surface or subsurface waters;
- Spraying with herbicides or pesticides for reasons other than controlling invasive species;
- Grazing or use by domesticated animals;
- Use of off-road vehicles and motor vehicles; and
- Utility lines.

The CM plan would include ecologically-based standards that would be used to determine whether the project is achieving its objectives and monitoring requirements to determine if the CM project is meeting the performance standards. A long-term management plan describing how the CM project would be managed after performance standards have been achieved would also be prepared, approved, and implemented.

3.4.2.2.6 Operational Impacts

Operational impacts to surface waters should be minor during operation of the proposed SOC and TL. Other than non-contact storm water and septic discharges there would be no process water discharges from the SOC site. The SOC facilities would employ, when fully staffed, a total of between 210 and 220 people. Of these, 80 to 85 percent would be there during weekdays from 8 a.m. to 5 p.m., and the remainder would be there during nights and weekends. These staffing levels were taken into consideration when evaluating onsite, water needs, sewage treatment and HVAC systems. The HVAC system would be a no discharge air-cooled chiller system and would not have impacts to surface water resources.

<u>Onsite SOC Water Requirements</u>

The amount of potable water for the site for use in restrooms, water fountains and breakrooms would be expected to be approximately 4,200 gpd for the approximately 210-220 employees. This potable water would be provided across a designated easement to the SOC by Savannah Valley Utility District based in Georgetown, which is sourced by well water. Additionally, an onsite well could be used for dust control and for ancillary activities during the construction phase of the project. This well could also provide a limited water supply to portions of the facility during emergency situations. An 800-gallon holding tank would aid in the provision of this emergency water, if ever required. An additional holding tank would be onsite for storage of up to 150,000 gallons of water to be utilized for emergency fire protection. This tank would be filled with local utility water.

<u>Sewage Treatment System</u>

The total daily design sanitary wastewater flow would be approximately 4,400 gpd, representing between 18 and 19 gpd per employee. Wastewater would be conveyed by gravity sewers from the facility to the site of the treatment system. A grease trap would be provided on the building sewer from the employee breakroom. There would also be a small sewer force main from the entrance gatehouse. The entrance gatehouse would use a septic tank effluent pumping system in lieu of a grinder pump to prevent maceration of solids (which makes the wastewater more difficult to settle). These facilities would consist of a sewage treatment system with a drip dispersal system discharge. This sewage treatment system would include, a primary settling tank, an aerated equalization tank, two biological treatment tanks, a dosing tank and several storage tanks before being discharged by sub-surface drip dispersion for disposal. Eight disposal zones are proposed, each having 5,000 square feet of application area, to provide the 40,000 square feet required. Two zones would be dosed simultaneously.

This system would require a TDEC SOP and an Underground Injection Control Permit. This system would also require Tennessee water and wastewater operator certification for those operating the system.

3.4.2.2.7 Transmission Line Maintenance

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

Improper use of herbicides to control vegetation has the potential to result in runoff to streams and impact resident aquatic biota. Therefore, any pesticide/herbicide use as part of construction or maintenance activities would have to 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.

Proper implementation and application of these products would control runoff such that impacts to surface water are expected to be minor. Direct impacts to streams identified within the SOC site would occur and, as described in Section 3.4.2.2.5, would require the mitigation of those impacts.

3.4.2.2.8 Summary

Appropriate BMPs would be followed to minimize impacts associated with soil disturbance and all proposed project activities. Additionally, all construction and operation activities would be conducted in a manner to ensure that waste materials are contained and managed appropriately (e.g., refueling, maintenance activities, and storage of equipment) to ensure that the introduction of pollutants to the receiving waters would be minimized.

Onsite staff and normal operation of the SOC facility and maintenance of the TL would increase septic output, solid wastes, the potential for sediment and herbicides to enter waterways and even the potential for automobile leakage to be released to surface water streams. However, with good housekeeping practices and BMP placement, these potential releases should be minor and would have insignificant impacts to surface waters. TVA would also ensure that all chemicals handled are properly contained, covered and disposed of, so that they are not at risk of entering surface waters (TVA 2017a; TVA 2019c).

Proposed project activities that result in unavoidable direct impacts to surface water resources would be mitigated as appropriate in conjunction with agency consultation. SOC operations would utilize a wastewater treatment system that consists of infiltration and would not result in any releases to receiving streams. Additionally, BMPs would be used that would further reduce indirect impacts to surface water. Therefore, both direct and indirect impacts to surface water resources are anticipated to be minor.

3.5 Aquatic Ecology

3.5.1 Affected Environment

The proposed 166-acre SOC site and associated 161-kV TL are located in the Southern Limestone/ Dolomite Valleys and Low Rolling Hills level IV sub-ecoregion of the greater Ridge and Valley Level 3 ecoregion (Griffith et al. 1998).

Streams encountered during field surveys were typical of the Ridge and Valley sub-ecoregions. This ecoregion has great aquatic habitat diversity and is characterized by high numbers of aquatic fauna (Griffith et al. 1998).

As previously discussed in Section 3.4.1, a total of 38 watercourse intersections—including four perennial, 11 intermittent, one pond, and 21 ephemeral/WWC streams—occur along the proposed 5.25-mile TL route within the ROW and/ or within the 166-acre SOC.

Because TL construction and maintenance activities primarily affect riparian conditions and instream habitat, TVA evaluated the condition of these resources at each stream crossing along the 5.25 miles of the proposed TL route. Riparian conditions along the TL route was evaluated in field surveys conducted in November 2016, December 2018, and April 2019. Hydrologic determinations were made using the Tennessee Division of Water Pollution Control (Version 1.4) field forms by a Tennessee qualified hydrologic professional (Appendix E). These forms evaluate the geomorphology, hydrology, and biology of each stream. A listing of stream crossings in the project area, excluding ephemeral/WWCs, is provided in Appendix D.

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 3-5.

- 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.
- Non-forested – No or few trees are present within the riparian zone. Significant clearing has occurred, usually associated with pasture or cropland.

Table 3-5. Riparian Condition of Streams Located Along the Proposed Transmission Line Route and/or Within the System Operations Center Property

Riparian Condition	# Perennial Streams	# Intermittent Streams	Total
Forested	1	1	**2**
Partially forested	0	3	**3**
Non-forested	3	8	**11**
Total	**4**	**12**	**16**

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.

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 SOC is drained by the Chickamauga Lake-Hiwassee River (0602000214) 10-digit HUC watershed, part of the Tennessee River. This region has great aquatic habitat diversity and is characterized by high numbers of aquatic fauna (Griffith et al. 1998).

3.5.2 Environmental Consequences

3.5.2.1 Alternative A – The No Action Alternative

Under the No Action Alternative, construction, operation, and maintenance of the proposed project components would not occur. Changes to aquatic ecology would likely occur within the watershed over the long term due to factors such as the continuation of agricultural activities and population growth. However, no impacts to aquatic ecology would occur as a result of TVA's proposed project.

3.5.2.2 Alternative B – TVA Constructs a New Standalone SOC, Gunstocker Creek 161-kV Substation, and Associated 161-kV Transmission Line

Aquatic ecology could be affected by the proposed action. Impacts would either occur directly by the alteration of habitat conditions within the stream or indirectly due to modification of the riparian zone and storm water runoff resulting from construction and maintenance activities around the project area. As noted in Section 3.4.2.2, 949 feet of intermittent stream would be directly impacted by the SOC footprint and 20 feet would have temporary, direct impacts during construction of the SOC.

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 Section 404 Permits would be obtained for any stream alterations located within the project area and the terms and conditions of these permits. To mitigate for stream impacts identified within the SOC site, TVA would contract with a 3rd party to complete a Permittee Responsible Mitigation project scaled to account for 331 SQT 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 standard BMPs as identified within TVA 2017a.

Watercourses that convey only surface water during storm events such as ephemeral streams/WWCs and could be affected by the proposed SOC site preparation would be protected by standard BMPs outlined in TVA (2017b) 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 on the SOC site would be temporary and insignificant as a result of the proposed TVA action. Direct impacts to streams identified within the SOC site would occur. Because there are currently no stream restoration credits available at local mitigation banks, TVA would contract with a 3rd party to complete a Permittee Responsible Mitigation project scaled to account for 331 SQT stream credits.

In conjunction with the design of the SOC facility, TVA has avoided and minimized the extent of impact to aquatic ecosystems. Direct impacts to streams identified within the SOC site would occur. However, in compensation for unavoidable direct impacts, TVA would contract with a 3rd party to complete a Permittee Responsible Mitigation project. Additionally, TL activities would avoid impacts to streams crossed by the existing transmission system and would minimize impacts associated with the development of the new TL by minimizing impacts to SMZ. Furthermore, because appropriate standard BMPs would be implemented during both site construction and future maintenance activities, any impacts to the aquatic ecology of streams at the SOC site that are not directly affected by site construction would be temporary and minor as a result of the proposed TVA action.

3.6 Vegetation

3.6.1 Affected Environment

The proposed project is located in the Ridge and Valley Level 3 ecoregion, which is located between the Blue Ridge to the east and Cumberland Plateau to the west (Griffith et al. 1998). The alternating ridges and valleys found in this region are variable in size and are comprised of multiple types of bedrock including limestone, sandstone, and shale. Approximately half of the ecoregion is currently forested; many areas of higher productivity soils are in agricultural production.

Field surveys of the proposed 166-acre SOC parcel were conducted in November of 2016 and May of 2019, while field reviews of the proposed TL upgrades were conducted in January, February, and July 2019. The focus of these surveys was to document plant communities, established populations of invasive plants, and to search for possible threatened and endangered plant species. Using the National Vegetation Classification System (Grossman et al. 1998), plant community types observed during field surveys can be classified as a combination of herbaceous and forest. The SOC site as a whole is primarily forested (67 percent forest vs 33 percent herbaceous), while land where proposed TL upgrades would occur is dominated by herbaceous vegetation (82 percent). No forested areas in the proposed project area had structural characteristics indicative of old growth forest stands (Leverett 1996).

All of TVA's existing ROW associated with the rebuild section of TL, and a substantial portion of the proposed new ROW, currently support herbaceous vegetation. Herbaceous vegetation is characterized by greater than 75 percent cover of forbs and grasses and less than 25 percent cover of other types of vegetation (Grossman et al. 1998). Vegetation within the existing 4.25-mile rebuild TL ROW is periodically managed by TVA to remove woody plants to ensure the reliability of the TL. Some areas are dominated by native plant species, but many are populated with weedy and invasive plants indicative of disturbed areas. Higher quality plant habitats found along the 4.25-mile rebuild section are typically found in ROW bordered by forests on both sides. Common native species found in these areas include gray goldenrod, hairy sunflower, little bluestem, Loomis' mountain mint, grayhead coneflower, poverty oatgrass, rice button aster, small woodland sunflower, and silver plumegrass. Lower quality sections of this ROW contained a greater proportion of invasive plants and were often grazed or used to grow agricultural crops. Common plants in these disturbed areas include species like annual bluegrass, hairy buttercup, henbit dead nettle, Japanese honeysuckle, Johnson grass, narrowleaf plantain, sericea lespedeza, shrub lespedeza, tall fescue, and wild garlic.

Small segments of TVA's Sequoyah NP–Hiwassee 500-kV TL ROW and about 4 acres of the SOC parcel, contain unique herbaceous vegetation that resemble rocky, prairie habitats that are now imperiled in the southeastern United States. This is not entirely unexpected because of the ROW's close proximity to Gunstocker Glade—an informal site located 0.2 mile southwest of SOC parcel known to botanists because the local flora resembles that of cedar glades found in the Central Basin of Tennessee. Native forbs and grasses observed on these sites include blazing star, Carolina larkspur, Eastern prickly pear, Eastern purple coneflower, false aloe, Gattinger's prairie clover, grayhead coneflower, late purple aster, little bluestem, poverty dropseed, prairie dock, rigid goldenrod, soft thistle, straggling St. John's-wort, white crownbeard, and wild bergamont. No rare plant species were identified during the surveys, but prairie habitats on the SOC site contained a richness and diversity of native plant species rarely seen in the Ridge and Valley Ecoregion in the southeastern United States. For instance, six species of milkweed were found across 4 acres of prairie; these include butterfly, common, green antelopehorn, green comet, redring, and whorled milkweed. The diversity and richness of native herbaceous plants in these habitats, along with the lack of invasive species, is unique in Tennessee.

Forest in the project area is comprised of both deciduous forest and mixed evergreen deciduous forest. Deciduous forest is characterized by trees with overlapping crowns where deciduous species account for more than 75 percent of total canopy cover (Grossman et al. 1998). Common species across this vegetation type include mockernut hickory, post oak, shagbark hickory, white ash, white oak, and Shumard oak in the overstory with redbud, pawpaw, American beech, flowering dogwood in the midstory, and plants like dwarf larkspur, crossvine, Jacob's ladder, poison ivy, and river cane in the herbaceous layer. While the size of canopy trees varies by location, overstory trees commonly range from 12 to 24 inches in diameter at breast height across the SOC parcel. Forest along sections of the proposed TL ROW is generally more fragmented, containing a mixture of larger mature trees and younger, even-age stands.

Mixed evergreen deciduous forest, where both evergreen and deciduous species contribute more than 25 percent of canopy cover (Grossman et al. 1998), accounts for most of the forest present along the proposed TL ROW. These areas are generally rocky, frequently with limestone outcrops at the soil surface. Eastern red cedar is the most common overstory trees in this vegetation type, often comprising the majority of canopy cover. Other evergreen species present in the proposed ROW include sporadic Virginia pine, loblolly pine, and short leaf pine. Common deciduous overstory trees in these habitats include chinkapin oak, shagbark hickory, Shumard oak, and white oak. The herbaceous layer in mixed evergreen deciduous forest is often sparse with few species, except near openings in the canopy where light is more prevalent. These small canopy openings support herbaceous species found in prairie-like habitats mentioned above.

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

Some invasive plants have been introduced accidentally, but most were brought here as ornamentals or for livestock forage. Because these robust plants arrived without their natural predators (insects and diseases) their populations spread quickly across the landscape (Miller 2010). No federal-noxious weeds were observed within the project area, but several non-native invasive plant species characterized by the Tennessee Invasive Plant Council as an Established Threat were observed in both herbaceous and forested habitats (Table 3-6). These species are widespread along large portions of the proposed ROW. Invasive species are generally less prevalent on the SOC parcel, but Chinese privet is common in some forested stands. High-quality prairie remnants on the SOC contain few invasive plants and are dominated by native grasses and wildflowers.

Table 3-6. Invasive Plant Species observed within the Project Area

Common Name	Scientific Name
Hairy Jointgrass	*Arthraxon hispidus*
Chinese Lespedeza	*Lespedeza cuneata*
Bicolor Lespedeza	*Lespedeza bicolor*
Chinese Privet	*Ligustrum sinense*
Japanese Honeysuckle	*Lonicera japonica*
Japanese Stilitgrass	*Microstegium vimineum*
Callery Pear	*Pyrus calleryana*
Johnson grass	*Sorghum halepense*

3.6.2 Environmental Consequences

3.6.2.1 Alternative A – The No Action Alternative

Under the No Action Alternative, construction, operation, and maintenance of the proposed project components would not occur. As such, no additional impacts to vegetation would occur as a result of the proposed development of the SOC or the new TL. The unique prairie habitats located on the SOC site would remain in their current condition and routine periodic vegetation maintenance would continue to be conducted along the existing TL ROWs. Potential impacts to vegetation include periodic cutting and herbicide application to maintain a safe and reliable transmission system as described in the final programmatic EIS (see Section 2.5.2) (TVA 2019b). Therefore, because such maintenance activities are routine and are a component of on-going vegetation management programs, overall impacts to vegetation under this alternative are considered minor.

3.6.2.2 Alternative B – TVA Constructs a New Standalone SOC, Gunstocker Creek 161-kV Substation, and Associated 161-kV Transmission Line

Adoption of Alternative B would not significantly affect forest cover in the region. Conversion of forest land for construction of the proposed SOC facility and TL would be long-term in duration, but insignificant. As of 2015, there were about 287,000 acres of forest land in Bradley, Hamilton, and Meigs counties, Tennessee (USDA 2019).

Approximately 113 acres of forested lands (including low density woodlands) occurs on the SOC property. It is expected that approximately 36 acres (32 percent) of these woodlands would need to be cleared for the proposed project. About 4 acres of forest occur within the proposed ROW along the new build section of the TL project. These forested communities are common in Tennessee and the removal of a total of approximately 40 acres of forest would not be significant. Ultimately, completion of the project would likely result in clearing of less than one tenth of one percent of the forest occurring in Bradley, Hamilton, and Meigs counties.

Some forest stands within the proposed new TL ROW (approximately 4 acres) have a relatively small component of invasive terrestrial plants. Construction and operation of a TL would likely result in an increase of invasive plant cover in these areas. However, the plants most likely to invade disturbed areas are common throughout Tennessee. Adoption of Alternative B would not change the abundance of these species at the county, regional, or state level. The use of TVA standard operating procedure of revegetating with noninvasive species (TVA 2017a) would serve to minimize the potential introduction and spread of invasive species in the project area.

Adoption of Alternative B would result in substantial, long-term impacts to the unique prairie habitats found on the SOC site. The proposed alternative would result in the permanent conversion of less than five acres of prairie habitats found onsite. However, TVA plans to leave vegetation undisturbed on large portions of the SOC site. To avoid the potential for significant impacts, TVA plans to restore native prairie habitat in areas along Highway 58 on the west side of the parcel and along Old Highway 58 on the east side of the parcel. These sites would be permanently managed as prairie habitats to benefit native plants and pollinators, including bees and butterflies.

Prairie habitats found within the Sequoyah NP–Hiwassee 500-kV TL could be negatively impacted by the proposed action, but any affect would be short-term. As evidenced by their presence in the existing ROW, these communities are not necessarily mutually exclusive with construction, operation, and maintenance of a TL. In fact, important herbaceous plant habitats that support a diverse suite of native plants occur at many locations on TVA ROW.

As described in Section 2.5.2.2, routine maintenance of TL ROWs would have periodic direct effects on plant communities within the TLs over the long-term. Methods may vary but are likely to include use of herbicides and various mechanical measures to control vegetation. As such maintenance measures would result in cutting, damage and mortality to treated plants.

However, as discussed in TVA's final programmatic EIS regarding TL vegetation management, it is expected that such practices would result in localized, but generally minor impacts to established TL ROWs (TVA 2019b). Such potential impacts would be minimized by the integration of TVA's O-SAR[8] process and appropriate BMPs as described in the programmatic EIS (TVA 2019b). Further, with the implementation of TVA's proposed action, vegetation management would be undertaken on a condition-based manner (i.e., as needed) and would result in the development of a higher quality plant community that is inherently more compatible with TLs. Other potential impacts to plant communities include the potential for recruitment of sensitive herbaceous plant species within suitable areas of the transmission ROW.

[8] TVA's "office-level sensitive area review" process used to identify the need for site-specific field surveys and particular tool use when an area contains documented sensitive environmental resources or has the potential for the presence of such resources.

With implementation of the commitments below, project-related effects to these habitats would be insignificant. TVA would:

- Revegetate disturbed areas on the SOC parcel using native or non-invasive species and would not use species identified by the Tennessee Invasive Plant Council as Emerging or Established invasive threats in Tennessee.

- Restore pollinator friendly, prairie habitat on at least 10 acres of currently unforested land on the SOC parcel using purchased local-genotype native seed and seed collected from the SOC site, and by transplanting native sod from portions of the parcel that would be destroyed by construction.

- Maintain restored prairie in the long-term by using selective application of herbicide to control encroachment of woody plants and invasive species and/or by mowing only between November and March 15, unless otherwise approved by the TVA botanist.

- Demarcate prairie restoration areas using temporary fencing or other comparable methods before work begins to exclude equipment and prevent disturbance during construction.

In consideration of TVA's commitment to implement these measures, the amount of plant communities impacted, and the adherence to practices that control and reduce the establishment of invasive species, overall impacts to vegetation are considered to be substantial, but not significant.

3.7 Wildlife

3.7.1 Affected Environment

Habitat assessments for terrestrial animal species within project areas were conducted in the field in November 2016, December 2017, and January, February, and July 2019. 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., pasture and agricultural), and residential or otherwise disturbed areas (see Section 3.6). Approximately 117 acres of forested habitat occur within the project footprint. Of this, 113 acres are within the SOC site and the remaining 4 acres are within the footprint of the proposed new TL ROW. All forested habitat within the ROW footprint is suitable bat habitat and would be cleared for the new TL ROW and maintained as early successional habitat. Each of the varying community types offers suitable habitat for terrestrial animal species common to the region, both seasonally and year-round. It should be noted that the forested land cover in the project area is extensively bisected by multiple infrastructure facilities (roadways, TLs, pipelines, etc.). Consequently, existing habitat is highly fragmented with few to no large, intact forested areas remaining in the project vicinity.

Deciduous and mixed deciduous-evergreen forests comprise approximately 117 acres of the habitat within the project footprint. Approximately 67 percent of the 166-acre SOC parcel is occupied by deciduous forest whereas the ROW contains 4 percent deciduous and 14 percent mixed forest. Deciduous and mixed forest types provide habitat for an array of terrestrial animal species. Birds typical of this habitat include Acadian flycatcher, downy and hairy woodpecker, eastern screech-owl, tufted titmouse, eastern wood-pewee, indigo bunting, white-breasted nuthatch, red-bellied woodpecker, red-tailed hawk, summer tanager, wood thrush, blue jay, chestnut-sided warbler, wild turkey, and yellow-billed cuckoo (National Geographic 2002; Nicholson 1997). This area also provides foraging and roosting habitat for several species of bats, particularly in areas where the forest understory is partially open. Bat species likely found within this habitat include big brown bat, eastern red bat, evening bat, silver-haired bat, and tricolored bat. Eastern chipmunk, eastern woodrat, gray fox, and woodland vole are other mammals likely to occur within this habitat (Kays and Wilson 2002; Whitaker 1996). Eastern box turtle, five-lined skink, broad-headed skink, smooth earth snake, timber rattlesnake, and gray rat snake are common reptiles of eastern deciduous forests (Conant and Collins 1998; Dorcas and Gibbons 2005; Scott and Redmond 2008). In forests with aquatic features, amphibians likely found in the area include northern slimy salamanders, spotted salamanders, eastern spadefoot toad, Fowler’s toad, gray treefrog, and southern leopard frog (Bailey et al. 2006; Petranka 1998).

Both emergent and forested wetlands are found 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 sandhill crane, pileated woodpecker, 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). Eastern painted turtle, pond slider, common garter snake, northern water snake, rough green snake, and copperhead are common reptiles likely present within this habitat along the existing and 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, spring peeper, and southern two-lined salamander (Bailey et al. 2006; Petranka 1998).

Pastures and agricultural fields comprise approximately 54 acres or 33 percent of the SOC footprint. Approximately 67 acres or 82 percent of the ROW contained early successional habitat at the time of field survey. Common inhabitants of this type of habitat include killdeer, brown-headed cowbird, brown thrasher, American kestrel, common yellowthroat, eastern bluebird, white-eyed vireo, eastern kingbird, eastern meadowlark, field sparrow, and grasshopper sparrow (National Geographic 2002; Nicholson 1997). Bobcat, coyote, eastern cottontail, hispid cotton rat, and red fox are mammals typical of fields and cultivated land (Kays and Wilson 2002; Whitaker 1996). Amphibians such as eastern narrow-mouthed toad and reptiles including North American racer, ring-necked snake, and prairie kingsnake are also known to occur in this habitat type (Bailey et al. 2006; Conant and Collins 1998; Dorcas and Gibbons 2005; Scott and Redmond 2008).

Developed areas and areas otherwise previously disturbed by human activity are home to a large number of common species. American robin, American crow, Carolina chickadee, European starling, house finch, house sparrow, mourning dove, 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, Nicholson 1997). 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, upland chorus frog, and spring peeper (Bailey et al. 2006). Reptiles potentially present include red-bellied snake, gray rat snake, and rough earth snake (Conant and Collins 1998, Dorcas and Gibbons 2005, Scott and Redmond 2008).

Review of the TVA Regional Natural Heritage database in November 2018 indicated no recorded caves within three miles of the project area, although one possible cave entrance was identified during the field review on January 21st, 2019. A protective buffer of 200-foot radius would be documented in TVA's O-SAR database and implemented around this opening to prevent herbicide use, heavy machinery operation, and vehicle use outside of access roads. No other unique or important terrestrial habitats were identified within the project area. Further, no aggregations of migratory birds or wading bird colonies have been documented within three miles of the project area, and none were observed during field surveys. Proposed actions are approximately 4.9 miles from the Hiwassee Refuge State Wildlife Management Area, a known stopping point for migratory birds.

3.7.2 Environmental Consequences

3.7.2.1 Alternative A – The No Action Alternative

Under the No Action Alternative, construction, operation, and maintenance of the proposed project components would not occur. As such, no additional impacts to wildlife would occur as a result of the proposed development of the SOC or the new TL. However, routine periodic vegetation maintenance would be conducted along the existing TL ROWs. Potential impacts to wildlife include localized habitat alteration resulting from periodic cutting and herbicide application to maintain a safe and reliable transmission system as described in the final programmatic EIS (see Section 2.5.2) (TVA 2019b). Therefore, because such maintenance activities are routine and are a component of on-going vegetation management programs, overall impacts to wildlife under this alternative are considered minor.

3.7.2.2 Alternative B – TVA Constructs a New Standalone SOC, Gunstocker Creek 161-kV Substation, and Associated 161-kV Transmission Line

Under Alternative B, TVA would maintain approximately 120 acres of early-successional, herbaceous habitat (pastures, cultivated fields, residential areas within the SOC and TL ROW). In many areas, the TL would span agricultural and developed areas. Impacts to wildlife habitat would thus be limited to specific locations where the structures would be established. Ground disturbance would occur in these areas. Any wildlife (primarily common, habituated species) currently using these heavily disturbed areas may be displaced by increased levels of disturbance during construction activities, but it is expected that the wildlife would return to the project area upon completion of the proposed actions.

Approximately 113 acres of forested lands (including low density woodlands) occur on the SOC property. It is expected that approximately 36 acres (32 percent) of these woodlands would need to be cleared for the proposed project. Additionally, about 4 acres of forest occur within the proposed TL ROW along the new build section of the project. Ultimately, completion of the project would likely result in clearing of less than one tenth of one percent of the forest occurring in Bradley, Hamilton, and Meigs counties. 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. To minimize impacts to ground nesting birds, when practicable, mowing would be avoided during the height of the breeding season (May 1 to July 15) (Vickery et al. 2000) and would ideally occur before mid-March and after August.

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

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

As described in Section 2.5.2.2, routine maintenance of TL ROWs would have periodic effects on habitats within the TLs over the long-term. Methods may vary but are likely to include use of herbicides and various mechanical measures to control vegetation. As such maintenance measures would result in cutting, damage and mortality to treated plant communities and the associated habitats. Wildlife is expected to be displaced intermittently in conjunction with the presence of maintenance crews and the alteration of habitats. However, as discussed in TVA's final programmatic EIS regarding TL vegetation management, it is expected that such practices would result in localized impacts but generally minor impacts to established TL ROWs (TVA 2019b). Such potential impacts would be minimized by the integration of TVA's O-SAR process and appropriate BMPs as described in the programmatic EIS (TVA 2019b). Further, with the implementation of TVA's preferred alternative, vegetation management would be undertaken on a condition-based manner (i.e., as needed) and would result in relatively increased long-term habitat quality associated with ROW floor end-state and the potential for increased habitat and support for pollinator species.

Based on the relatively small amount of habitat directly impacted by Alternative B in the context of other similar resources in the project vicinity, direct impacts to wildlife characteristics of such habitats are minor. Additionally, because the existing landscapes consist of fragmented habitat types and wide-scale disturbance in the areas immediately adjacent to the project area, populations of migratory birds identified by USFWS as "of conservation concern" are not likely to inhabit the proposed action area. Thus, migratory bird populations of conservation concern are not likely to be impacted by the proposed actions. Additionally, with the implementation of TVA's preferred alternative for management of vegetation within ROWs, it is expected that there would be a relatively increased long-term habitat quality associated with ROW floor end-state and the potential for increased habitat and support for pollinator species. Therefore, overall impacts to wildlife under Alternative B are considered to be minor.

3.8 Endangered and Threatened Species

3.8.1 Affected Environment

Endangered species are those determined to be in danger of extinction throughout all or a significant portion of their range. Threatened species are those likely to become endangered within the foreseeable future throughout all or a significant portion of their range. Section 7 of the ESA requires federal agencies to consult with the USFWS when their proposed actions may affect endangered or threatened species or their designated critical habitats (DCH).

The ESA provides broad protection for species of fishes, wildlife, and plants that are listed as threatened or endangered in the United States or elsewhere. The ESA outlines procedures for federal agencies to follow when taking actions that may jeopardize federally listed species or DCH. The policy of Congress is that federal agencies must seek to conserve endangered and threatened species and use their authorities in furtherance of the ESA's purposes.

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 State listing is handled by the TDEC; however, the Tennessee Natural Heritage Program and TVA both maintain databases of aquatic animal species that are considered threatened, endangered, special concern, or tracked in Tennessee.

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 3-7.

Table 3-7. Federally and State-Listed species within the Project Area and Vicinity of Bradley, Hamilton and Meigs Counties, Tennessee

Common Name	Scientific Name	Status[1] Federal	Status[1] State (Rank)[2]	Element Rank[3]
Terrestrial Wildlife[4]				
Birds				
Bald eagle[5]	*Haliaeetus leucocephalus*	DM	D(S3)	
Mammals				
Little brown bat	*Myotis lucifugus*	-	T(S3)	
Gray bat	*Myotis grisescens*	LE	E(S2)	
Indiana bat[6]	*Myotis sodalis*	LE	E(S1)	
Northern long-eared bat[5]	*Myotis septentrionalis*	LT	(S1S2)	
Aquatic Wildlife[7]				
Fish				
Highfin carpsucker	*Carpiodes velifer*		D(S2S3)	E
Snail darter	*Percina tanasi*	LT	T(S2S3)	E
Tangerine darter	*Percina aurantiaca*		D(S3)	E
Tennessee dace	*Chrosomus tennesseensis*		D(S3)	H
Crayfish				
Cocoa crayfish	*Cambarus stockeri*		T(S1)	E
Conasauga blue burrower	*Cambarus cymatilis*		E(S1)	E
Mussels				
Cumberland bean	*Villosa trabalis*	LE	E(S1)	E
Oyster mussel	*Epioblasma capsaeformis*	LE	E(S1)	AB
Plants[8]				
White prairie-clover	*Dalea candida*	-	T(S2)	
Naked-stem sunflower	*Helianthus occidentalis*	-	S(S2)	
Small-whorled pogonia[9]	*Isotria medeoloides*	T	E(S1)	
Western false gromwell	*Onosmodium molle* ssp. *occidentale*	-	T(S1S2)	
Gibbous panic-grass	*Sacciolepis striata*	-	S(S1)	
Large-flowered skullcap	*Scutellaria montana*	T	T(S4)	
Virginia spiraea[9]	*Spiraea virginiana*	T	E(S2)	

Source: TVA Regional Natural Heritage database, queried 2018 and 2019; USFWS Information for Planning and Conservation (IPaC) resource list (https://ecos.fws.gov/ipac/), accessed 11/26/2018; The Tennessee Bat Working Group species occurrence maps (http://www.tnbwg.org/index.html), accessed 4/24/2019.

[1] Status Codes: D = Deemed in Need of Management; DM = Delisted and Monitored; E or LE = Listed Endangered; LT or T = Listed Threatened.

[2] State Ranks: S1 = Critically Imperiled; S2 = Imperiled; S3 = Rare and uncommon.

[3] Heritage Element Occurrence Rank: AB=excellent or good estimated viability; E = extant record ≤25 years old

[4] Terrestrial animal species include those within Bradley, Hamilton, and Meigs counties, and other species of conservation concern recorded within three miles of project

[5] Federally listed species recorded in Bradley, Hamilton, or Meigs counties, but not within three miles of the project footprint.

[6] Federally listed species whose ranges appear in IPaC search, but whose presence has not been recorded in Bradley, Hamilton, or Meigs counties.

[7] Aquatic species include those from within the Chickamauga Lake-Hiwassee River (0602000214) or, Candies Creek (0602000213) ten digit HUC watersheds, and/or, iPaC

[8] Plant species include those previously reported from within a 5-mile radius of project area

[9] Federally listed species occurring within the county where work would occur, but not within 5 miles of the project area

3.8.1.1 Aquatic Animals

A review of the TVA Regional Natural Heritage database and the USFWS Information for Planning and Consultation (IPAC) database (04/17/2019) indicated 3 federally listed species (one fish, two mussels) and five additional state-listed species (three fish, two crayfish) within the Chickamauga Lake-Hiwassee River (HUC 0602000214) 10-digit HUC watershed and the Candies Creek (0602000213) 10-digit HUC watershed. The federally listed snail darter and oyster mussel are all endemic to the Tennessee River drainage (Etnier and Starnes 1993; Parmalee and Bogan 1998; Page and Burr 2011) and would not occur in streams potentially affected by the proposed action, which are part of Tennessee River drainage.

Table 3-7 includes federally listed aquatic species potentially occurring within the Chickamauga Lake-Hiwassee River (0602000214) 10-digit HUC watershed, Candies Creek (0602000213) 10-digit HUC watershed and or iPaC. General ecological descriptions were retrieved from Etnier and Starnes (1993), fish; and Parmalee and Bogan (1998), mussels.

The federally threatened snail darter is found in the Tennessee River system, and upon discovery in 1973, a small population was placed in the Hiwassee River. Both of these systems are home to the snail darter. They are also found in many smaller systems such as the Holston and French Broad. Snail darters prefer sand and gravel shoal areas but can also be found in deeper portions of rivers and reservoirs where current is present (Etnier and Starnes 1993). No suitable habitat was identified within streams located on the SOC site or along the proposed TL route.

The Cumberland bean occurs in small rivers and streams in gravel or sand substrate with fast current in riffle areas. Potential suitable habitat could occur within Gunstocker Creek that would be spanned by the proposed TL. However, the Cumberland bean has not been documented within Gunstocker Creek.

The oyster mussel was once found throughout the Tennessee and Cumberland River systems from Virginia to Alabama. It is most often found in shallow riffles with fast moving water where there is a sandy gravel substrate. The oyster mussel is a federally endangered species and is most commonly found in the Clinch River system in Hancock County, Tennessee (Parmalee and Bogan 1998). No suitable habitat for the oyster mussel was documented within streams located on the SOC site or along the proposed TL route.

3.8.1.2 Plants

Four state-listed and one federally listed plant species have been previously reported from within a five-mile vicinity of the project area. No federally listed plants have been documented from Bradley or Meigs counties, but several are known from Hamilton County (Table 3-7). No designated critical habitat for plant species occurs within the project area. *Virginia spiraea* grows only in river scour habitat along high-gradient streams; this habitat does not occur within the project area. The nearest record of small whorled pogonia is situated on top of the Cumberland Plateau in southwest Hamilton County, approximately 25 miles away from the proposed TL improvements. The species has never been observed in the southern Ridge and Valley Level 3 ecoregion, where the proposed project is located. Large-flower skullcap does occur relatively near the project area, but the forest type that supports the species at those locations differs from stands found in the proposed project area. Forests within the project area are typified by limestone outcrops and appear similar to habitats occurring in the Central Basin of middle Tennessee that do not support the species.

High-quality prairie habitats dominated by native species were observed on the SOC site and Sequoyah NP–Hiwassee 500-kV TL ROW, but no populations of state-listed species were observed during field surveys.

3.8.1.3 Terrestrial Animals

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 4.1 miles outside of the project footprint. No additional nests or individuals were observed during field surveys in January, February, or July 2019.

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. The nearest known little brown bat record is a mist net capture approximately 2.5 miles from the project footprint. No caves are known within 3 miles of the project footprint. One possible cave opening was observed in the existing ROW during field surveys; however, the opening appeared too narrow for use by bats.

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). The nearest gray bat record is from a mist net capture approximately 180 feet from the existing ROW. No caves have been documented within three miles of the project area, although a possible entrance was observed during field surveys (see above). No large waterways are present within the project area although Gunstocker Creek and several nearby ponds may provide foraging habitat for gray bats.

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). There are no known records of Indiana bat within 10 miles or from Bradley, Hamilton, or Meigs counties although each of these counties is within the species' range. No caves have been documented within three miles of the project area, although a possible entrance was observed during field surveys (see above). Foraging habitat for Indiana bat exists throughout the project footprint over forest fragments, fence rows, and seasonally over ephemeral streams. Suitable summer roosting habitat for Indiana bat exists throughout forested areas of the project footprint.

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). Northern long-eared bat records are known from Meigs, Bradley, and Hamilton counties; however, the exact location of these records is unknown. No caves have been documented within three miles of the project although a possible entrance was observed during field surveys (see above). No additional winter habitat was found within the project area. Foraging habitat exists throughout the proposed project area in forest fragments, along fence rows, and seasonally over ephemeral streams. Suitable summer roosting habitat for northern long-eared bat exists throughout forested areas of the project footprint.

Assessment of the project area for presence of summer roosting habitat for Indiana bat and northern long-eared bat followed federal guidance (USFWS 2014, 2015, 2018). Field surveys resulted in the identification of 296 suitable roost trees scattered throughout the 117 acres of forested habitat within the combined SOC and ROW footprints. Habitat quality ranged from moderate to high, based on the presence of trees with exfoliating bark (i.e., 26 white oak, 51 snags, 238 hickories, and 2 trees of other species) within the proposed ROW. Solar exposure and proximity to water sources was also considered. Suitable summer roosting areas were comprised of mature deciduous and mixed deciduous-evergreen stands dominated by a mixture of blackjack oak, eastern red cedar, eastern redbud, post oak, shagbark hickory, southern red oak, and sugar maple.

Following habitat assessment, a presence/absence survey was conducted following federal guidance (USFWS 2018) on the 166-acre SOC site. Plateau Ecological LLC completed 9 net-nights of mist net surveys at one location on June 5, 6 and 7, 2018. Two eastern red bats were captured. No Indiana bats or northern long-eared bats were captured, establishing probable absence for both species within the SOC portion of the project footprint.

3.8.2 Environmental Consequences

3.8.2.1 Alternative A – The No Action Alternative

Under the No Action Alternative, construction, operation, and maintenance of the proposed project components would not occur. As such, no impacts to endangered or threatened species would occur as a result of the proposed development of the SOC or the new TL. However, routine periodic vegetation maintenance would be conducted along the existing TL ROWs. Potential impacts to threatened or endangered species include localized roost tree alteration (i.e., potential “immediate hazard” trees) resulting from periodic cutting to maintain a safe and reliable transmission system as described in the final programmatic EIS (see Section 2.5.2) (TVA 2019b). However, such maintenance activities are routine and have been included in extensive consultations with USFWS in conjunction with maintenance activities across TVA’s TL system. As such, overall impacts to threatened and endangered species under this alternative would be avoided.

3.8.2.2 Alternative B – TVA Constructs a New Standalone SOC, Gunstocker Creek 161-kV Substation, and Associated 161-kV Transmission Line

3.8.2.2.1 Aquatic Animals

Aquatic life could be affected by the proposed action either directly by the alteration of habitat conditions or indirectly due to modification of riparian zones and storm water runoff resulting from activities associated with construction of the SOC facility or TL. Potential impacts due to the removal of streamside vegetation within the riparian zone include increased erosion and siltation, loss of in-stream habitat, and increased stream temperatures. Other potential construction impacts include alteration of stream banks and stream bottoms by heavy equipment and runoff of herbicides into streams. Two intermittent streams and one ephemeral stream/WWC identified within the 166-acre SOC property would be directly impacted. Proposed stream impacts would be offset through permittee responsible mitigation as there are no credits available within watershed of this HUC. To accomplish this, TVA would enter into a 3rd party turnkey contract with a qualified firm that would implement a permittee-responsible mitigation project, on TVA's behalf. These impacted streams would not provide suitable habitat for any of the species listed in Table 3-7.

The remaining streams documented within the proposed project footprint would be protected by standard 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. The federally listed endangered Cumberland bean may occur within Gunstocker Creek. However, the proposed TL route would span the stream and not result in in-stream impacts. No designated critical habitat is known from the potentially affected 10-digit HUC watersheds encompassed by the proposed project. Therefore, with appropriate implementation of BMPs during site preparation, construction and maintenance activities, the proposed TVA action is expected to have no effect on the species listed in Table 3-7.

3.8.2.2.2 Plants

Adoption of Alternative B would not impact federally listed plant species or designated critical habitat because neither occurs in the proposed project area. State-listed plant species would not be impacted by adoption of Alternative B. High-quality prairie habitats capable of supporting listed plants were observed on the SOC site and Sequoyah NP–Hiwassee 500-kV TL ROW, but no listed plants were observed during field surveys.

3.8.2.2.3 Terrestrial Animals

Under Action Alternative B, TVA would construct the proposed SOC project and would maintain approximately 120 acres of early-successional habitat within the SOC site and TL ROW. Construction of the SOC and TL require clearing approximately 36 acres of forested habitat at the SOC and approximately 4 acres of forested habitat within the 1-mile portion of the TL. TVA would maintain this habitat as early successional habitat.

Two terrestrial animal species, little brown bat (state-listed) and gray bat (federally listed), were assessed based on documented presence within three miles of the project footprint. Two additional federally protected species (bald eagle and northern long-eared bat) were addressed based on recorded presence within Bradley, Hamilton and/or Meigs counties.

Finally, the species range of Indiana bat is thought to include the project footprint. All five of these species have the potential to utilize the project area.

Marginal nesting habitat and poor foraging habitat for bald eagle exists within the project area. Large trees are abundant but the largest waterways within the project footprint are Gunstocker Creek and a 1-acre pond. The nearest known bald eagle nest is approximately 4.1 miles from the project footprint on Chickamauga Reservoir. No nests or individuals are known from the project footprint and none were observed during field surveys in November 2016, December 2017, or January, or February 2019 when active nesting behavior would have been apparent. No impacts are anticipated to occur from occasional helicopter use in the vicinity, as no bald eagle nests are known to exist within 1,000 feet, the recommended buffer for aircraft operation (USFWS 2007). Standard BMPs (TVA 2017a) would be used to minimize impacts to water bodies within the affected area, thus bald eagle foraging habitat would not be impacted by the proposed actions. Impacts to bald eagle are not anticipated in association with the proposed actions.

All four species of state-listed and/or federally listed bats addressed in this document hibernate in caves, mines, tunnels, or similar underground structures. No caves have been previously recorded within 3 miles of the project footprint. One possible cave opening was observed in the existing TVA TL ROW during a field survey on January 21, 2019. This entrance is narrow and does not appear to be suitable for use by bats. However, a protective buffer of 200-foot-radius would be implemented during TL construction and maintenance activities around this opening to prevent vehicle use outside of access roads, herbicide use, and heavy machinery operation. Foraging habitat for each of the four bat species addressed in this document exists throughout the proposed project area in forest fragments and over streams, ponds, and wetlands. No water bodies greater than approximately 1 acre are present within the project footprint. Standard BMPs (TVA 2017a) would be used to minimize impacts to water bodies within the affected area, thus aquatic foraging habitat for these bat species would not be impacted by the proposed actions.

Little brown bat primarily uses man-made structures and infrequently hollow trees for summer roosting and maternity colonies. One structure is located near the project footprint (a hunting blind). If this structure must be removed, removal should take place between October 15th and March 31st to prevent impacts to potentially roosting little brown bats. Outside of winter, a presence absence survey would be performed less than 24 hours prior to disturbance. There are no known caves or other winter hibernacula within 3 miles of the proposed actions although a possible cave entrance was discovered within the existing TVA TL ROW during a field survey (see above). Approximately 117 acres of forested foraging habitat would be cleared as part of this project, however similar habitat is abundant in the surrounding area and populations of little brown bat would not be impacted by the proposed action.

Gray bats roost in caves year-round. No caves are known within 3 miles of the project action area. One possible cave entrance unsuitable for bat use was discovered within the existing TL ROW (see above). No roosting habitat for gray bat would be impacted by the proposed actions. Gray bat foraging habitat exists over farm ponds and streams in and near the project area. BMPs would be implemented during construction to minimize potential impacts to foraging habitat as described and in accordance with TVA's Programmatic Consultation on Bats on routine actions (TVA 2017c). No significant impacts to gray bat would occur as a result of the proposed action.

No winter hibernacula for Indiana bat or northern long-eared bat exists in the project footprint or would be impacted by the proposed actions. One possible cave entrance unsuitable for bat use was found within the existing TVA TL ROW (see above). Suitable foraging habitat does exist for these species over ponds, streams, and wetlands within the proposed ROW. BMPs would be utilized in SMZs around these bodies of water, thus minimizing sedimentation and avoiding any changes to hydrology. Additional foraging habitat for Indiana bat and northern long-eared bat exists along fence rows and within forest fragments. This foraging habitat would be removed in association with the proposed actions, however, similarly suitable foraging habitat is plentiful in the surrounding landscape.

Summer roosting habitat surveys were performed in November 2016, December 2017, and January, February, and July 2019. During these surveys, 296 suitable roost trees were identified along the proposed new and existing TL ROW and within the 166-acre SOC site. Suitability was determined based on the high number of snags, shagbark hickory, and other trees with exfoliating bark or cavities and their proximity to water sources. Probable absence of Indiana and northern long-eared bat from the SOC site was established using mist net surveys in 2018 exempting this area (113 suitable acres) from “take” under the programmatic consultation. A total of about 4 acres of suitable summer roosting habitat for Indiana and northern long-eared bat would be removed for the proposed TL ROW and is subject to “take.” A number of activities associated with the proposed project, including daytime operation of helicopters and blasting, were addressed in TVA’s programmatic consultation with the USFWS on routine TVA actions and federally listed bats in accordance with ESA Section 7(a)(2) (TVA 2017c). For those activities with the 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 F) and would need to be reviewed/implemented as part of the proposed action. As there are no known records of federally or state-listed terrestrial animal species within 3 miles of the project footprint, of bat roosts within 0.5 mile, or known nests or other sensitive resources in the area, no additional impacts are anticipated should blasting be necessary on the SOC site.

In summary, TVA would integrate on-going standard BMPs and procedures that are designed to avoid and minimize impacts to federally or state-listed species. Such practices include spanning of streams and aquatic habitats potentially suitable for use by the Cumberland bean, integration of BMPs to exclude vehicles from identified populations of federally or state-listed plant species, and 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. As such, potential impacts to federally and state-listed threatened and endangered species are considered minor.

3.9 Floodplains

3.9.1 Affected Environment

A floodplain is the relatively level land area along a stream or river that is subjected to periodic flooding. The area subject to a one percent chance of flooding in any given year is normally called the 100-year floodplain. It is necessary to evaluate development in the 100-year floodplain to ensure that the project is consistent with the requirements of EO 11988.

An unnamed tributary of Gunstocker Creek is located within the SOC parcel boundary; the proposed TL would cross Gunstocker Creek; the proposed TL rebuild on existing ROW would cross an unnamed tributary of Greasy Creek, Bigsby Creek, and three unnamed tributaries of Gunstocker Creek; and the access roads would cross floodplain areas of Greasy Creek and one unnamed tributary, and Gunstocker Creek and three unnamed tributaries in Meigs County. The various project activities are shown in Figure 3-4.

The floodplains in the project area are either unmapped or listed on the Meigs County Flood Insurance Rate Map, called a panel, as Zone A. Zone A is the FEMA designation for streams whose 100-year flood elevations have not been determined. Therefore, 100-year flood elevations on Gunstocker Creek have not been determined. Gunstocker Creek is the only stream within the project area with a floodplain that has been mapped by FEMA. The floodplain boundary of Gunstocker Creek is depicted in light blue shading on Figure 3-4.

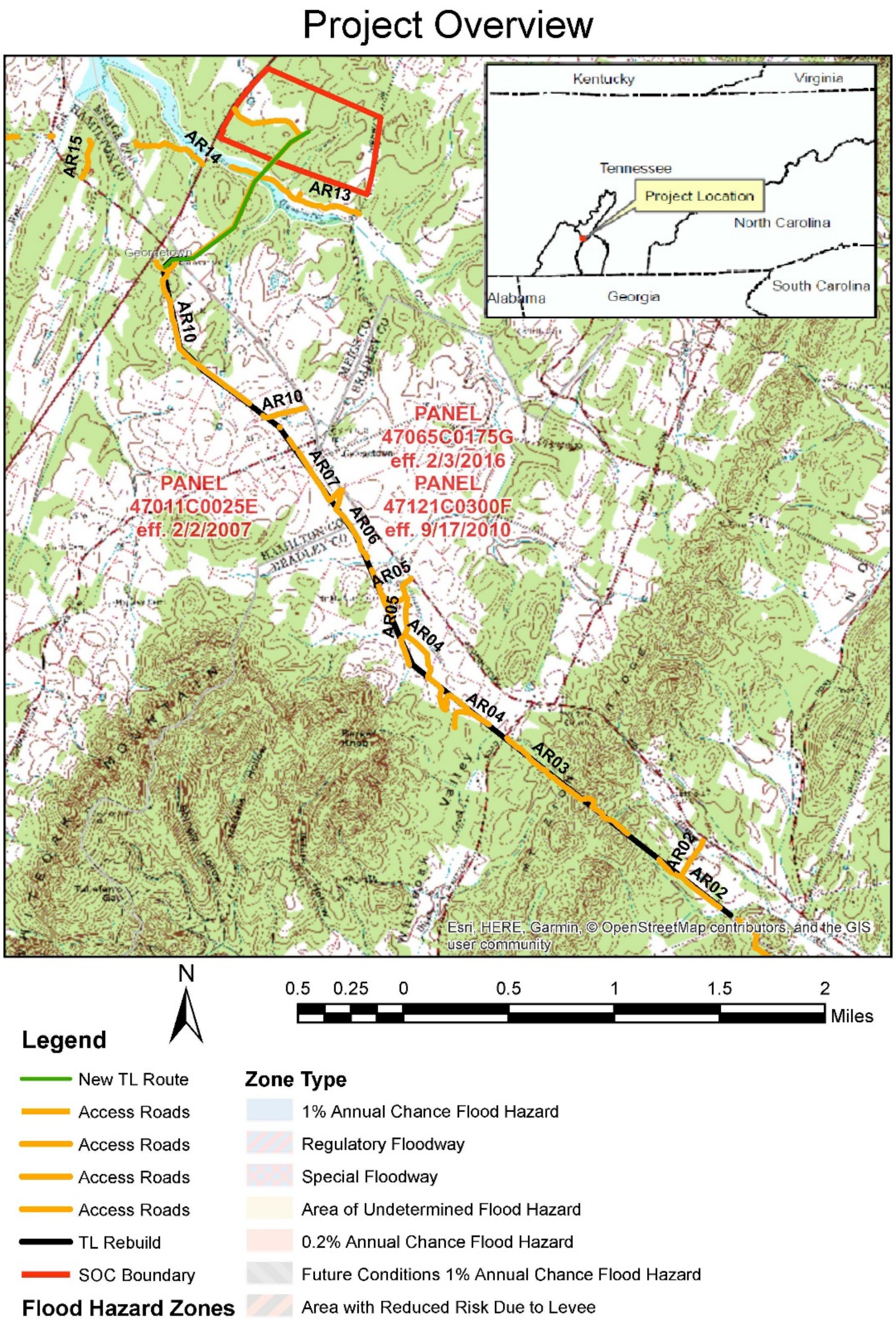


Figure 3-4. General Location of the Proposed Project and Floodplains in the Area

3.9.2 Environmental Consequences

3.9.2.1 Alternative A – The No Action Alternative

Because the construction, operation, and maintenance of the proposed project components would not occur under the No Action Alternative, no impacts to floodplains in the project area would occur as a result of TVA actions associated with the proposed project.

3.9.2.2 Alternative B – TVA Constructs a New Standalone SOC, Gunstocker Creek 161-kV Substation, and Associated 161-kV Transmission Line

3.9.2.2.1 System Operations Center

Based on the rendering in Figure 3-5, two roads would cross the unnamed tributary of Gunstocker Creek. Consistent with EO 11988, roads are considered to be repetitive actions in the 100-year floodplain that should result in minor impacts. To minimize adverse impacts, any road construction in the floodplain would be done in a manner such that flood elevations would not increase more than 1.0 foot. Consistent with EO 11988, all other activities and facilities on the SOC parcel would avoid floodplains.

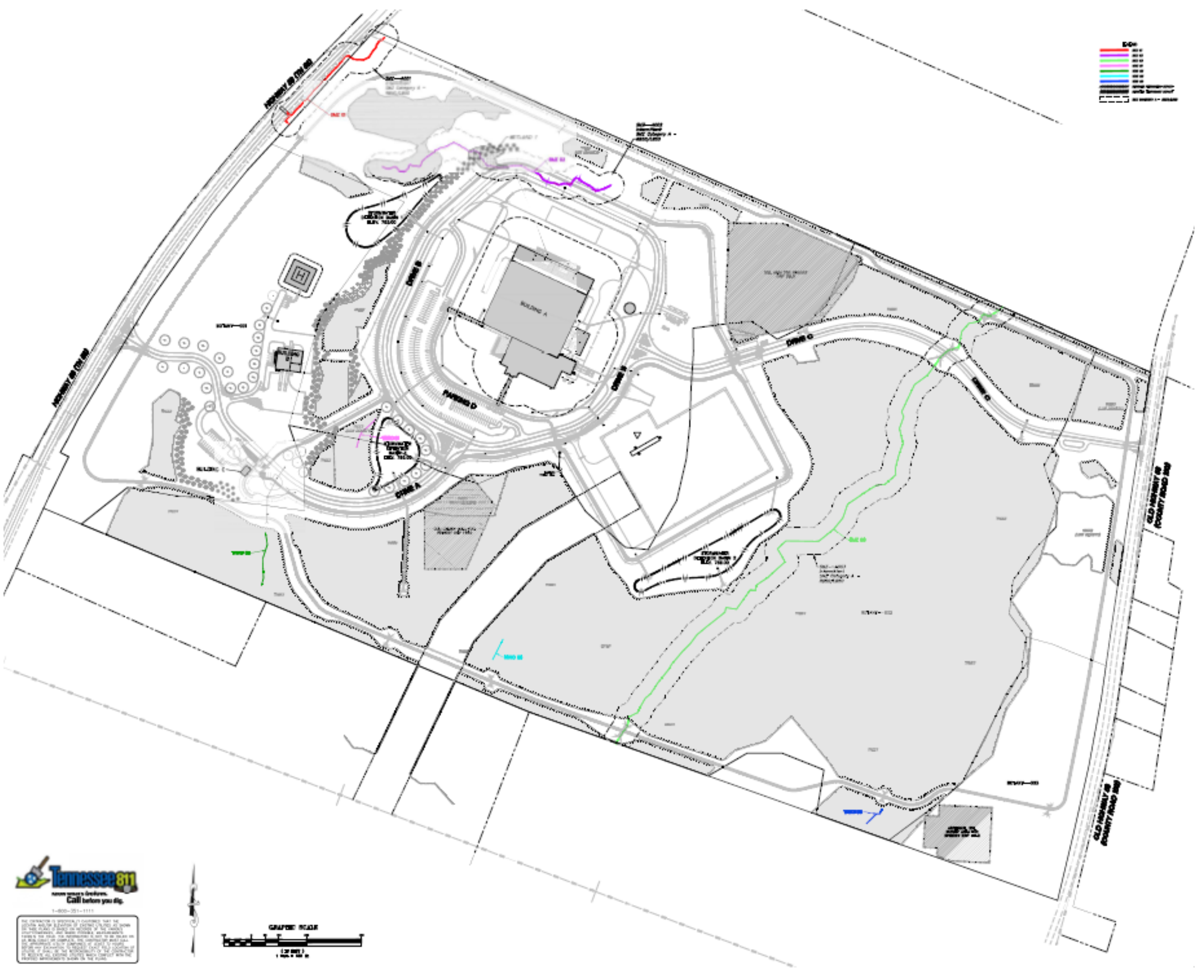


Figure 3-5. Rendering of the Proposed System Operations Center Located on the TVA-Owned 166-acre Parcel

3.9.2.2.2 Transmission Line Rebuild

Rebuilding the existing 4.25-mile TL would be considered a repetitive action in the 100-year floodplain that would result in minor impacts.

3.9.2.2.3 Proposed New Transmission Line

As shown in Figure 3-6, a portion of the new 1-mile section of TL would cross the floodplain of Gunstocker Creek. The new TL would be consistent with EO 11988 provided the subclass review criteria for TL location in floodplains are followed.

3.9.2.2.4 Access Roads

Portions of several access roads would be located within 100-year floodplains. As shown in Figure 3-6, portions of AR11, AR13 and AR14 would be located within the mapped 100-year floodplain of Gunstocker Creek. The remaining access roads would be located outside mapped floodplains. Consistent with EO 11988, roads are considered to be repetitive actions in the 100-year floodplain. To minimize adverse impacts, road construction and/or improvements would be done in such a manner that upstream flood elevations would not be increased by more than 1.0 foot.

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

- BMPs would be used during construction activities (TVA 2017a)
- Construction would adhere to the TVA subclass review criteria for TL location in floodplains
- Road construction and/or improvements would be done in such a manner that upstream flood elevations would not be increased by more than 1.0 foot

Based upon implementation of the above standard BMPs and mitigation measures, the proposed project would have no significant impact on floodplains.

3.10 Wetlands

3.10.1 Affected Environment

The USACE regulates the discharge of fill material into waters of the United States, including wetlands pursuant to Section 404 of the CWA (33 USC 1344). Additionally, EO 11990 (Protection of Wetlands) requires federal agencies to avoid to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative. Section 401of the CWA requires water quality certification by the state for projects permitted by the federal government (Strand 1997). Section 404 implementation requires activities resulting in the discharge of dredge or fill into waters of the U.S. to be authorized through a nationwide general permit or individual permit issued by the USACE.

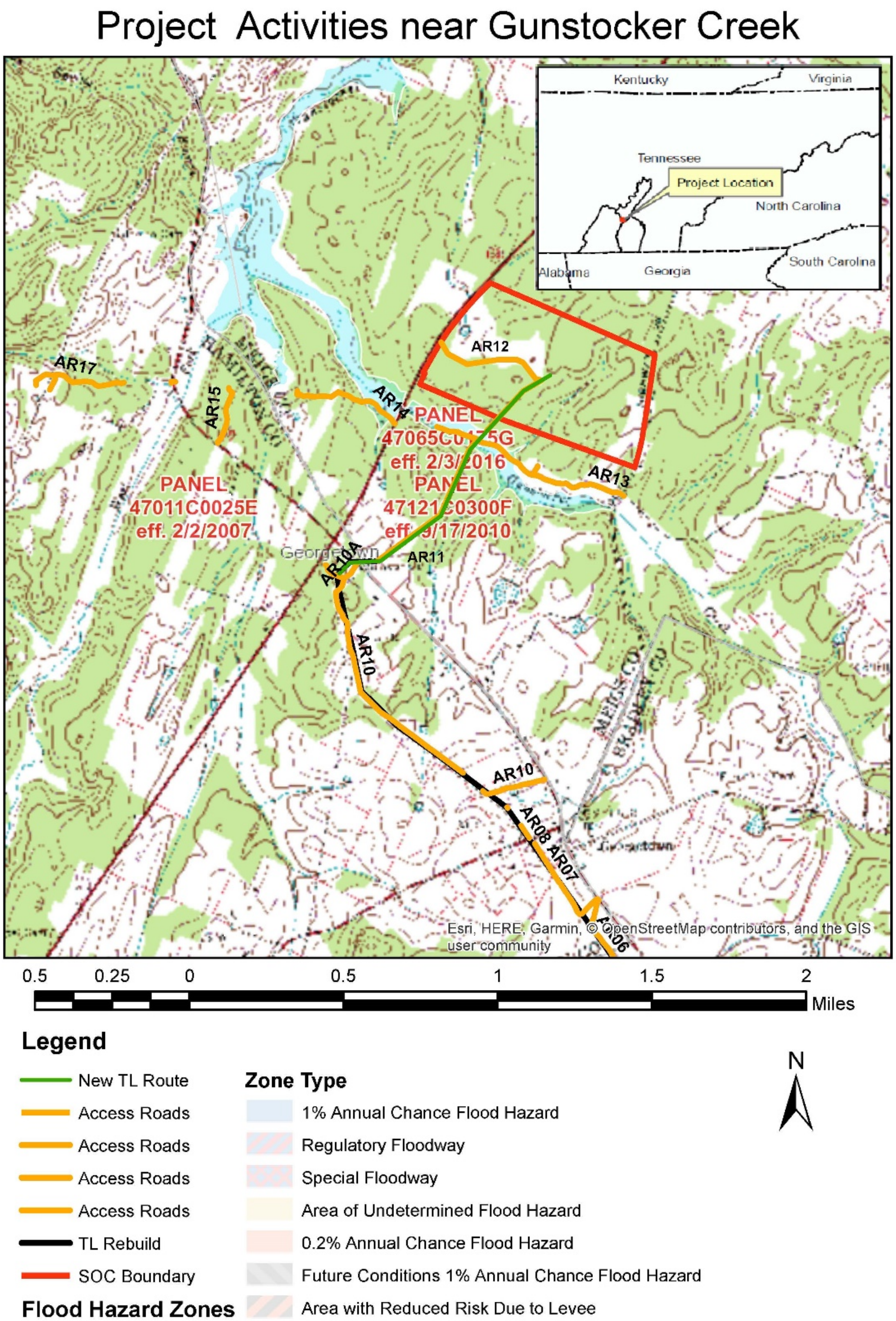


Figure 3-6. Project Activities near the Mapped Floodplain of Gunstocker Creek

Wetlands are those areas inundated or saturated by surface or groundwater such that vegetation adapted to saturated soil conditions are prevalent. Examples include bottomland forests, swamps, wet meadows, isolated depressions, and fringe wetland along the edges of watercourses and impoundments. Wetlands provide many societal benefits including toxin absorption and sediment retention for improved downstream water quality, storm water attenuation for flood control, shoreline buffering for erosion protection, and provision of fish and wildlife habitat for commercial, recreational, and conservation purposes. Therefore, a wetland assessment was performed to ascertain wetland presence, condition, and extent to which wetland functions may be provided within the proposed project area. Field assessments took place in November 2016, December 2017, January and February 2019, and June 2019. The review footprint included the 166-acre SOC site, proposed new TL ROW, existing TVA TL corridor proposed for rebuild, the waterline route necessary to service the SOC site, pull points for proposed fiber line or splice case installation, and all associated access roads. A total of nine wetlands were identified within the project footprint (Table 3-8).

Table 3-8. Wetlands within the Proposed Project Area in Bradley, Hamilton, and Meigs County, Tennessee

Wetland Identifier	Wetland Type[1]	TRAM[2] Functional Capacity (score)	Location	Acreage in Review Area	Wetland Acres within the Project Footprint
W001	PEM1E	Moderate (50)	Between Existing Str. 76-77	0.06	None - Span
W002	PEM/SSHx	Moderate (48)	Between Existing Str. 81-82	0.09	None - Span
W003	PEM1E	Moderate (45)	Between Existing Str. 82-83	0.06	Temporary for Access
W004	PEM1E	Low (28)	Between Existing Str. 88-89	0.04	None - Span
W005	PEM1E	Low (39)	Between Existing Str. 89-90	0.26	Temporary for Access
W006	PFO1E	Low (14)	Between Existing Str. 120-121	0.02	None - Span
W007	PFO1E	Low (39)	Proposed ROW	0.04	**Tree Clearing: 0.04 acre**
W008	PEM1E	Low (42)	Adjacent (but not including) str 151 and on access through existing 500-kV ROW	0.52	Temporary for Access
W009	PEM1E	Low (27)	Waterline	0.01	None Directionally Drill
W001-SOC	PEM/PFO1E	Low (38)	SOC Site Parcel	0.17	**Permanent Fill: 0.17 acre**
		TOTAL		**1.10**	**0.04 acre – Clearing** **0.17 acre – Fill**

[1]Classification codes as defined in Cowardin et al. (1979): P=palustrine; E=seasonally flooded/saturated FO=forested; H=permanently flooded; SS=scrub-shrub; UB=unconsolidated bottom; x=excavated; 1 = broadleaf deciduous.
[2]Tennessee Rapid Assessment Method determination for wetland function and value to the surrounding landscape.

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 quality, moderate quality, or exceptional resource value (TDEC 2015) (Appendix G). 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. Wetlands with exceptional resource value provide high functions and values within a watershed or are of regional/statewide concern. Those wetlands would exhibit little, if any, recent disturbance, provide essential and/or large scale storm water storage, sediment retention, and toxin absorption, contain mature vegetation communities, and/or offer habitat to rare species. Only low and moderate quality wetlands were identified within the proposed project extent.

The proposed project area crosses a landscape of open fields, upland forest over rolling terrain, and pastureland, dissected by channels, streams, or wetlands. The proposed project footprint is located across two local (sub-) watersheds, the Hiwassee River-Coppinger Creek and Lower Candies Creek, both within the Hiwassee River basin. Combined, these local watersheds contain approximately 500 acres of mapped wetland area on the National Wetland Inventory (USFWS 1982). The nine wetlands identified within the review footprint total 0.87 acre. Wetlands W001 through W006 and W008 are located on existing TL ROWs, which have been maintained as low-growing emergent or scrub-shrub wetland habitat either through TVA's ROW vegetation management efforts or due to the residential or farmed land use within the existing TL corridor. W007 is a forested wetland located along an intermittent drain on the proposed new ROW. W009 is located along Highway 58 where the waterline servicing the SOC site is proposed for installation. These wetland habitats exhibited typical assemblages of meadow-like, scrub-shrub, or forested wetland vegetation, and experience varying hydrologic regimes. Due to disturbance history, hydrologic influence, size, or watershed setting, these wetlands were assessed as low to moderate condition, and thereby offering minimal to adequate value to the water resource functions within the surrounding landscape.

3.10.2 Environmental Consequences

3.10.2.1 Alternative A – The No Action Alternative

Under the No Action Alternative, construction, operation, and maintenance of the proposed project components would not occur. As such, no project related disturbance to wetlands within the proposed project footprint would occur.

3.10.2.2 Alternative B – TVA Constructs a New Standalone SOC, Gunstocker Creek 161-kV Substation, and Associated 161-kV Transmission Line

Under Alternative B, the proposed project would result in permanent wetland impacts associated with the filling of W001-SOC, the 0.17-acre wetland present on the TVA-owned SOC parcel and clearing of the 0.04-acre forested wetland in W007 (see Table 3-9). Temporary wetland impacts associated with vehicular access along the TL ROW would occur to wetlands W003, W005, and W008. The remainder of the wetlands within the project footprint are anticipated to be avoided by the proposed project activities.

Table 3-9. Wetlands Impacts within the Proposed Project Area in Bradley, Hamilton, and Meigs County, Tennessee

Wetland Identifier	Wetland Impact Type	Permanent Wetland Impact Acreage
W001	None - Span	--
W002	None - Span	--
W003	Temporary for Access	--
W004	None - Span	-
W005	Temporary for Access	--
W006	None - Span	--
W007	Forest Clearing/Habitat Conversion	0.04
W008	Temporary for Access	--
W009	None - Directionally Drill	--
W001-SOC	Fill	0.17
TOTAL	**Habitat Conversion** **Fill**	**0.04** **0.17**

The tree clearing in W007 would convert the 0.04-acre wetland habitat from forested to emergent within this wetland's small depressional feature and linear about 250-foot stretch along an intermittent stream channel where wetland parameters were evident. Woody wetland vegetation, in general, has deeper root systems and contains greater biomass (quantity of living matter) per area than do emergent wetlands which do not grow as tall. As a result, forested wetlands tend to provide higher levels of wetland functions, such as sediment retention, carbon storage, and pollutant retention and transformation (detoxification), all of which support better water quality. Consequently, the clearing and conversion of forested wetlands to emergent wetland habitat would result in a reduction of wetland function that would otherwise support healthier and improved downstream water quality (Wilder and Roberts 2002; Ainslie et al. 1999; Scott et al. 1990). Therefore, the converted emergent wetland habitat would provide the same suite of functions as when previously forested, but at a reduced level due to the removal of woody vegetation. However, the proposed wetland habitat conversion is relatively minimal, totaling less than one-tenth acre. Likewise, this wetland scored as low quality due to size, landscape position, and hydrologic influence. Therefore, this wetland does not contribute significantly to the ecological or aquatic habitat in the watershed, regardless of the woody wetland vegetation present. Accordingly, the proposed habitat conversion of this wetland at this scale is not expected to significantly impact the aquatic environment downstream. In addition, the USACE/TDEC maintains discretion over forested wetland conversion. These agencies are tasked with ensuring the mandates of the CWA are followed, and no more than minimal impacts to the aquatic environment are permitted. Forested wetland conversion is considered a secondary impact resulting from any fill required for TL construction. Therefore, these regulatory agencies would impose mitigation requirements as deemed necessary to adequately compensate for loss of wetland resources resulting from forested wetland conversion at this scale.

The filling of W001-SOC would result in permanent loss of all wetland functions currently provided by this wetland. However, due to size, landscape position, and disturbance regime, this wetland exhibited low functional capacity. Although this wetland is not anticipated to contribute significantly to the quality of downstream water, its contribution would not be nominal. As such, wetland regulations require compensatory mitigation be provided to ensure no net loss of wetland resources result from this project. TVA would obtain all appropriate wetland permits from the USACE/TDEC regulatory offices, including purchase of wetland credits from an approved wetland mitigation to offset this proposed loss of wetland functions within the watershed.

Chapter 2 details TVA’s alternatives analysis in compliance with the NEPA, CWA, and EO 11990 that requires consideration of alternatives such that adverse environmental effects may be avoided or minimized during project planning. Furthermore, the CWA requires selection of the least environmentally damaging alternative, and EO11990 mandates wetland avoidance to the extent practicable. Per TVA’s alternatives analysis (Chapter 2), there is no practicable alternative to filling 0.17 acre of wetland and clearing the 0.04-acre forested wetland within the project footprint.

TVA would implement standard BMPs across all delineated wetlands (TVA 2017a). This includes the use of low ground-pressure equipment, matts, no rutting greater than 12 inches, dry season work, etc. for access across W003, W005, and W008. Standard BMPs such as erosion controls would be in place elsewhere to ensure no indirect wetland impacts result from siltation during construction activities. Similarly, all wetlands located within the ROW would be subject to periodic vegetation management long-term to maintain low-stature habitat compatible with overhead conductor clearance. TVA would incorporate the mapped wetlands into a sensitive area database to ensure wetland BMPs are implemented during future TL ROW vegetation maintenance activities within the delineated wetland boundaries (TVA 2019b).

The proposed 0.04-acre forest wetland habitat conversion and 0.17-acre wetland fill would take place across two local watersheds containing an estimated 500 wetland acres combined (USFWS 1982). The proposed impacts would affect less than 0.05 percent of mapped wetland extent in the general area. Under the authority of the CWA, the USACE and TDEC ensure maintenance of the chemical, physical, and biological integrity of national or state waters, including wetlands. The USACE and TDEC would require mitigation for the 0.17-acre wetland fill via purchase of wetland credits from Tennessee’s approved wetland in-lieu-fee program. This compliance mechanism ensures replacement of lost wetland resources through wetland enhancement or creation elsewhere within the watersheds’ basin, such that no net loss of wetland function results. Similar jurisdictional authority and compliance measures for forested wetland habitat conversion could be required at agency discretion. Therefore, TVA would comply with all regulatory requirements to ensure the proposed wetland disturbances result in less than minimal adverse impacts to the aquatic environment and the objective of the CWA is met.

TVA would obtain approval from USACE/TDEC for the proposed wetland fill and habitat conversion. The approval process would ensure the stepwise approach of wetland avoidance, minimization, and mitigation has been followed, resulting in only unavoidable, minimal, or compensated wetland impacts.

Therefore, in consideration of the small acreage of unavoidable long-term and short-term impacts to wetlands, use of BMPs, and the commitment to mitigate for impacts as required, impacts to wetlands are considered minor.

3.11 Visual Resources

3.11.1 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 3.13.

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 is 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.

The project area is comprised of a mix of forest and grassland on slightly rolling to mainly flat terrain. In the foreground, the viewshed includes trees, TLs, roadways, agricultural fields and rural residential properties (see Figure 1-5). There are several TVA high-voltage TLs present in the study area, including the Sequoyah-Hiwassee 500-kV TL which aligns east to west near the northern portion of project area. This TL is approximately 500 feet from, and parallels the site proposed for the SOC. Additionally, there are two 69-kV TL, which once were connected to the old Georgetown Substation located approximately 0.75-mile to the southwest near the intersection of State Highways 60 and 58.

The viewshed of certain facilities, such as churches, schools and outdoor recreation sites can be vulnerable to visual modifications in the surrounding landscape. Within the foreground of the proposed project area, there are four cemeteries and two churches

(Figure 3-7), all of which are located near the existing TL proposed to be rebuilt under Alternative B. There are no sensitive visual receptors within the foreground of the SOC or the proposed new TL. The middleground contains 38 cemeteries, 21 churches, six schools, and one recreational area. The background includes 268 potentially sensitive visual receptors, including 110 cemeteries, 102 churches, 28 parks/ recreational areas, and 28 schools.

Within the project area and surrounding landscape, the composition of vegetation and the patterns of vegetation are the prominent features and consist of a variety of deciduous and evergreen trees and agricultural fields. Scenic attractiveness of the project area is considered common, and scenic integrity is moderate due to the large amount of undisturbed forested lands.

The rating for scenic attractiveness is due to the ordinary or common visual quality in the foreground, middleground and background (Table 3-10). The forms, colors and textures in the affected environment 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 slight human alteration including agricultural 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 affected environment is good.

Table 3-10. Visual Assessment Ratings for Existing Affected Environment

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

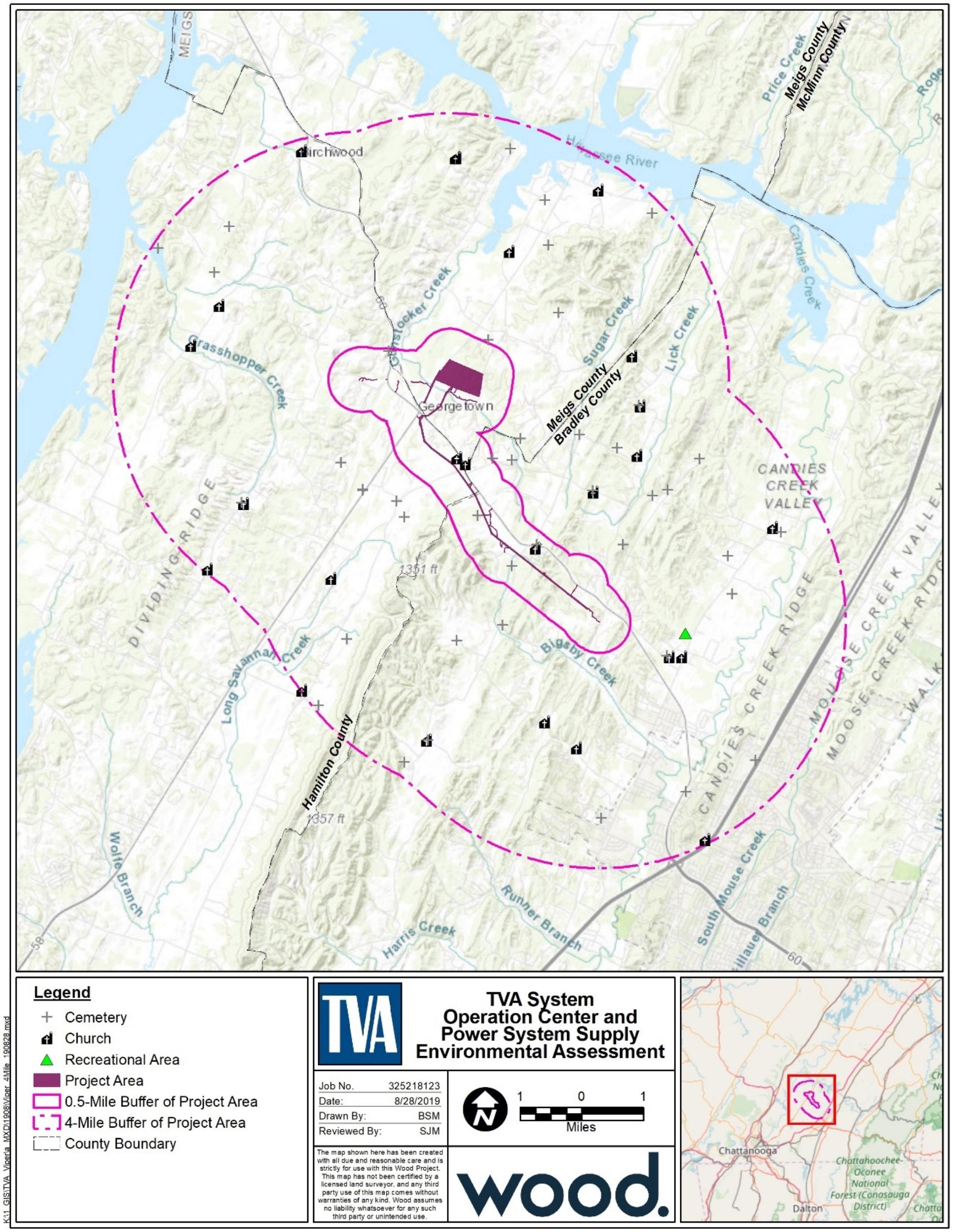


Figure 3-7. Sensitive Visual Receptors within Foreground and Middleground of Project Area

3.11.2 Environmental Consequences

3.11.2.1 Alternative A – The No Action Alternative

Under the No Action Alternative, construction, operation, and maintenance of the proposed project components would not occur. As such, no impacts to visual resources would occur as a result of TVA actions associated with the proposed project.

3.11.2.2 Alternative B – TVA Constructs a New Standalone SOC, Gunstocker Creek 161-kV Substation, and Associated 161-kV Transmission Line

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.

The Action Alternative would result in visual discord during the construction phase of the proposed project components due to an increase in personnel and equipment coupled with disturbances of the site characteristics. However, this would be contained within the immediate vicinity of the construction activities and would only last until all activities have been completed by TVA. Sensitive viewing receptors located along this portion of the project area would experience some minor visual discord during construction, but there would be no change in the aesthetics once that phase is complete.

The proposed SOC would be constructed on lands that are currently undeveloped and predominantly forested. The building would consist of two independent structures (the SOC and the Technical Support Building) separated by concrete wall panels. Exterior building materials would consist of metal composition wall panels with curtain wall glazing on the Technical Support Building and masonry veneer at the SOC. The tallest portion of the building complex would be the SOC at 42 feet high. Lighting on the exterior of the SOC would consist of a combination of 25-foot-tall pole-mounted area lighting fixtures and wall mounted wallpack type lighting fixtures mounted at a height of 17 feet around the entire perimeter. All exterior lighting fixtures are expected to have a 0 percent up-light and would be photocell controlled. Light trespass would be kept to a minimum at all property boundaries and lighting fixture placement would be designed to eliminate glare on adjoining properties. Based on the renderings there would also be a 190-foot tall communications tower installed adjacent to the building complex, which would be taller than the buildings and extend above the tree line. Therefore, this feature is expected to be visible to others outside of the immediate project area.

Construction of the SOC and associated features under this alternative would result in effects to existing scenic resources. Removal of existing trees and site grading and surfacing would affect the scenic integrity of the site as it would alter the natural landscape character. Under this alternative, there would be a moderate visual change in the landscape at the foreground viewing distance due to the change from a natural landscape to one of light industrial development. The heavily forested sections of the proposed SOC property to the south and east of the building would remain undisturbed, and as such would provide a visual buffer to any motorists or residents to the east of the site along Old Highway 58. The greatest impact would be experienced in the foreground by nearby residents and motorists along State Highway 58 near the main entrance. In order to minimize the visual impacts, the proposed site design includes the planting of evergreen and deciduous trees along the perimeter of the site and along the main entrance road (Figures 3-8 and 3-9). Additionally, based on the visual renderings of the proposed action (Figures 1-2 and 3-10), the buildings would be at or near the same height as the surrounding trees. As such the only project feature expected to be visible at the middleground would be the communications tower. However, at this distance, the details of the tower are expected to be weak as they tend to merge into larger patterns.

The existing TLs and associated structures already contribute some minor visual discord with the landscape. These elements contribute to the landscape's ability to absorb negative visual change. Additionally, vegetative areas maintained around the SOC building and adjacent to the TL would provide screening in the foreground and middleground, allowing the landscape to absorb the minor visual changes associated with the proposed action.

The proposed Gunstocker Creek Substation and the new segment of TL between the proposed SOC and Gunstocker Creek Substation would be visible in the foreground by motorists where the TL would cross State Highway 60. However, observers would be transient motorists who would only be exposed to these features for short periods of time.

The new TL segment and substation are not expected to be visible in the middleground and background as the features would be buffered by the surrounding vegetation. The dominant shapes and colors in the landscape include green and brown from the vegetation and vertical lines of trees and existing transmission structures against the horizon. The proposed TL and substation would add a small number of discordantly contrasting elements and colors to the existing landscape, which would be greatest in the foreground to passing motorists, although color and features would be less noticeable in the middleground and background. Therefore, no sensitive visual receptors are anticipated to be impacted by the new TL.

Figure 3-8. Visual Rendering of Action Alternative: Eye Level View from the Northwest Corner of System Operations Center Site

Figure 3-9. Visual Rendering of Action Alternative: Eye Level View of the Main Entrance from the Southwest Corner of the System Operations Center Site

Figure 3-10. Visual Rendering of Action Alternative: Elevated View from the Southwest Corner of the System Operations Center at Main Entrance

The permanent removal of woody vegetation within the new TL ROW would create a visible corridor in addition to the overhead portion of the TL conductors. Management of vegetation within the TL corridors would be necessary to ensure access to structures and to maintain an adequate distance between TL conductors and vegetation. Adequate ground clearance is important to account for construction, design, and survey tolerances (e.g., conductor sagging). As described in Chapter 2, after tall trees and other tall-growing vegetation are removed from the ROW during construction, routine management of vegetation within the cleared ROW would include an integrated vegetation management approach designed to encourage the low-growing plant species and discourage tall-growing plant species. Along the new segment of TL, the view of the corridor from local roadways would be limited by the natural density of the tree growth near the TL alignments. Except where it crosses a roadway, the proposed new segment of TL would largely avoid disruptions to the scenery and landscape for local residents and motorists by being located in forested, undeveloped land.

For the segment of the TL between the proposed Gunstocker 161-kV Substation and existing Sequoyah-Hiwassee No. 1 161-kV TL, the proposed visual changes are limited to a change in tower structures. Because this would occur within an existing TL corridor, there would be no changes to the overall aesthetics of this portion of the project.

While Alternative B would contribute to a minor decrease in visual integrity of the landscape, it is not expected that the existing scenic class would be reduced two or more levels, which is the threshold of significance of impact to the visual environment. In the foreground, the scenic attractiveness would remain common; however, the scenic integrity at the SOC would be reduced to low (Table 3-11). The forms, colors, and textures of the landscape that make-up the scenic attractiveness would be affected due to the construction of the SOC, but still remain common or ordinary. Impacts to scenic integrity are anticipated to be greatest in the foreground for motorists on the nearby roads and adjacent landowners; however, these are mitigated by the landscaping plans and undisturbed portions of forest around the site. There would be no change in the ratings for the middleground and background. Based on the criteria used for this analysis, the scenic value class for the affected environment after the proposed modifications would remain classified as good and therefore impacts would be minor.

Table 3-11. Visual Assessment Ratings for Affected Environment Resulting from Action Alternative

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

3.12 Noise and Vibration

3.12.1 Affected Environment

3.12.1.1 Noise

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 (L_{dn}), 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 L_{dn} of 35 and 50 dB, whereas higher-density residential and urban areas background noise levels range from 43 dB to 72 dB (USEPA 1974).

Background noise levels greater than 65 dBA can interfere with normal conversation, watching television, using a telephone, listening to the radio, and sleeping. Common indoor and outdoor noise levels are listed in Table 3-12.

Table 3-12. Common Indoor and Outdoor Noise Levels

Common Outdoor Noises	Sound Pressure Levels (dB)	Common Indoor Noises
	110	Rock Band at 5 meters (16.4 feet)
Jet Flyover at 300 meters (984.3 feet)		
	100	
		Inside Subway Train (New York)
Gas Lawn Mower at 1 meter (3.3 feet)		
	90	
		Food Blender at 1 meter (3.3 feet)
Diesel Truck at 15 meters (49.2 feet)		Garbage Disposal at 1 meter (3.3 feet)
	80	
		Shouting at 1 meter (3.3 feet)
Gas Lawn Mower at 30 meters (98.4 feet)	70	Vacuum Cleaner at 3 meters (9.8 feet)
Commercial Area		Normal Speech at 1 meter (3.3 feet)
	60	
		Large Business Office
	50	Dishwasher Next Room
Quiet Urban Daytime		
	40	Small Theater, Large Conference Room
Quiet Urban Nighttime		Library
Quiet Suburban Nighttime		
	30	
		Bedroom at Night
Quiet Rural Nighttime		Concert Hall (Background)
	20	
		Broadcast and Recording Studio
	10	
		Threshold of Hearing
	0	

Source: Arizona Department of Transportation 2008

3.12.1.1.1 Noise Regulations

The Noise Control Act of 1972, along with its subsequent amendments (Quiet Communities Act of 1978, USC 42 4901–4918), delegates authority to the states to regulate environmental noise and directs government agencies to comply with local community noise statutes and regulations. There is no federal, state, or locally established quantitative noise-level regulations specifying environmental noise limits in Meigs County or the surrounding counties. However, the USEPA noise guideline recommends outdoor noise levels do not exceed L_{dn} 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 L_{dn} of 65 dBA or less to be compatible with residential areas (HUD 1985).

3.12.1.1.2 Background Noise Levels

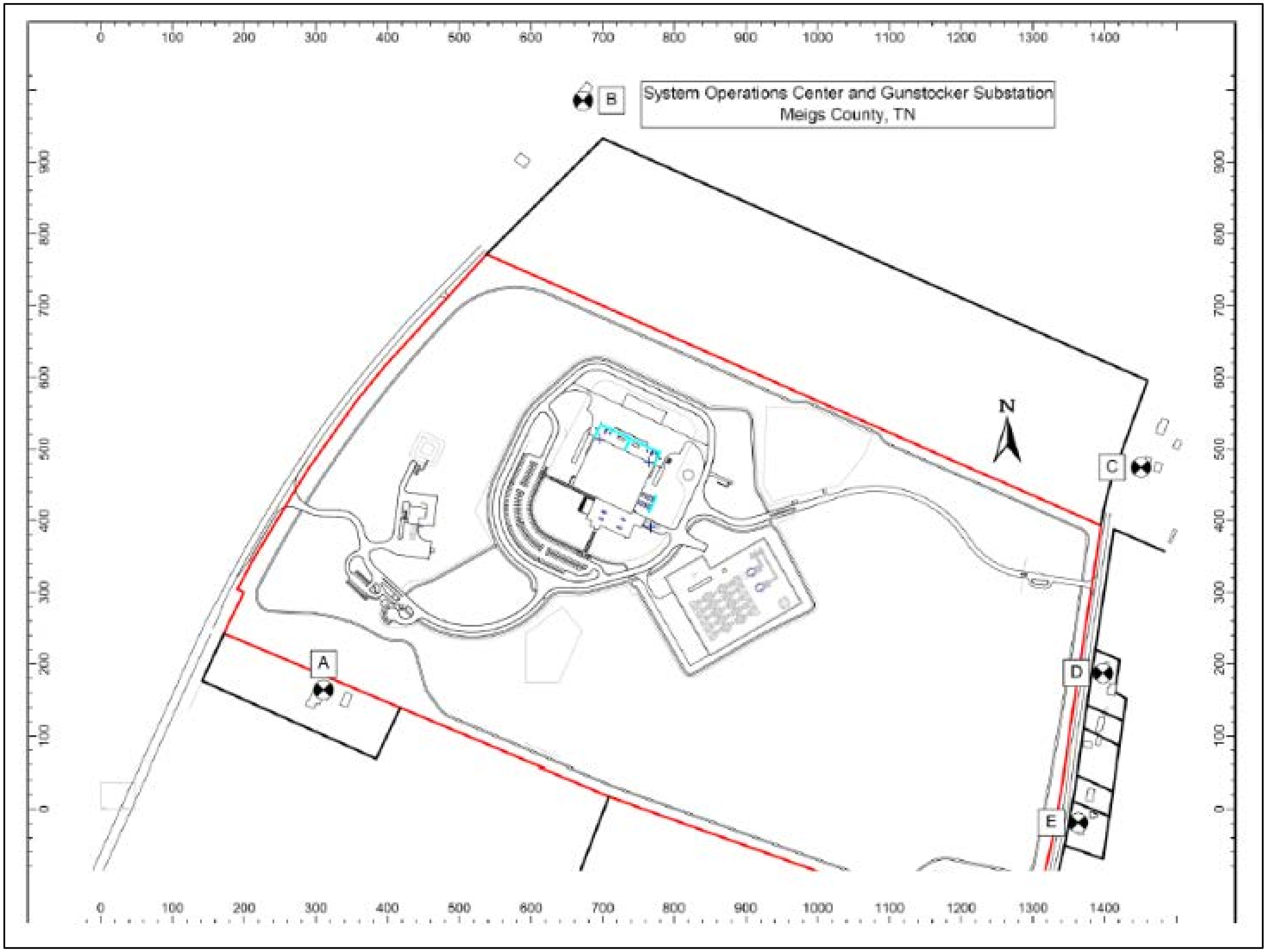
The proposed SOC site is located in a rural area, with ambient noise characterized by occasional vehicle noise, vegetation rustling in the breeze, and other natural noises. Sensitive noise receptors include residences, parkland, churches and schools. Sensitive receptors in the vicinity of the project area were identified in a noise analysis conducted for this project and consist of residences located proximate to the property boundary, identified as receptors A through E in Figure 3-11. During the noise analysis conducted by Ostergaard Acoustical Associates (Ostergaard 2019) in March 2019, background noise measurements were taken at the location of these receptors along the east, southwest, and northern boundaries of the proposed SOC site. Existing background sound levels were generally low, with nighttime levels being lower than morning and afternoon sound levels at all locations. The A-weighted background noise level at the sensitive receptors in the vicinity of the SOC site ranged from 24 to 27 dBA during nighttime hours and from 31 to 43 dBA during daytime hours.

3.12.1.2 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).

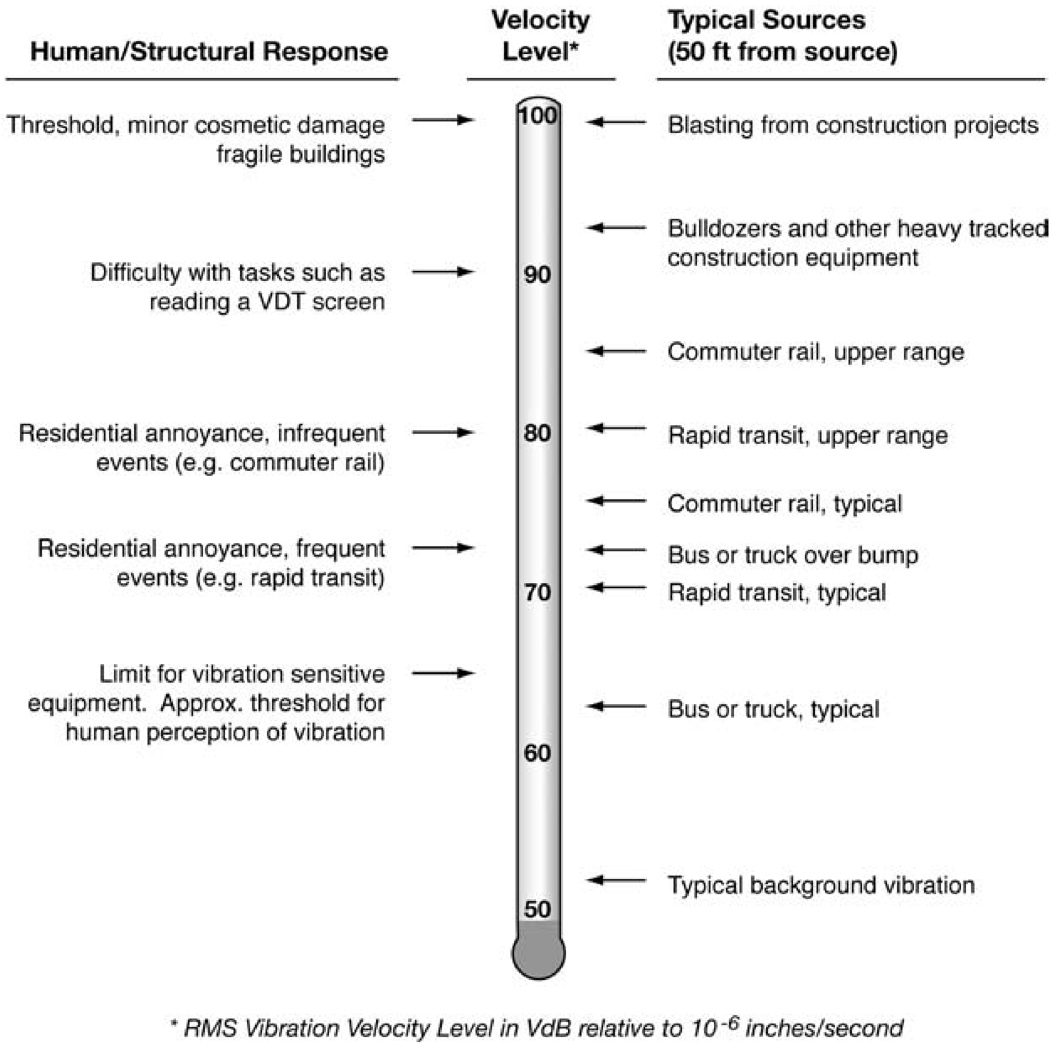
During construction of the proposed SOC and associated substation, most of the vibration sources would consist of equipment that produces continuous vibration, including excavation equipment, tracked vehicles, and heavy machinery operation. However, single-impact vibration sources such as blasting may also be used. If required, the blasting operations would be primarily concentrated around the substation area.

The Federal Transit Authority (FTA) 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 3-12 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 (FTA 2006). There are no residences or privately-owned structures located within 50 feet of the substation footprint; the nearest residence, receptor D in Figure 3-11, is more than 1,300 feet east of the proposed substation.



(Source: Ostergaard 2019)

Figure 3-11. Noise-Sensitive Receptors in the Vicinity of the Proposed System Operations Center Site



Source: FTA 2006

Figure 3-12 Typical Levels of Ground-Borne Vibration

3.12.2 Environmental Consequences

3.12.2.1 Alternative A – The No Action Alternative

Under the No Action Alternative, construction, operation, and maintenance of the proposed project components would not occur. As such, no additional impacts associated with noise emissions or vibration would occur as a result of the proposed development of the SOC or the new TL. However, routine periodic vegetation maintenance would be conducted along the existing TL ROWs. Noise emissions would occur in conjunction with periodic cutting and maintenance activities as described in the final programmatic EIS (see Section 2.5.2) (TVA 2019b). Therefore, because such maintenance activities are routine and are a component of on-going ROW vegetation management programs, overall impacts from noise and vibration under this alternative are considered minor.

3.12.2.2 Alternative B – TVA Constructs a New Standalone SOC, Gunstocker Creek 161-kV Substation, and Associated 161-kV Transmission Line

3.12.2.2.1 System Operations Center Site

Construction Noise

Under Alternative B, construction activities at the proposed SOC site, including the Gunstocker Creek Substation, would last approximately three years. Work would occur during daytime hours, between 6:30 am and 5:30 pm, up to seven days a week. During the construction phase, noise would be generated by a variety of construction equipment including feller-bunchers, bulldozers, excavators, graders, pile-drivers, augers, and rollers. In addition, explosive blasting may be utilized to break rock for excavation within the construction site. Typical noise levels from this construction equipment is expected to be 85 dBA or less at a distance of 50 feet from the 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 receptor to the SOC site's primary construction area, where structures would be built and the majority of noise would be produced, is a single-family residence located approximately 460 feet southwest of the proposed SOC site, along the southwest property boundary (Receptor A in Figure 3-11). Based on straight line noise attenuation, it is estimated that noise levels from most construction equipment (85 dBA or less at a distance of 50 feet) would attenuate to 65.7 dBA at this residence, slightly above HUD's recommended noise level of 65 dBA for residential areas. Other residences in the vicinity would typically experience construction noise levels ranging from 54.7 to 56.6 dBA.

On occasion, sensitive receptors may experience construction noise levels greater than those described above. For example, during construction requiring the use of pile-drivers or blasting at the primary construction area, it is estimated that noise levels would attenuate to 75.7 dBA at the nearest residence, and 64.7 to 66.6 dBA at other residences in the vicinity. In addition, an 8-foot wide gravel security path is proposed around the perimeter of the SOC site. As the security path would be located near the property line, the tree clearing and associated construction activities for the path would be located closer to the sensitive receptors than the primary construction area. At the closest point, the proposed security path is located approximately 125 feet from the nearest sensitive receptor, a single-family residence located east of the SOC site on Old Highway 58 (Receptor D in Figure 3-11). Based on straight line noise attenuation, maximum noise levels for equipment used during path construction would be expected to attenuate to approximately 77.0 dBA at the closest residence, with noise levels ranging from 60.3 to 75.5 dBA at other nearby residences.

Although noise levels at nearby residences may periodically surpass the HUD's recommended L_{dn} guidance of 65 dBA for residential areas, the highest noise levels, like those associated with pile-driving, blasting, and perimeter security path construction, 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 SOC site are anticipated to be minor.

Operational Noise

The predicted sound levels that would be emitted from the SOC site during operation were calculated in an acoustical study (Ostergaard 2019). As sound emissions would vary depending on the equipment in use, three different operational conditions were analyzed: typical operation with all equipment in continuous use, operation during intermittent generator use, and operation only during emergency power failure. Noise generating equipment and structures of acoustical importance are shown in Figure 3-13. Solid enclosure walls are shown in light blue.

Continuous sources of noise that were evaluated in the acoustical analysis for typical operating conditions include:

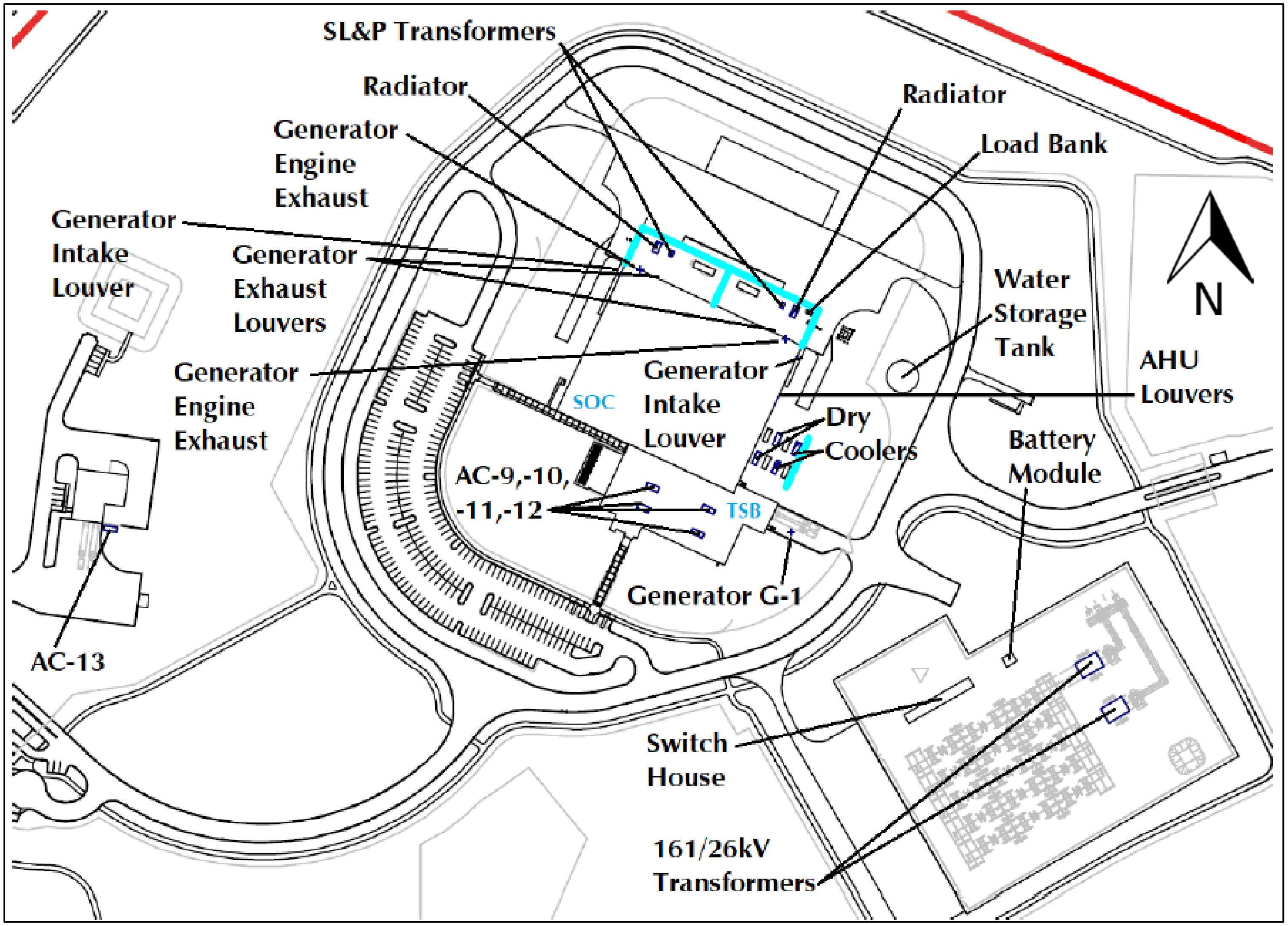
- Four dry coolers located in the east equipment yard (eight total dry coolers are proposed, but a maximum of four would operate simultaneously);
- Outside air intake louvers for the air handling unit, located on the east façade of the SOC;
- Four AC units located on the rooftop of the Technical Support Building;
- Switching Station transformers; and
- Two electrical transformers located in the north equipment yard.

Figure 3-14 displays the results of the acoustical study for the worst-case steady sound emissions from the SOC site with all continuously operating equipment in use. As shown in Table 3-13, noise levels at nearby sensitive receptors are predicted to fall between 30 and 34 dBA during continuous operation. These noise levels are consistent with typical background day-night noise levels for rural areas, and below the USEPA's L_{dn} guideline of 55 dBA. Additionally, when compared to existing nighttime background noise levels, the noise levels associated with continuous operation represent an increase of 5 to 8 dBA. Noise that does not exceed nighttime background noise by more than 10 dBA is typically perceived as minor and less likely to result in annoyance to adjacent residents.

Table 3-13. Noise Levels at Sensitive Receptors in Vicinity of System Operations Center Site

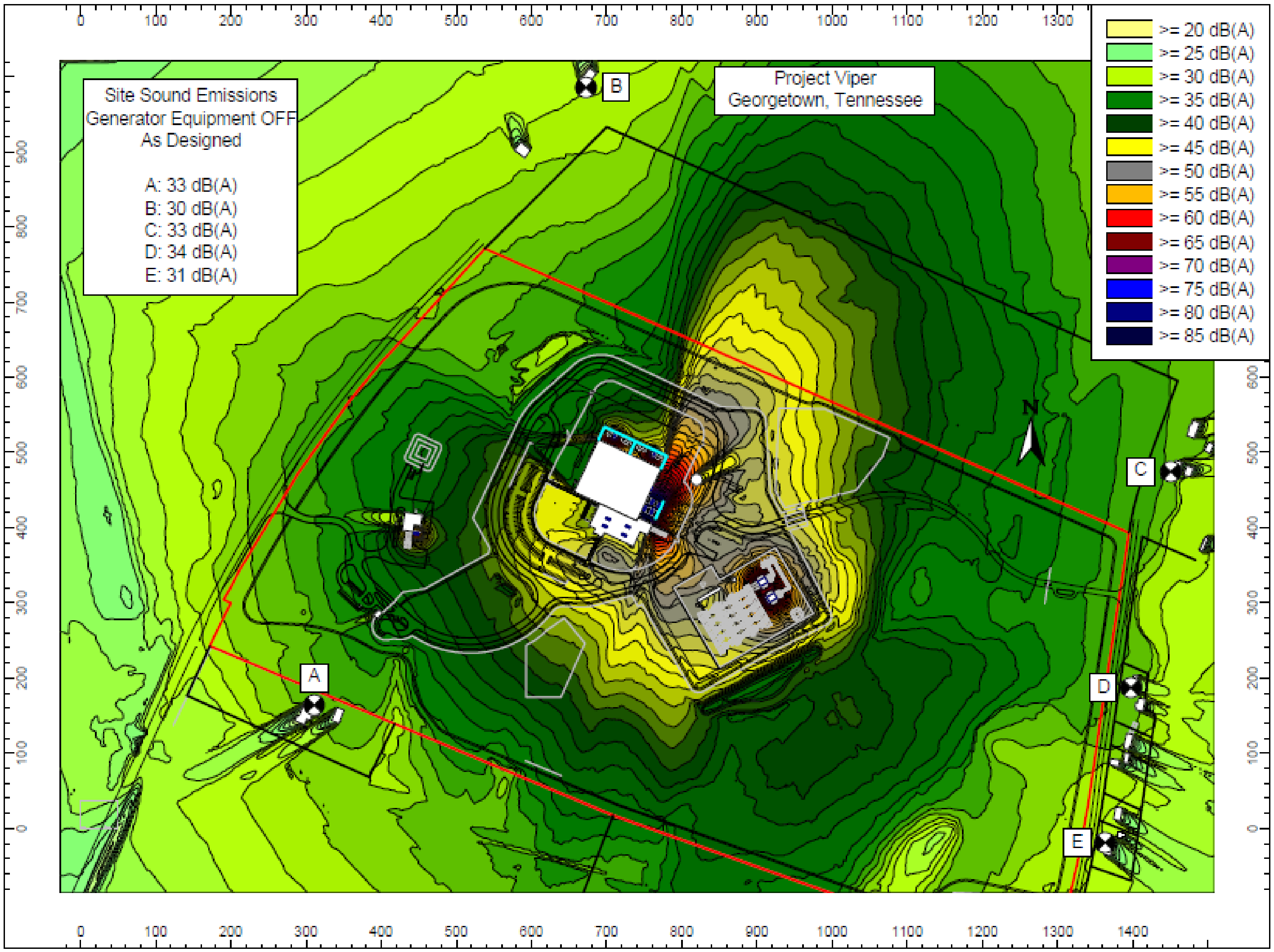
	Noise Level (dBA)				
Receptor	**Existing Nighttime Background Level**	**Existing Daytime Background Level**	**During SOC Continuous Operation**	**During SOC Intermittent Generator Use**	**During SOC Emergency Operation**
A	27	37	33	49	49
B	24	43	30	53	53
C	26	31	33	42	45
D	26	31	34	41	45
E	26	31	31	36	44

Source: Ostergaard 2019



(Source: Ostergaard 2019)

Figure 3-13. System Operations Center Noise Generating Equipment and Structures of Acoustical Importance



(Source: Ostergaard 2019)

Figure 3-14. System Operations Center Noise Emission Levels at Sensitive Receptors – Continuous Operation

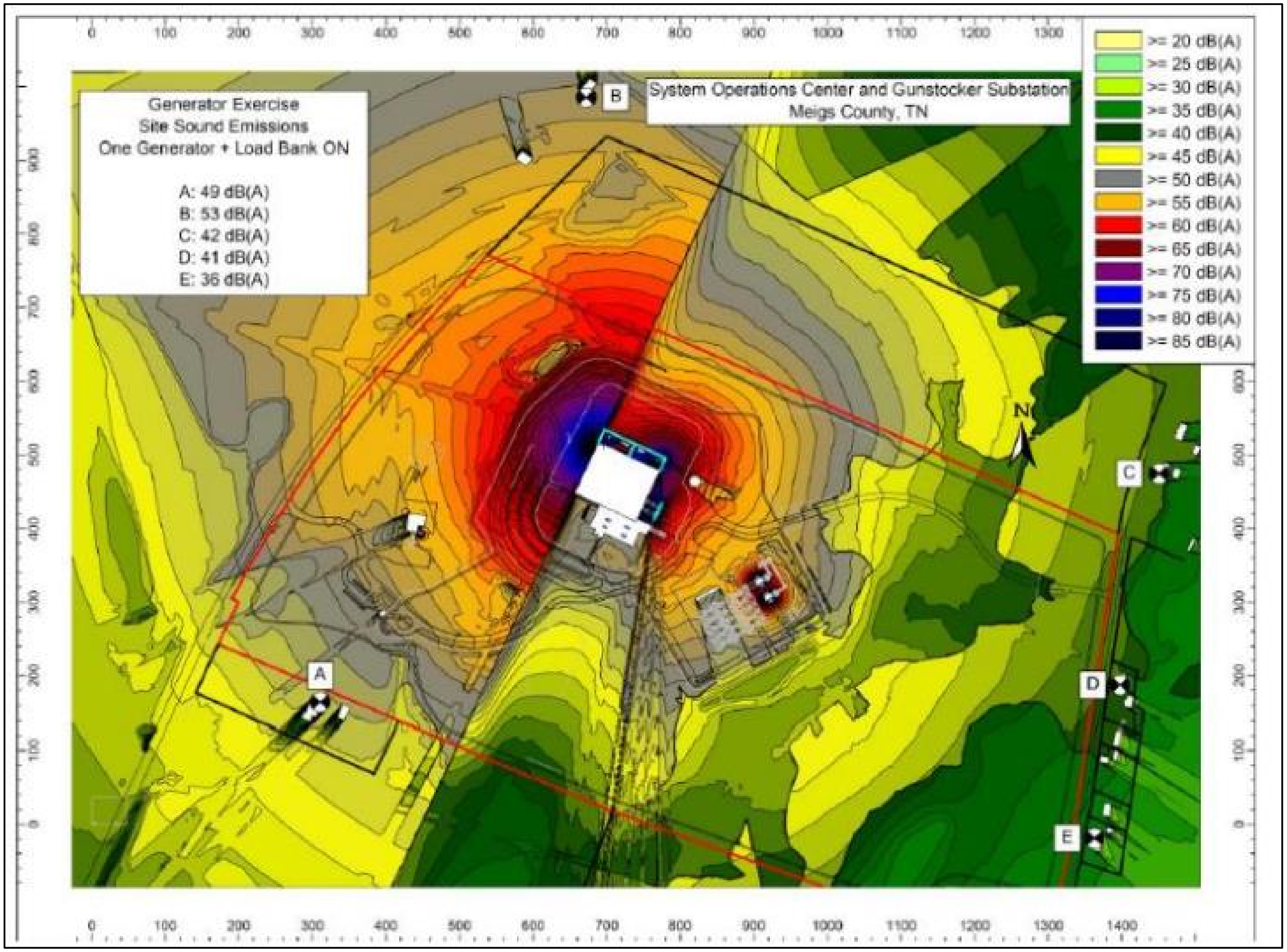
The second operational scenario modeled the worst-case sound emissions from the site during intermittent generator exercising, as depicted in Figure 3-15. In addition to all continuous noise sources described previously, this scenario includes noise contributions from one of two generators located in the SOC facility interior, as well as one associated radiator and the load bank located in the north equipment yard (see Figure 3-13). These conditions represent a scenario in which one of the facility's generators is being periodically exercised under load. This is expected to be an intermittent occurrence and would only be scheduled to occur during daytime hours. As shown in Table 3-13, noise levels at the sensitive receptors are predicted to fall between 36 and 53 dBA during these intermittent periods of generator testing. Although noise emissions at some sensitive receptors would be approximately 10 to 12 dBA above existing daytime background levels, they would be under the USEPA's L_{dn} guideline of 55 dBA.

Figure 3-16 provides the results of modeling the worst-case sounds emissions from the SOC site under the third scenario, representing emergency operating conditions during a power failure. In this scenario, in addition to all continuous noise sources, both interior generators and associated radiators would operate, as well as outdoor generator G-1, located south of the east equipment yard (Figure 3-13). The facility would be powered entirely from backup systems and the load bank would not be used. While there is potential for this condition to occur during the night, this is expected to be an infrequent occurrence and only occur in the event of an emergency. As shown in Table 3-13, noise levels at the sensitive receptors are predicted to fall between 44 and 53 dBA during periods of emergency operation at the SOC facility. Similar to the second scenario, while these noise levels are notably higher than existing background levels, they would be infrequent and would remain below the USEPA's L_{dn} guideline of 55 dBA.

As noise levels from typical continuous operation are anticipated to be less than 10 dBA higher than current nighttime background levels at nearby residences, direct noise impacts from the routine operation of the SOC are anticipated to be minor. Impacts associated with infrequent noise emissions from periodic generator testing and emergency situations are expected to be moderate but short-term.

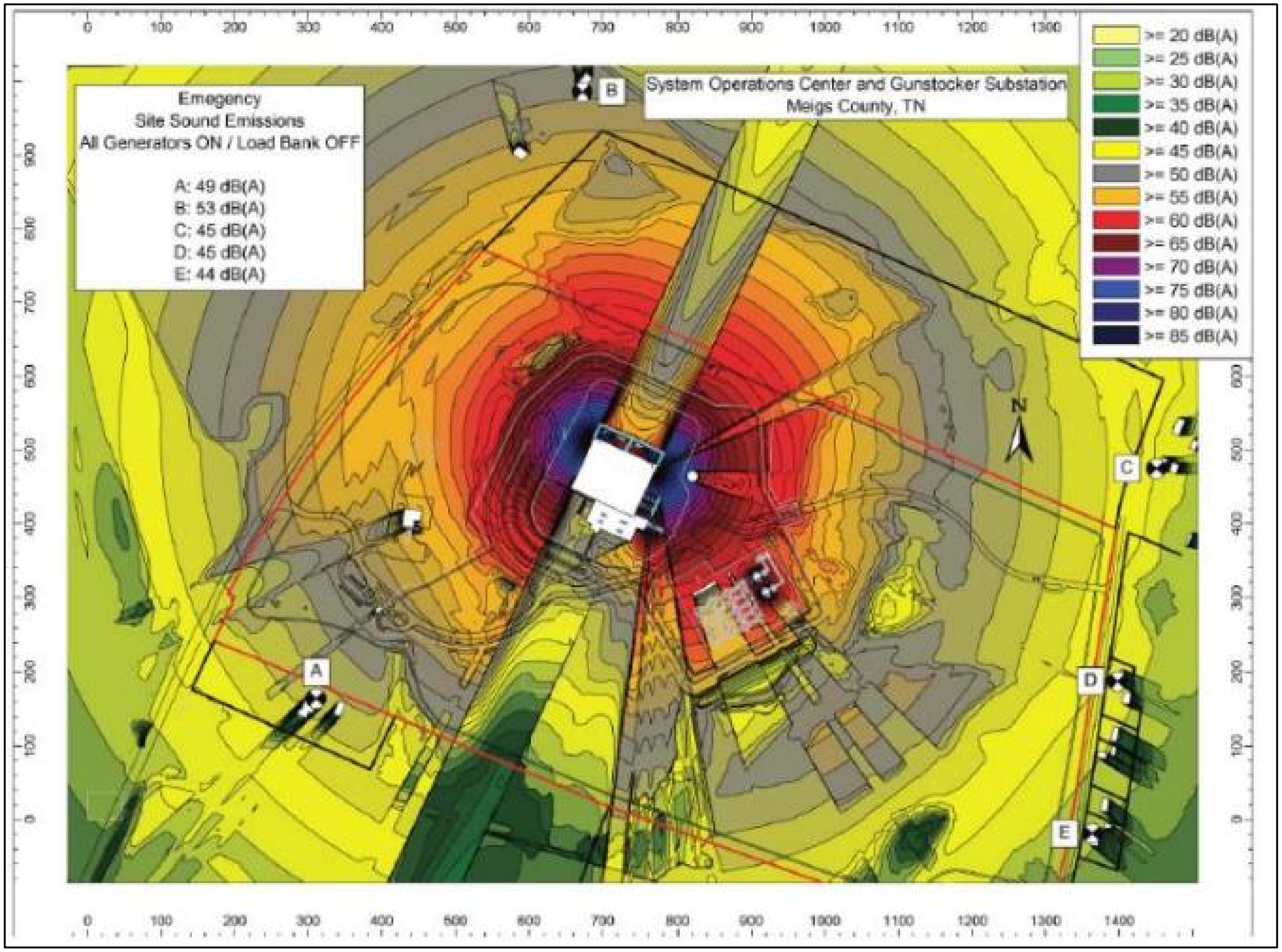
There is also a potential for indirect noise impacts associated with an increase in vehicle traffic from employees commuting to the SOC. Employee traffic would consist of approximately 200 vehicles and would occur twice per day as workers are entering and leaving the project site. However, as primary access to the SOC facility would be provided via Highway 58, which currently has an annual average daily traffic count of more than 4,000, the addition of 200 employee vehicles is anticipated to have minor impacts on traffic volume, and consequently, traffic noise.

The SOC would also include a helicopter pad, with operations including the occasional use of TVA owned or leased helicopters for transport of TVA employees on official business, and of non-TVA or governmental representatives performing functions directly related to TVA's mission. Additionally, the pad could be used by non-TVA helicopters, such as EMS, National Guard, or the State of Tennessee, during TVA-related emergency operations or disaster response situations, although this would be very rare. Noise levels from helicopter operation could range between 83 and 105 dBA at distances of 150 to 300 feet, depending on the helicopter size and manufacturer. While the helicopter noise would dissipate with distance, there could be brief periods of dramatic noise increase for residents near the flight path. However, helicopter use would be infrequent, short-term, and generally limited to daylight hours.



(Source: Ostergaard 2019)

Figure 3-15. System Operations Center Noise Emission Levels at Sensitive Receptors – Intermittent Generator Exercising



(Source: Ostergaard 2019)

Figure 3-16. System Operations Center Noise Emission Levels at Sensitive Receptors – Emergency Operation

Vibration

During construction activities, the introduction of energy into the site from sources such as heavy equipment or explosive blasting could 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 over 1,000 feet from the proposed substation footprint and assuming the most sensitive structures are present, the use of an explosive below 264 pounds per delay would result in a very low risk for damage from vibration.

Should blasting be necessary, TVA, in conjunction with the blasting contractor, will 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 264 pounds per delay) by measuring the vibrations at defined distances caused by known weights of explosives and calculating a site-specific prediction equation. A pre-blast survey will be conducted prior to the start of any blasting and seismograph monitoring systems will be installed at required locations. Prior to blasting, a layer of soil will be left above the rock surface to prevent fly rock and promote fracturing. Due to the temporary nature of the blasting operations, implementation of the blasting plan, and distance to nearest receptors, vibration effects are expected to be temporary and minor.

3.12.2.2.2 161-kV Transmission Line

Construction Noise

Along the approximately one-mile section of new TL construction, all trees and most shrubs would be removed from the entire width of the ROW to maintain adequate clearance between tall vegetation and TL conductors, as well as to provide access for construction equipment. Additionally, some clearing may be required along portions of the existing 4.25-mile ROW where vegetation has encroached upon the previously cleared ROW. Equipment used during ROW clearing would include chain saws, skidders, bulldozers, tractors, and/or low ground pressure feller-bunchers. Equipment used during the construction phase of both the new TL and the replacement of 4.25 miles of existing TL would include trucks, truck-mounted augers and drills, excavators, as well as 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 (Bolt et al. 1971). 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. Use of track drills is not expected to be widespread.

TL-related construction noise levels would likely exceed background noise levels by more than 10 dBA at distances from within 500 feet in developed areas to over 1,000 feet in rural areas with little development. These distances are without the use of track drills; drilling activities could increase the distances by an additional 500 feet. A 10 dBA increase is typically perceived as a significant increase over the existing noise level and could result in annoyance to adjacent residents. The residential noise level guideline of 55 dBA could also be temporarily exceeded for residences near construction activities, especially those located immediately adjacent to the existing ROW. However, construction activities would be limited to daylight hours. Because of the sequence of construction activities, construction noise at a given point along the TL connections would be limited to a few periods of a few days each. Because of the short construction period, noise-related effects are expected to be temporary and minor.

Operational and Maintenance Noise

Under certain wet weather conditions, high-voltage TLs, such as the proposed 161-kV TL, 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 small increase in the background noise levels due to corona noise is not expected to result in annoyance to adjacent residents.

Periodic maintenance activities, particularly vegetation management, would produce noise comparable to that of some phases of TL construction. Vegetation control methods or tools and their appropriate uses for various TL ROW conditions have been described in TVA's final Transmission System Vegetation Management programmatic EIS (TVA 2019b). These methods include manual (i.e. chainsaw, machete, brush hooks, axes, and bush blades), mechanical cutting or trimming (i.e. mower or brush hog, bulldozer, track-hoe, skid steer, feller-buncher, mulcher/chipper, tracked equipment, helicopter tree saw, and aerial lifts) and herbicide spraying and growth regulators. Noise from this equipment, particularly from bush-hogging or helicopter operation, would be loud enough to be audible to some nearby residents. It would, however, be of very short duration and infrequent occurrence. Therefore, noise-related effects of TL operation and maintenance would be infrequent and minor.

3.13 Archaeological and Historic Resources

3.13.1 Affected Environment

Federal agencies are required by Section 106 of the NHPA and by NEPA to consider the possible effects of their undertakings on historic properties. Undertaking means any project, activity, or program, and any of its elements that has the potential to effect historic properties that is under the direct or indirect jurisdiction of a federal agency or is licensed or assisted by a federal agency. To determine an undertaking's possible effects on historic properties, a four-step review process is conducted. These steps are:

1) Initiation (defining the undertaking and the APE, and identifying consulting parties);
2) Identification of historic properties in the APE;
3) Assessment of effects to historic properties; and
4) Resolution of adverse effects by avoidance, minimization, or mitigation.

Throughout the Section 106 process, the agency must consult with the appropriate SHPO (in this case the Tennessee SHPO), federally recognized Indian tribes that have an interest in the region, and any other party with a vested interest in the undertaking. TVA is coordinating its Section 106 compliance with NEPA's requirement to assess adverse impacts on cultural or historical resources.

A project may have effects on a particular historic property that are not adverse, if those effects do not diminish the qualities of the property that identify it as eligible for listing on the National Register. However, if the agency determines (in consultation) that the undertaking's effect on a historic property would diminish any of the qualities that make the property eligible for the National Register (based on the criteria for evaluation at 36 CFR Part 60.4), the effect is said to be adverse. Examples of adverse effects would be ground disturbing activity in an archaeological site, or erecting structures within the viewshed of a historic building in such a way as to diminish the structure's integrity of feeling or setting. Adverse effects must be resolved through avoidance, minimization, or mitigation. Adverse effects to archaeological sites are typically mitigated by means of excavation to recover the important scientific information contained within the site. Mitigation of adverse effects to historic structures sometimes involves thorough documentation of the structure by compiling historic records, studies, and photographs. Agencies are required to consult with SHPOs, tribes, and others throughout the process.

With regards to historic properties, the undertaking's APE is taken as the affected environment for purposes of this EA. APE is defined at 36 CFR part 800.16(d) (a section from the federal regulations implementing Section 106 of the National Historic Preservation Act) as "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist." TVA determined the APE for archaeological resources to be the 166-acre parcel for the proposed SOC where ground disturbance could occur. Additionally, TVA determined the APE to be the following:

- The 4.25-mile-long by 100-foot-wide existing ROW, and all associated access roads;
- The one-mile-long by 100-foot-wide new TL ROW;
- The 1.42-mile-long by 20-foot-wide access roads;
- The 1.4-mile-long by 50-feet-wide waterline; and
- 2.5-acre area where ground disturbance could occur in association with the tower extension and prop structure.

The APE also includes a 0.5-mile area surrounding the TL corridors within the line of sight of the project area where viewshed effects could occur. For the 26-kV back-up electrical feed, TVA determined the APE to be the footprint of ground disturbing activity including the proposed new utility pole structures and the proposed underground feed to the site.

Human occupation in east Tennessee began at the end of the Ice Age with the Paleo Indian Period (13,500 to 11,000 years before present, or "B.P."). In the southeastern U.S., pre European contact archaeological chronology is generally broken into four broad time periods: following the Paleo-Indian Period are the Archaic (11,000 to 3,000 B.P.), Woodland (3,000 to 1,100 B.P.), and Mississippian (1,100 to 500 B.P.) periods. 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. These habitation sites can vary from small single homesteads to large Civic-Ceremonial centers such as the one on Hiwassee Island that characterize the Mississippian period. Specialized campsites tend to be located on older alluvial terraces and in the uplands. The first contact between native Southeastern groups and the Europeans occurred during the sixteenth century Hernando de Soto and Juan Pardo expeditions.

By the eighteenth century, the region was dominated by Overhill Cherokee settlements including those of Great Talequah and Tanasi. During the late 18th and early 19th centuries, the westward expansion of Euro-American settlements led to the decline of the Overhill towns. The Cherokee were forced to cede most of their lands through a series of treaties. As a result of the Treaty of New Echota, the Tennessee Legislature created several new counties including Bradley and Meigs and led to the expansion of Hamilton County. From May 1838 to March 1839, the federal government used military force to relocate American Indians to Indian reservations in Oklahoma including Cherokees and Creeks that lived in the project area. During the forced removal, Fort Cass/Cherokee Agency military depot at present day Charleston, Tennessee, served as a deportation holding area. Nearby Blythe's Ferry served as a river crossing on the removal route. Mixed-race Cherokee Indians were also forced to leave the area, including Captain George "Cherokee" Fields who owned a 1,500-acre farm at the northern end of the project area. His dwelling would later possibly serve as a trading post for the surrounding "Georgetown" community.

During the Antebellum period farmers chiefly raised hogs, wheat, oats, corn, and potatoes. In the 1850's, the East Tennessee and Georgia Railroad reached the town of Cleveland which resulted in rapid growth of the town. Although several major military battles were fought at Chattanooga during the Civil War, the project area experienced only minor skirmishes. After the Civil War, cash crops such as tobacco as well as timber sales and manufacturing became increasingly important to the local economy. During this period, Georgetown was a thriving village including the African-American Rosenwald School a one-teacher frame school was constructed around 1923. The Great Depression of the 1930s had serious effects on Chattanooga and the surrounding area. As part of Franklin Roosevelt's New Deal programs, TVA constructed the Chickamauga Dam 1936-1940.

TVA contracted with Tennessee Valley Archaeological Research (TVAR) to conduct a Phase I Cultural Resources survey of an 86-acre portion of the SOC site slated for the office complex (Van de Kree et al. 2017). Following the survey, TVA decided to incorporate the remaining acreage of the SOC Site as well as an additional tract of land (approximately 20 acres) to provide more flexibility in design. This acreage was subject to an additional archaeological survey plus viewshed survey of the entire 166-acre complex (Rosenwinkel et al. 2018). No archaeological sites were identified as a result of either survey for the 166-acre complex. During the architectural survey within the visual APE, TVAR revisited two previously documented architectural resources (MG-276 and MG-277). MG-276 had been destroyed since its initial recordation. Previously documented architectural resource MG-277 is extant but located outside the viewshed of the project area. The architectural survey also identified three previously undocumented architectural resources (IS-1 - IS-3) within the architectural APE. TVA finds IS-1 – IS-3 not eligible due to their lack of architectural distinction and loss of integrity caused by modern alterations.

For the associated TL construction, TVA contracted with New South Associates (New South) to conduct a Phase I cultural resources survey of the rebuild and new portions of the TL ROW (Patch et al. 2019a and Patch et al. 2019b). New South identified three previously recorded archaeological sites (40BY167, 40HA534 and 40HA566) and one newly recorded site (40MG305) within the APE.

Nance (2001) identified sites 40HA534 and 40BY167 as segments of the Northern Route of the Trail of Tears based on historical documentation. The Northern Route closely follows the modern alignment of Georgetown Road/SR 60 in the vicinity of the project area. The APE crosses Georgetown Road/SR 60 along site 40HA534 just east of its intersection with SR 58 for the new build portion and where proposed access roads intersect SR 60. New South identified no intact portions of the Trail of Tears nor other artifacts or features that may be associated with the Trail of Tears within the APE.

The site boundaries of 40HA566, the Rosenwald, Georgetown School, were previously recorded based on documentary evidence and no ground-truthing was conducted at the time of recordation. The portion of the site within the APE has been heavily disturbed and no intact archaeological deposits were identified. Based on the results of the survey, TVA finds that the portion of the site within the APE is not contributing to the eligibility of site 40HA566.

Site 40MG305 is a single stone pile approximately 135 centimeters in diameter and 50 centimeters tall identified within the Phase B APE (new build portion). While these types of features can sometimes be the result of historic EuroAmerican or precontact/early historic American Indian occupations, New South identified no clear documentary evidence that this stone pile is historic. Due to the sensitive nature of these type of sites to consulting federally recognized Indian tribes, TVA shifted the orientation of the proposed TL in order to avoid this potentially sensitive resource. The proposed reroute was based on allowing for a sufficient buffer to the resource while factoring in other environmental and engineering constraints. TVA finds site 40MG305 to be potentially eligible for the NRHP. The archaeological survey conducted on the proposed reroute identified one isolated find. Following this consultation, a property owner provided TVA with additional information regarding possible rock cairns that may be associated with archaeological site 40MG305 including within the proposed realignment of the Gunstocker TL ROW. Although these resources have not been formally evaluated, they are potentially significant to federally recognized Indian tribes and TVA has chosen to avoid this location by seeking a potential reroute to the west. No additional resources were identified during the Phase I survey conducted for the western reroute. There would be some visibility of the rock cairn identified by New South, especially when vegetation enters winter dormancy. The viewshed of 40MG305 has been previously affected by an existing 500-kV TL located 50 meters to the north and TVA finds that although there would be visual effects to site 40MG305, the effects of the proposed undertaking would not be adverse.

Table 3-14 lists the historic architectural resources identified within the visual APE of the new and rebuild portions of the proposed TL and TVA's NRHP eligibility determinations. All but two of these resources have been recommended by New South to be ineligible for the NRHP, based on lack of integrity in the absence of any association between the structures and historically important persons or events, and/or the lack of architectural distinction.

Table 3-14. Historic Structures Identified during the Survey and TVA's Eligibility Assessment

Property Number	Property Name	Eligibility Determination
HS-1	Leamon House	Not Eligible
HS-2	Dave's Spiced Right BBQ	Not Eligible
HS-3	Caldwell House	Not Eligible
HS-4	Hubbard House	Not Eligible
HS-6	Vital Buffalo Farm	Not Eligible
HS-5	Vital Barn	Not Eligible
HS-7	Gooch Barns	Not Eligible
HS-8	First Baptist Church of Georgetown	Not Eligible
HS-9	Former Store	Not Eligible
HS-10	Hinkle-Houseley Farm	Not Eligible
HS-11	Carter House	Not Eligible
HS-12	Mount Zion Revival Center	Not Eligible
HS-13	Epperson House	Not Eligible
HS-14	Williams Service Station	Not Eligible
HS-15	Murray House	Not Eligible
HS-16	Mount Zion United Mehodist Church and Cemetery	Not Eligible
HS-17	Lewis House	Not Eligible
HS-18	Don and Dawana Mcclanahan House	Not Eligible
HS-19	Snider House	Not Eligible
HS 20	Davis House	Not Eligible
HS 21	Laws House	Not Eligible
HS -22	Flanagan House	Not Eligible
HS-23	Jessie Beaty House	Not Eligible
HS-24	Mcclanahan House	Not Eligible
HS-25	Chhouse	Not Eligible
HS-26	Womick House	Not Eligible
HS-27	Smith House	Not Eligible
HS-28	Donald Vassey House	Not Eligible
HS-29	Darnell House	Not Eligible
HS-30	Clayton Beaty House A	Not Eligible
HS-31	Clayton Beaty House B	Not Eligible
HS-32	Scroggins Duplex	Not Eligible
HS-8 (Phase B)	Mack House	Not Eligible
HS-9 (Phase B)	Crawford House	Not Eligible

Property Number	Property Name	Eligibility Determination
MG.293	Rymer-Lonas House	Not Eligible
MG-294	Bradford Rymer Stone Barn	Listed
BY-389	Pendegrass House	Not Eligible
BY-391	Former Beaty Farm	Not Eligible/House no longer extant
BY-390	Beaty Cantilever Barn	Eligible
BY-392	Barger Farm	Not Eligible
BY-455	Vassey House	Not Eligible
BY-476	Beavers House	Not Eligible
BY-477	Captain George Fields House	Not Eligible
BY-478	Hall House	No longer extant
BY-479	Collins House	Not Eligible
BY-481	Mcclanahan House	Not Eligible
BY-482	Mowrey House	No longer extant
TVAR IS-1	Circa 1930 Front-Gable House	Determined Not Eligible in consultation
TVAR IS-2	Circa 1958 Side-Gable House	Determined Not Eligible in consultation
TVAR IS-3	Circa 1968 Side-Gable House	Determined Not Eligible in consultation
MG-276	Early Twentieth-Century Truss Bridge	Determined Not Eligible in consultation

The NRHP-listed Bradford Rymer Stone Barn (MG-294) was identified within the 0.5-mile visual APE of TVA's undertaking. The proposed undertaking would not result in physical alteration of the property, removal of the property, change in the property's use or physical features, or the neglect of the property. The property is privately owned and would not come under federal ownership of control. The TL for this portion of the undertaking would follow a ROW that was established in the 1950's (please note the report says 1930s this is in error and will be changed for the final report). MG-294 is located approximately 0.3 miles northeast of the proposed TL and wooded areas of mature trees further buffer the property from the project area. The proposed undertaking would not introduce new visual, atmospheric or audible elements that diminish the integrity of the property's historic features for which it was listed. TVA finds that the proposed undertaking would not have an adverse effect on the NRHP-listed Bradford Rymer Stone Barn.

TVA finds the Beaty Cantilever Barn to be eligible for listing on the NRHP under Criterion C due to the rarity of the barn's single cantilever design. The proposed undertaking would not result in the physical alteration of the property, removal of the property, change in the property's use or physical features, the neglect of the property, or transfer of the property out of federal ownership or control. The Beaty Cantilever Barn is located approximately 0.3 miles northeast of the TL proposed to be rebuilt and is further buffered with wooded areas of mature trees between the property and the TL ROW. Further, the setting of this property has been compromised by the removal of the associated house and the construction of a local power company's transmission metering station. For these reasons, TVA finds that the proposed undertaking would not have an adverse effect on the Beaty Cantilever Barn.

3.13.2 Environmental Consequences

3.13.2.1 Alternative A – The No Action Alternative

Because construction, operation, and maintenance of the proposed project components would not occur under the No Action Alternative, no impacts to archeological and historic resources in the project area would occur as a result of TVA actions associated with the proposed project.

3.13.2.2 Alternative B – TVA Constructs a New Standalone SOC, Gunstocker Creek 161-kV Substation, and Associated 161-kV Transmission Line

Phase I archaeological surveys within the project area identified three previously recorded archaeological sites (40BY167, 40HA534 and 40HA566) and one newly recorded site (40MG305). 40HA534 and 40BY167 are segments of the Northern Route of the Trail of Tears. The archaeological survey identified no intact portions of the Trail of Tears nor other artifacts or features that may be associated with the Trail of Tears within the APE. TVA will demarcate the ROW with high visibility fencing around the location of 40HA534. The portion of 40HA566, the Rosenwald, Georgetown School, within the project area has been heavily disturbed and no intact archaeological deposits were identified. TVA changed the alignment of the proposed new TL route to avoid potentially eligible site 40MG305. As such, the proposed action would have no effect to 40MG305.

Two historic properties were identified within the visual APE of the project area: NRHP-listed Bradford Rymer Stone Barn and the Beaty Cantilever Barn. The Bradford Rymer Stone Barn is located approximately 0.3 miles northeast of the proposed TL and wooded areas of mature trees further buffer the property from the project area. The proposed undertaking would not introduce new visual, atmospheric or audible elements that diminish the integrity of the property's historic features for which it was listed. TVA finds that the proposed undertaking would not have an adverse effect on the NRHP-listed Bradford Rymer Stone Barn. The Beaty Cantilever Barn is located approximately 0.3 miles northeast of the TL proposed to be rebuilt and is further buffered with wooded areas of mature trees between the property and the TL ROW. Further, the setting of this property has been compromised by the removal of the associated house and the construction of a local power company's transmission metering station. For these reasons, TVA finds that the proposed undertaking would not have an adverse effect on the Beaty Cantilever Barn.

The current project plans do not call for any staging areas outside the project area or in TVA's APE that has not been subject to a Phase I archaeological resources review. If any additional laydown or staging areas are required, TVA would follow the Section 106 process outlined in 36 CFR§ 800. A post review discovery protocol is provided in TVA's work packages for TL crews. If historic properties are discovered or unanticipated effects on historic properties found after completion of Section 106, work within a 328-foot radius of the discovery, or work within a historic structure, will be immediately stopped and the discovery location secured, and TVA would follow the regulations outlined in 36 CFR § 800.13.

In letters dated March 31, 2017 and February 15, 2018, TVA consulted with the TN SHPO and federally recognized Indian tribes regarding the proposed SOC. In letters dated, April 11, 2017 and March 1, 2018, the TN SHPO concurred with TVA's no effect finding. Pursuant to 36 CFR Part 800.3(f)(2), 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. TVA received three responses from the Absentee Shawnee, Muscogee (Creek) Nation, and the Chickasaw Nation with no objections. TVA consulted with the TN SHPO and federally recognized Indian tribes and other consulting parties regarding the portion of the undertaking associated with the TL construction and the basis of TVA's findings of no adverse effect. In a letter dated, May 17, 2019, the TN SHPO concurred with TVA's eligibility determinations and its findings that the proposed undertaking would not adversely affect NRHP-listed Bradford Rymer Stone Barn and the Beaty Cantilever Barn. In a letter dated August 23, 2019, TVA reopened consultation with the TN SHPO and federally recognized Indian tribes regarding the proposed reroute on a portion of the TL ROW. TVA received responses from the Jena Band of Choctaw Indians, from the Cherokee Nation, and from the TN SHPO indicating no additional significant concerns (Appendix B).

3.14 Recreation, Parks, and Natural Areas

3.14.1 Affected Environment

Managed areas include lands held in public ownership that are managed by an entity (e.g., TVA, USDA, USFS, State of Tennessee, and local counties and municipalities) to protect and maintain certain ecological and/or recreational features. Ecologically significant sites are either tracts of privately-owned land that are recognized by resource biologists as having significant environmental resources or are identified tracts on TVA lands that are ecologically significant but not specifically managed by TVA's Natural Areas program. Nationwide Rivers Inventory streams are free-flowing segments of rivers recognized by the National Park Service as possessing remarkable natural or cultural values. This section 3.14.1 addresses natural areas (managed areas and sites) that are on, immediately adjacent to (within 0.5 mile), or within the region of the project area (5-mile radius).

Circle V Farm Conservation Easement is the only natural area found within the project footprint. The easement was designated by the Land Trust for Tennessee in 2007 to preserve the historic, scenic, and natural values of open land in the growing corridor along Highway 60 near Georgetown.

An additional five natural areas are found within five miles of the proposed project footprint:

- Vital Buffalo Farm Conservation Easement is located 0.3 miles northeast of the project. This farm was also established in 2007 under similar guidelines as the Circle V Farm Conservation Easement.
- Gunstocker Glade is a unique floristic habitat type consisting of limestone outcrops that is located 0.2 miles northwest of the proposed project footprint.
- Hiwassee Refuge State Wildlife Management Area is found 1.6 miles north of the proposed project. This 6,000-acre refuge is popular among outdoor enthusiasts for wildlife observation, water sports, and hunting.

- Cleveland State Community College, located 3.8 miles southeast of the proposed project footprint, is designated as a Level II Certified Arboretum that features 100 different tree species.
- Grasshopper Creek TVA Habitat Protection Area (4.5 miles northwest of the proposed project) was initially developed and operated by TVA, but it is now operated by the private sector under a revocable license agreement. Facilities at this area include a campground, a boat-launching ramp, picnic facilities, a swimming beach, and a rental cabin.

There are no developed parks or outdoor recreation areas within or in the immediate vicinity of the SOC site and no dispersed public recreation currently occurs on the property. There are also no developed parks or outdoor recreation areas within or immediately adjacent to the TL corridors associated with this project. However, some dispersed outdoor recreation activity such as walking for pleasure, wildlife observation or hunting may occur in the area of the existing and proposed TLs.

3.14.2 Environmental Consequences

3.14.2.1 Alternative A – The No Action Alternative

Because construction, operation, and maintenance of the proposed project components would not occur under the No Action Alternative, no impacts to recreation, parks, and natural areas in the project area would occur as a result of TVA actions associated with the proposed project.

3.14.2.2 Alternative B – TVA Constructs a New Standalone SOC, Gunstocker Creek 161-kV Substation, and Associated 161-kV Transmission Line

A 0.35-mile long by 100-foot-wide section of TL ROW would cross Circle V Farm Conservation Easement (Figure 3-17). A majority of this total ROW area would transect an existing agricultural field via an existing TL ROW and would not require any tree clearing. However, two stands of trees totaling approximately 0.4 acres would require clearing within this area. The scheduling of tree clearing during construction would be arranged with the land manager to ensure minimal conflicts with the management goals of Circle V Farm Conservation Easement. Direct impacts to this area associated with tree clearing and ROW disturbance would be minimized via the use of standard BMPs (TVA 2017a).

Because the distance from the project site to the remainder of natural areas in the vicinity is sufficient (0.2 miles to 4.5 miles), development of the proposed TL upgrade is not anticipated to impact these natural areas.

Adoption of Alternative B would not significantly affect any natural areas located within the region. Despite the project footprint crossing Circle V Farm Conservation Easement, there would be little change to the existing site conditions within that immediate area due to the presence of an existing TL ROW. The proposed TL work could cause some minor shifts in any dispersed outdoor recreation activity that may currently take place in the immediate area of the TL corridors. However, the extent and impacts of any such shifts in use patterns would be minor and short-term.

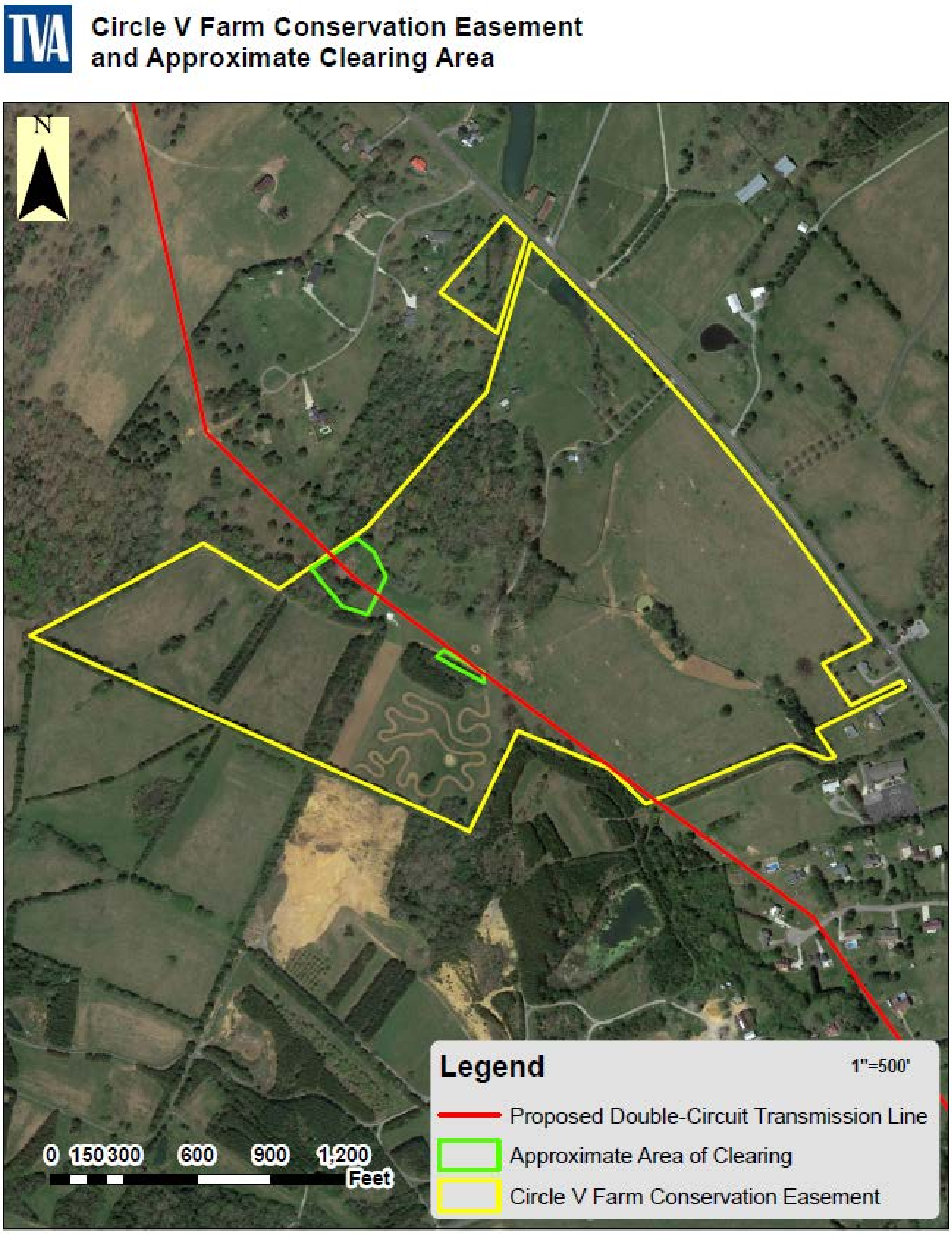


Figure 3-17. Circle V Farm Conservation Easement and Approximate Clearing Area

3.15 Socioeconomics and Environmental Justice

The proposed SOC site is located in southern Meigs County, northeast of the intersection of State Highways 58 and 60 and north of the unincorporated community of Georgetown (see Figure 1-1). Given the nature of the proposed action, the potentially affected communities for socioeconomic and environmental justice analysis are considered to be primarily limited to those census block groups that fall within a 5-mile radius of the proposed SOC site. This radius also encompasses the entirety of the new approximately 5.25-mile TL connecting to the proposed Gunstocker Creek 161-kV Substation. This community includes portions of Meigs, Hamilton, and Bradley counties, and therefore, these counties and the state of Tennessee are included as appropriate secondary geographic areas of reference. Hamilton County is also the location of the existing COC site and the county within which the majority of its current employees reside. Comparisons at multiple spatial scales provide a more detailed picture of populations that may be affected by the proposed actions. Demographic and economic characteristics of populations within the study area were assessed using the American Community Survey 5-year estimates (2013-17) provided by the U.S. Census Bureau (USCB 2019a).

3.15.1 Demographics

3.15.1.1 Affected Environment

Demographic characteristics of the study area, defined as the block groups located within a 5-mile radius of the proposed SOC site, and of the secondary reference geographies are summarized in Table 3-15. The study area has a resident population of 14,936 and is characterized by low-density residential development. It includes portions of the unincorporated communities of Georgetown and Birchwood, as well as a portion of the city of Hopewell. The surrounding counties range in population size from rural Meigs County (11,830 residents) to Hamilton County (354,589 residents) which includes the city of Chattanooga. Meigs, Bradley, and Hamilton counties account for approximately 0.2 percent, 1.6 percent, and 5.4 percent, respectively, of the total population of Tennessee (6,597,381). Since 2010, the population within the study area has increased by 9.3 percent. During this same period, the population of Meigs County essentially remained the same (with an increase of less than 1 percent), while the populations of Bradley and Hamilton counties experienced increases (4.8 and 5.4 percent, respectively) slightly higher than the state increase of 4.0 percent.

Approximately 93 percent of the study area population is white. Correspondingly, minority populations in the study area are relatively small. Minorities in the study area include: black or African American (1.6 percent), Hispanic or Latino (0.9 percent), Asian (0.7 percent), American Indian and Alaska Native (0.6 percent), and persons who identified as two or more races (2.8 percent). Minority populations in the study area are comparable to those of Meigs County and are notably lower than those of Bradley County, Hamilton County, and the state of Tennessee (Table 3-15).

Table 3-15. Demographic Characteristics within the Proposed Project Area

	Study Area (5-mile Radius)	Meigs County	Hamilton County	Bradley County	State of Tennessee
Population[1,2]					
Population, 2017 estimate	14,936	11,830	354,589	103,666	6,597,381
Population, 2010	13,670	11,753	336,463	98,963	6,346,105
Percent Change 2010-2017	9.3%	0.7%	5.4%	4.8%	4.0%
Persons under 18 years, 2017	19.9%	20.9%	21.0%	22.4%	22.7%
Persons 65 years and over, 2017	21.9%	19.7%	16.5%	16.1%	15.4%
Racial Characteristics[1]					
Not Hispanic or Latino					
White alone, 2017 (a)	93.4%	94.5%	71.4%	86.5%	74.3%
Black or African American, 2017 (a)	1.6%	1.4%	19.3%	4.9%	16.7%
American Indian and Alaska Native, 2017 (a)	0.6%	0.3%	0.1%	0.1%	0.2%
Asian, 2017 (a)	0.7%	0.2%	2.0%	1.1%	1.7%
Native Hawaiian and Other Pacific Islander, 2017 (a)	0.0%	0.0%	0.0%	0.0%	0.1%
Some Other Race alone, 2017 (a)	0.0%	0.0%	0.1%	0.2%	0.1%
Two or More Races, 2017	2.8%	2.2%	1.7%	1.3%	1.9%
Hispanic or Latino, 2017	0.9%	1.5%	5.3%	5.8%	5.2%
Housing and Income[1]					
Housing units, 2017	6,498	5,794	156,016	42,983	2,903,199
Median household income, 2013-2017	$57,412	$39,786	$50,273	$46,381	$48,708
Persons below poverty level, 2013-2017	10.6%	16.6%	14.5%	18.0%	16.7%
Persons below low-income threshold, 2013-2017 (b)	30.3%	40.8%	33.3%	38.0%	37.3%

(a) Includes persons reporting only one race.
(b) Low-income threshold is defined as two times the poverty level
Sources: [1]U.S. Census Bureau 2019a; [2] U.S. Census Bureau 2011

The average median household income in the block groups that make up the study area is $57,412, which is higher than the median household income reported for the surrounding counties (ranging from $39,786 to $50,273) and the state of Tennessee ($48,708) (Table 3-15). Persons falling below the poverty level comprise 10.6 percent of the total population of the study area. In comparison, the percentage of persons below the poverty level is higher in the surrounding counties (14.5 to 18.0 percent) as well as the state of Tennessee (16.7 percent).

3.15.1.2 Environmental Consequences

3.15.1.2.1 Alternative A – The No Action Alternative

Under the No Action Alternative, construction, operation, and maintenance of the proposed project components would not occur. Demographic conditions would continue to follow current trends. However, no additional changes to demographics in the project area would occur as a result of TVA actions associated with the proposed project.

3.15.1.2.2 Alternative B – TVA Constructs a New Standalone SOC, Gunstocker Creek 161-kV Substation, and Associated 161-kV Transmission Line

Under Alternative B, demographic characteristics of the study area and surrounding counties are not expected to change significantly in response to an increase in temporary construction workforce. The onsite construction workforce is estimated to range from 40 to 50 workers during the first year of construction, from 190 to 210 workers during the second year, and from 210 to 230 workers during the third and final year of construction. It is anticipated that most of these workers would be drawn from the labor force that currently resides in the region. Additionally, specialty workers and laborers not available within the area may temporarily relocate to the project area to support construction activities and leave the area once work is complete. Given that the majority of workers needed would likely be drawn from the existing labor force, impacts to demographics associated with the construction workforce would be temporary and minor.

The permanent workforce at the proposed SOC facility is expected to consist of approximately 200 employees and be comprised of persons who are currently employed at the existing COC facility in Chattanooga. As such, many of these employees would experience a change in their daily commute. The highest percentage of commuters currently reside in the Greater Chattanooga Metropolitan area with some commuting from as far as Trenton, Georgia to the south and Spring City, Tennessee to the north, with distances up to approximately 60 miles (Volkert 2019). While the average commute time for employees is anticipated to increase compared to current commute times, some employees would experience shorter commutes to the new facility and most commutes are expected to remain under one hour each way.

3.15.2 Economic Conditions

3.15.2.1 Affected Environment

Meigs, Hamilton, and Bradley counties employ a combined labor force of 217,917 workers (Table 3-16). Business sectors providing the greatest employment include Education, Health Care and Social Assistance (22.5 percent); Manufacturing (14.5 percent); Retail Trade (11.8 percent); and Arts, Entertainment, Recreation, Accommodation and Food Services (10.1 percent).

Employment characteristics of the study area and the secondary reference geographies are summarized in Table 3-17. The total employed civilian population within the study area is 12,355. A total of 6.3 percent of the civilian labor force in the study area is unemployed. This rate is lower than the civilian unemployment rate reported for Meigs County (9.9 percent), Bradley County (7.2 percent) and the state of Tennessee (6.6 percent), but slightly higher than the unemployment rate for Hamilton County (5.9 percent).

3.15.2.2 Environmental Consequences

3.15.2.2.1 Alternative A – The No Action Alternative

Under the No Action Alternative, construction, operation, and maintenance of the proposed project components would not occur. Changes to economics within the project area would continue to follow current trends as the population changes. However, no additional changes to economic conditions in the project area would occur as a result of TVA actions associated with the proposed project.

3.15.2.2.2 Alternative B – TVA Constructs a New Standalone SOC, Gunstocker Creek 161-kV Substation, and Associated 161-kV Transmission Line

Potential economic impacts associated with the proposed action relate to direct and indirect effects of construction and operations. Construction activities would entail a temporary increase in employment and associated payrolls over the three-year construction period, as well as the purchases of materials and supplies and procurement of additional services. Construction costs associated with the proposed action would, therefore, have direct economic benefits to the local area and surrounding community. Revenue generated by income tax and sales tax from construction workers would also benefit the local economy.

An economic impact analysis for the project was conducted by Younger Associates in 2018 to determine the annual impact of operations and a one-time expansion impact to the economy of Meigs County. The results of this analysis are shown in Table 3-18. The annual operations impact includes total direct and indirect jobs, wages, and tax revenues from sales, property, and other collections. The one-time economic impact includes the initial capital expenditures for building and equipment.

Table 3-16. Largest Employers by Sector Within Three-County Project Vicinity

Sector	Number of Employees	Percent
Education, Health Care and Social Assistance	48,971	22.5%
Manufacturing	31,539	14.5%
Retail Trade	25,770	11.8%
Arts, Entertainment, Recreation, Accommodation and Food Services	22,009	10.1%
Professional, Scientific, Management, and Administrative Services	19,663	9.0%
Finance and Insurance, Real Estate, Rental and Leasing	16,497	7.6%
Transportation, Warehousing, and Utilities	15,081	6.9%
Construction	12,457	5.7%
Public Administration	6,163	2.8%
Wholesale Trade	4,803	2.2%
Subtotal	**202,953**	**93.1%**
Total Employed Civilian Labor Force	**217,917**	**100%**

Source: USCB 2019a

Table 3-17. Employment Characteristics

Employment Status	Population				
	Study Area (5-mile Radius)	Meigs County	Hamilton County	Bradley County	State of Tennessee
Population >16 years	12,355	9,664	288,166	83,131	5,270,257
Civilian Labor Force	6,886	4,772	177,716	50,020	3,207,366
Employed	6,449	4,300	167,211	46,406	2,996,610
Unemployed	437	472	10,505	3,614	210,756
Unemployment					
% of Total Population > 16 years	3.5%	4.9%	3.6%	4.3%	4.0%
% of Civilian Labor Force	6.3%	9.9%	5.9%	7.2%	6.6%

Source: USCB 2019a

Table 3-18. Economic Impact of Proposed Energy Center

Annual Operations Impact	
Total Employment (direct and indirect jobs)	282
Total Wages (direct and indirect)	$34,241,341
Total Tax Revenue	$319,054
One-Time Expansion Impact	
Total Economic Impact from Capital Investment	$368,992,500
Total Tax Revenue	$679,847

Source: Younger and Associates 2018

3.15.3 Community Facilities and Services

3.15.3.1 Affected Environment

Community facilities and services are public or publicly funded facilities such as police protection, 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 defined for the purposes of a socioeconomic analysis may be defined. In this case, a 5-mile radius was utilized along the entirety of the project area to identify facilities, particularly emergency services, which could potentially be impacted by incidents at the SOC site, and also along the length of the TL. Community facilities and services available to the communities surrounding the proposed project site include schools, churches, hospitals, fire and emergency services, and an airport (Figure 3-18). Many of these facilities are concentrated in and around Cleveland, Tennessee, southeast of the eastern terminus of the proposed TL segment. While there are no facilities located in close proximity (within 0.5 miles) of the proposed SOC site, there are three churches, four cemeteries, and a post office located within 0.5 miles of the TL segment.

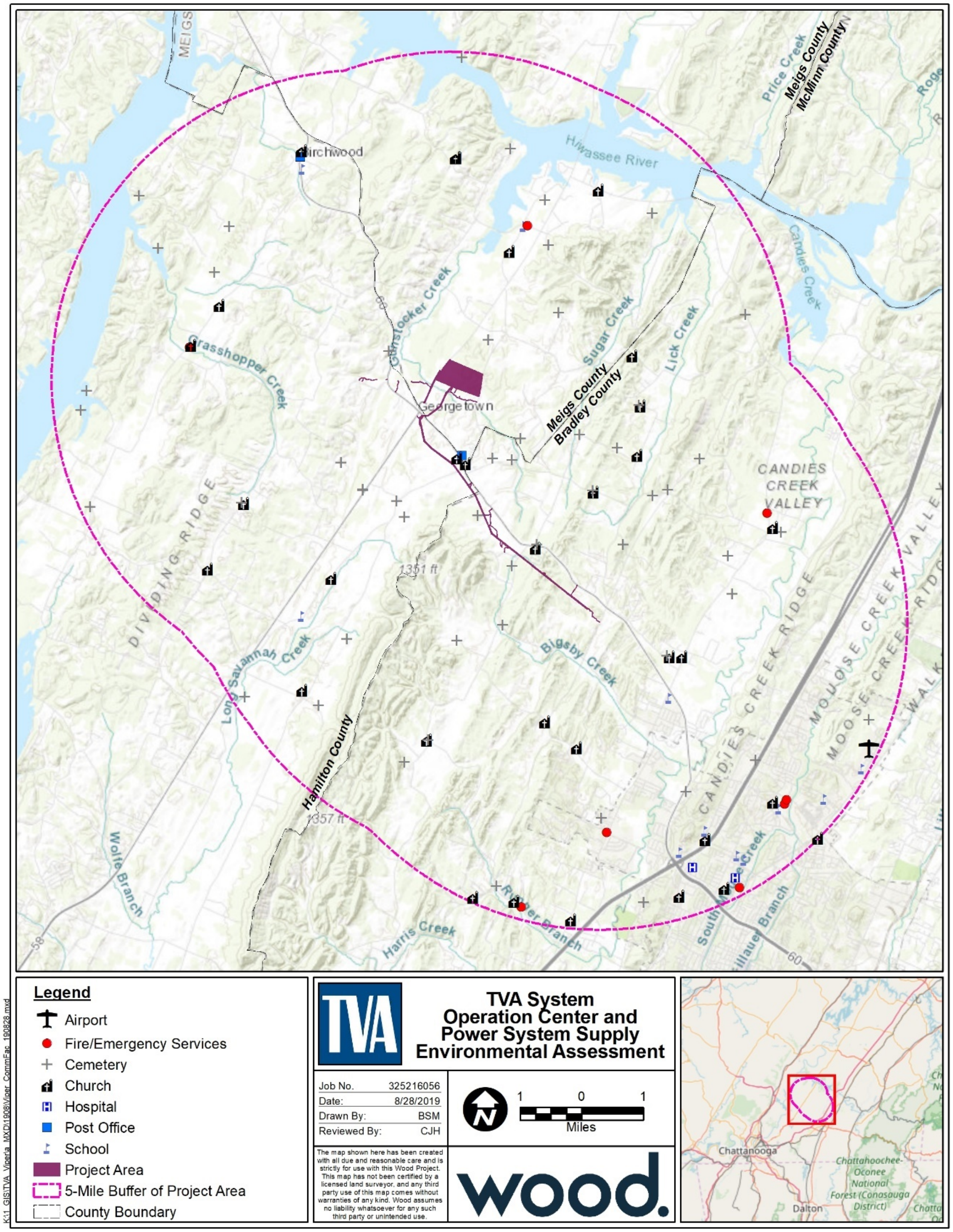


Figure 3-18. Community Facilities and Services within 5 Miles of the Project Area

3.15.3.2 Environmental Consequences

Direct impacts to community facilities occur when a community facility is displaced or access to the facility is altered. Indirect impacts occur when a proposed action or project results in a population increase that would generate greater demands for services and/or affect the delivery of such services.

3.15.3.2.1 Alternative A – The No Action Alternative

Under the No Action Alternative, construction, operation, and maintenance of the proposed project components would not occur, thus no impacts to community facilities resulting from construction or operation of the proposed action would occur. However, community facilities would change as population within the study area fluctuates.

3.15.3.2.2 Alternative B – TVA Constructs a New Standalone SOC, Gunstocker Creek 161-kV Substation, and Associated 161-kV Transmission Line

Construction and operations of the SOC site and the new TL segment would not result in the displacement of any community facilities. One access road along the existing TL that is proposed to be modified utilizes the driveway entrance to the Cedar Ridge Seventh-day Adventist Church. The driveway would allow construction equipment and vehicles to travel between State Highway 60 and a specific segment of the TL ROW corridor. Thus, the use of the driveway would be brief and infrequent and would not interfere with the public's ability to access the church. No other community facilities or services are anticipated to be directly impacted.

As neither construction nor operation of the proposed SOC site and TL would have significant impacts on local demographics, increased demands for services such as schools, and churches are not anticipated. However, in the event of an emergency at the SOC facility or along the TL corridor, local law enforcement, fire, and/or EMS response would likely be required. Due to the rural nature of the project area, emergency services in the immediate vicinity are limited. For this reason, most emergency services would likely come from the Cleveland area to the southeast. In case of fire, the SOC site would have a 150,000-gallon water storage tank for use during such emergencies. In addition, the onsite helicopter pad would be available for use by emergency responders or military personnel in TVA-related emergency operations or disaster response situations. As the need for emergency services at the SOC facility and along the TL are anticipated to be a rare occurrence and the city of Cleveland provides an extensive network of emergency services, this alternative is unlikely to put a significant strain on the demand for emergency services in the area.

3.15.4 Environmental Justice

3.15.4.1 Affected Environment

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 (USEPA 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 CEQ's Environmental Justice Guidance under the NEPA (CEQ 1997). The CEQ defines minority as any race and ethnicity, as classified by the USCB, as: 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 Thresholds state the poverty threshold as an annual household income of $25,900 for a family of four. For an individual, an annual income of $13,064 is the poverty threshold (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. This broader low-income threshold above the base poverty level 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. This is the same methodology used by USEPA in their delineation of low-income populations (USEPA 2017). According to USEPA, the effects of income on baseline health and other aspects of susceptibility are not limited to those below the poverty thresholds. 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 area of analysis.

Total minority populations (i.e. all non-white and Hispanic or Latino racial groups combined) comprise between 1.2 and 12.7 percent of the population of each of the individual block groups within the study area. The minority populations of the selected block groups do not exceed 50 percent of the total population nor do they significantly exceed the minority percentage for any of the reference geographies.

The percentage of the population of Tennessee living below the low-income threshold is 37.3 percent. Of the three counties considered, Meigs County has the highest percentage of low-income individuals (40.8 percent), followed by Bradley County (38.0 percent), and

Hamilton County (33.3 percent). Approximately 30.3 percent of people living within the study area are considered low-income, with percentages for individual block groups ranging from 13.9 to 46.8 percent of the population. The low-income populations within each block group do not exceed 50 percent of the total or significantly exceed corresponding rates for the surrounding counties. However, because specific income information is not available at the block level, smaller populations, such as the Georgetown Mobile Home Park, located off of Old Highway 58, approximately 0.75 miles of the proposed SOC site, may not be identified in this analysis as an Environmental Justice population. It is probable that persons in this area should be considered as a potential low-income population subject to Environmental Justice considerations.

3.15.4.2 Environmental Consequences

3.15.4.2.1 Alternative A – The No Action Alternative

Because construction, operation, and maintenance of the proposed project components would not occur under the No Action Alternative, no direct effects to low income or minority populations in the area are anticipated. However, changes to the project area and resources in this area may occur over time, independently of TVA's actions, due to factors such as population increases, changes in land use, and development in the area.

3.15.4.2.2 Alternative B – TVA Constructs a New Standalone SOC, Gunstocker Creek 161-kV Substation, and Associated 161-kV Transmission Line

While no block groups within the study area were identified as containing minority or low-income populations, the Georgetown Mobile Home Park, located approximately 0.75 miles south of the proposed SOC site and 0.3 miles east of the TL, was identified as a potential low-income population subject to Environmental Justice consideration. However, due to distance, impacts to the mobile home park, such as fugitive dust, air emissions, and noise, would be minimal. Old Highway 58, off of which the mobile home park is located, would be utilized to access the SOC site from the east, and may experience increased traffic during construction or under emergency conditions. However, as the primary entrance to the site would be located off of a different road, traffic increases on Old Highway 58 would be infrequent and would not be expected to result in significant delays. Overall, impacts to the potential low-income community at the Georgetown Mobile Home Park would be minimal, and would not be disproportionate when compared to impacts to surrounding non-environmental justice communities.

Furthermore, it should be noted that employment opportunities may be provided to residents during the construction phase, which could potentially provide positive impacts to area low-income populations.

3.16 Transportation

3.16.1 Affected Environment

The project area, located in Tennessee, is serviced by traditional highway transportation that includes State Highway 58, State Highway 60, and Old Highway 58 (see Figure 3-19).

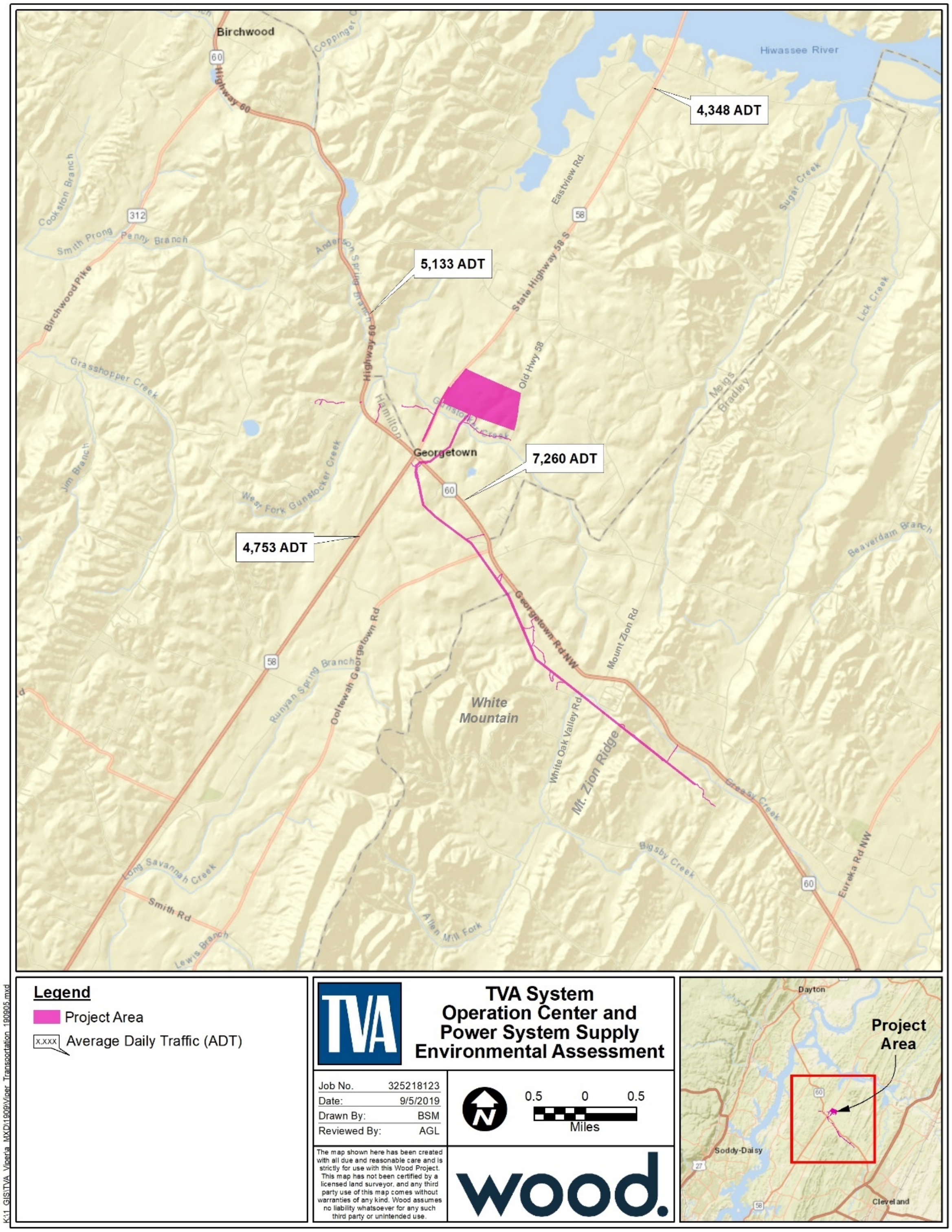


Figure 3-19. Existing Transportation Network within Project Area

State Highway 58 is generally oriented in a north-south direction and provides a connection between Chattanooga and Decatur. State Highway 58 includes one travel lane in each direction and consists of 11-foot travel lanes with a total pavement width of approximately 22 to 24 feet. Within the vicinity of the project area, there is no curb-and-gutter or sidewalk and the speed limit is posted at 55 mph. The speed limit decreases to 45 mph near the intersection with State Highway 60.

State Highway 60 is generally oriented in an east-west direction in the vicinity of the project area and provides a connection between Cleveland and Dayton. This roadway has two travel lanes each direction includes approximately two feet of paved shoulders and no sidewalks. The posted speed limit on State Highway 60 is 40 mph between State Highway 58 and Old Highway 58/Ooltewah Georgetown Road.

Old Highway 58 extends north from Highway 60. It forms an offset intersection with Ooltewah Georgetown Road. Old Highway 58 connects to State Highway 58 near Eastview Road and includes a single travel lane in each direction with a total pavement width of approximately 20 feet. There is no sidewalk or shoulder provided along Old Highway 58. The posted speed limit on Old Highway 58 is 30 mph.

The intersection of State Highway 58 and State Highway 60 is located south of the proposed SOC and is a four-legged intersection that is controlled by a traffic signal. All four approaches include a left turn lane and a shared through/right turn lane. The southbound left turn lane on State Highway 58 includes approximately 280 feet of storage, while the northbound left turn lane includes approximately 240 feet of storage. The westbound approach on State Highway 60 includes approximately 300 feet of storage, while the eastbound approach includes approximately 220 feet of storage. A protected/permitted left turn signal phase is provided for each approach. Pedestrian accommodations are not provided for this signal.

The intersection of State Highway 60 and Old Highway 58/Ooltewah Georgetown Road is an offset four-legged intersection that is controlled by stop signs on Old Highway 58/Ooltewah Georgetown Road. All approaches to this intersection include a shared lane for left, through, and right turning movements.

Several county and minor roads also occur in the area. Ooltewah Georgetown Road connects to Georgetown from the southwest. Old Highway 58 enters Georgetown from the northeast. Mt. Zion Road and White Oak Valley Road both intersect State Highway 60 near the southeast corner of the project area. Mt. Zion Road travels in a northeastern direction along the base of Mt. Zion Ridge. White Oak Valley Road enters Highway 60 from a southwestern direction and runs through a valley between White Mountain and Mt. Zion Ridge.

Table 3-19 summarizes the Average Annual Daily Traffic (AADT) for the routes near the proposed facility. These traffic levels are moderate, but well below the capacity of these two-lane roadways.

Table 3-19. Average Annual Daily Traffic Counts for Primary Routes

Roadway/Location	2017 Average Annual Daily Traffic (AADT)
State Highway 58 south of State Highway 60	4,753
State Highway 58 3.5 miles north of the TVA Site	4,348
State Highway 60 near Georgetown	7,260
State Highway 60 northwest of State Highway 58	5,133

Source: TDOT 2019

Existing traffic conditions were assessed in a traffic study developed for the proposed project (Volkert 2019). The existing weekday peak hour traffic volumes are shown in Figure 3-20. The capacity analyses result in the determination of a Level of Service (LOS) for an intersection. LOS is a quality measure describing operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. LOS is described accordingly:

- LOS A: describes free flow traffic conditions;
- LOS B: free flow conditions although presence of other vehicles begins to be noticeable;
- LOS C: increases in traffic density become noticeable but remain tolerable to the motorist;
- LOS D: borders on unstable traffic flow; the ability to maneuver becomes restricted; delays are experienced;
- LOS E: traffic operations are at capacity; travel speeds are reduced; ability to maneuver is not possible; travel delays are expected; and
- LOS F: designates traffic flow breakdown where the traffic demand exceeds the capacity of the roadway; traffic can be at a standstill.

The results of the capacity analyses for the existing conditions at the study intersections are presented in Table 3-20. As shown, capacity analyses indicate that the signalized intersection of State Highway 58 and State Highway 60 currently operates at LOS B during both peak hours. All turning movements at the intersection of State Highway 60 and Old Highway 58/ Ooltewah Georgetown Road currently operate at LOS C or better during both peak hours

In order to account for the regional traffic growth independent of the proposed action, historical daily traffic volumes were obtained from the TDOT count stations located near the project site. A growth factor of 2.0 percent was applied to the existing peak hour traffic volumes to account for background growth for the future conditions over the next 3 years (to 2022) (Volkert 2019).

The results of the capacity analyses for the background conditions at the study intersections are presented in Table 3-21 and Figure 3-21. Capacity analyses indicate that, under background conditions, the signalized intersection of State Highway 58 and State

Highway 60 would operate at LOS B during the AM peak hour and LOS C during the PM peak hour. All turning movements at the intersection of State Highway 60 and Old Highway 58/Ooltewah Georgetown Road would continue to operate at LOS C or better during both peak hours.

Table 3-20. Existing Peak Level of Service

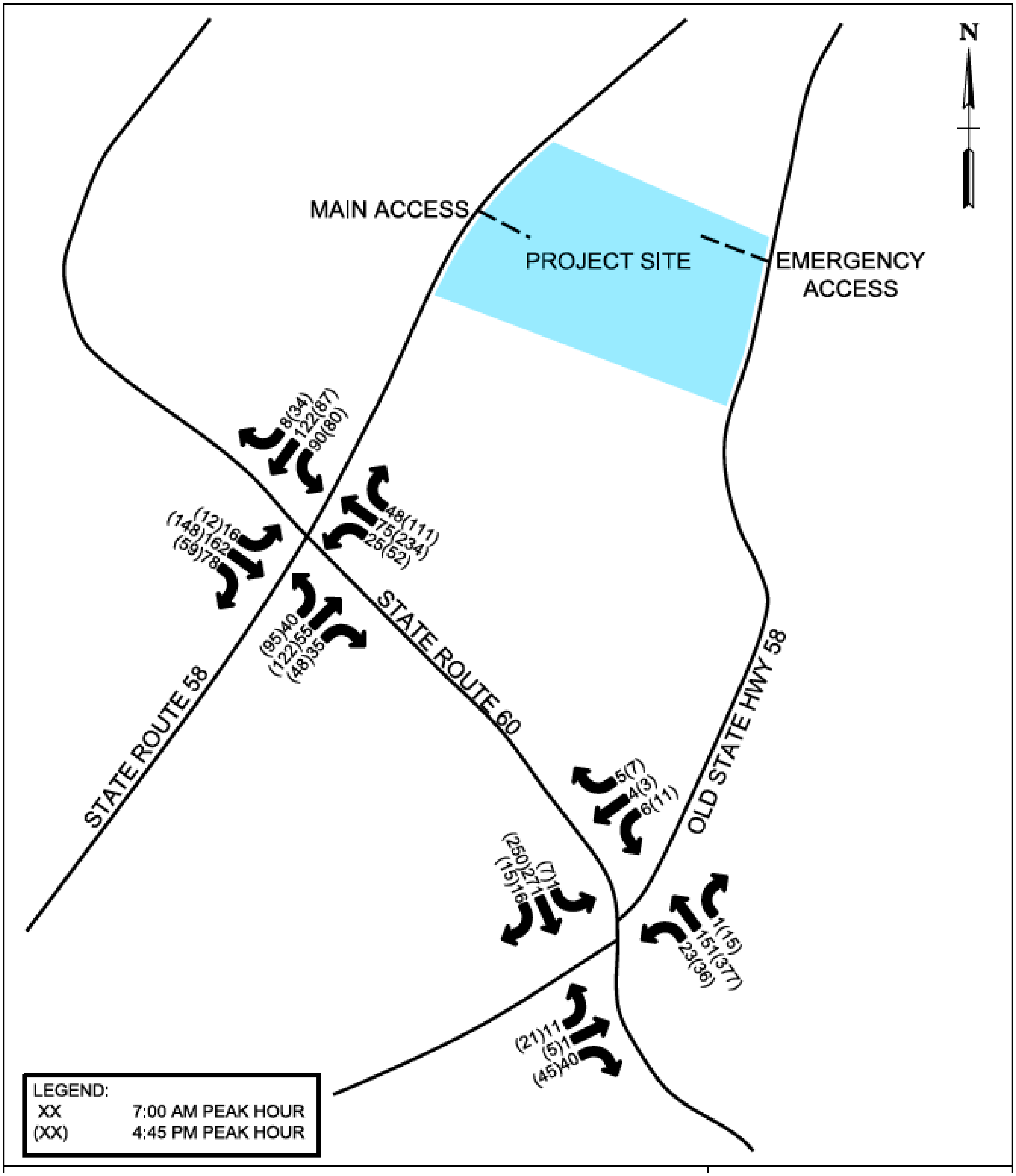
Intersection	Critical Movement	AM Peak Hour LOS	Delay (sec/veh)	PM Peak Hour LOS	Delay (sec/veh)
State Highway 58 and State Highway 60	Overall Intersection	B	16.1	B	19
State Highway 60 and Old Highway 58/ Ooltewah Georgetown Road	Eastbound Left Turn	A	7.5	A	8.2
	Westbound Left Turn	A	7.9	A	7.9
	Northbound Left/Thru/Right	B	11.2	B	14
	Southbound Left/Thru/Right	B	11.2	C	17.5

Source: Volkert 2019

Table 3-21. Background Peak Hour Level of Service

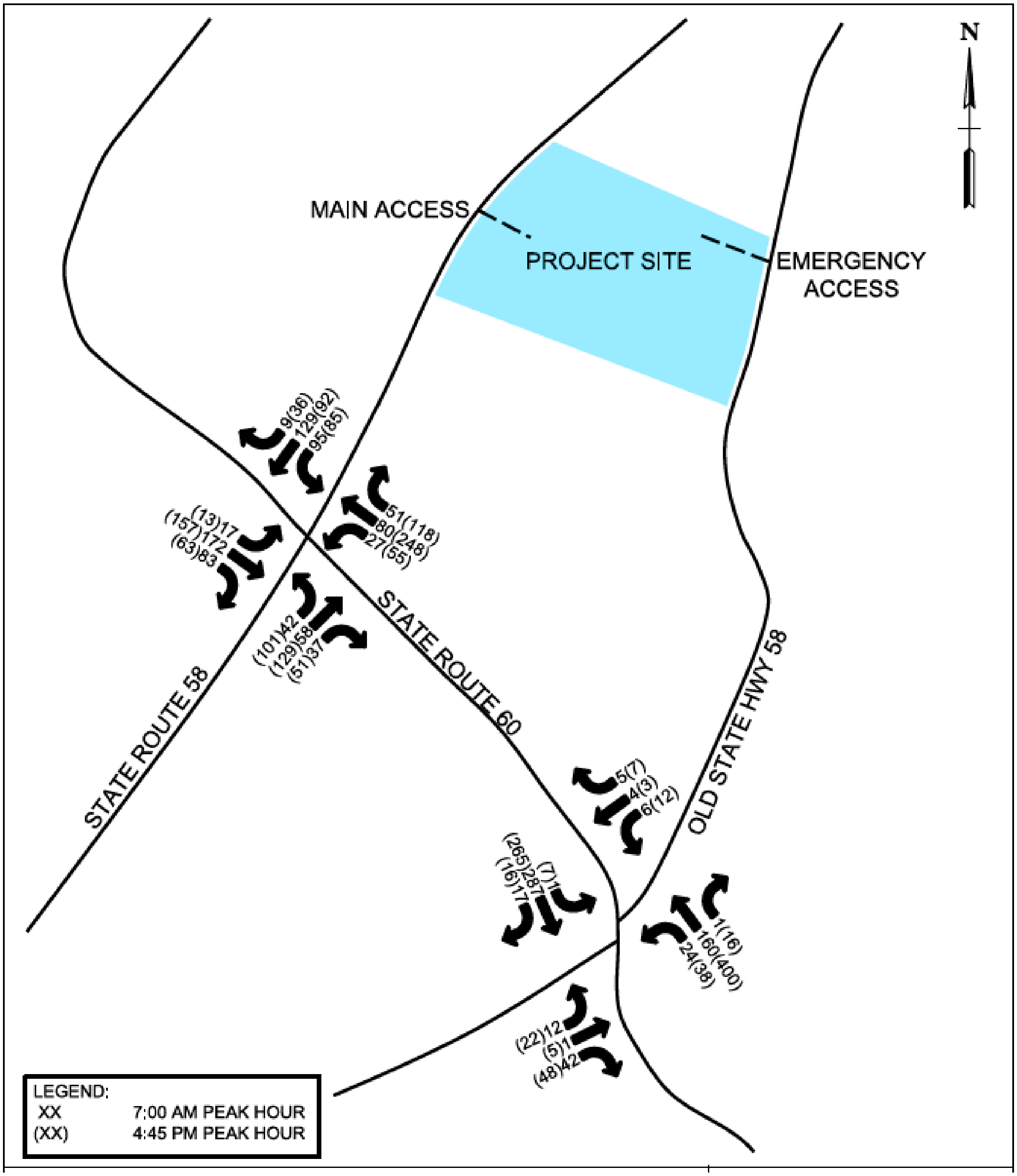
Intersection	Critical Movement	Level of Service			
		AM Peak Hour	Delay (sec/veh)	PM Peak Hour	Delay (sec/veh)
State Highway 58 and State Highway 60	Overall Intersection	B	19.9	C	19
State Highway 60 and Old Highway 58/ Ooltewah Georgetown Road	Eastbound Left Turn	A	7.6	A	8.2
	Westbound Left Turn	A	7.9	A	7.9
	Northbound Left/Thru/Right	B	11.2	B	14
	Southbound Left/Thru/Right	B	11.2	C	17.5

Source: Volkert 2019



(Source: Volkert 2019)

Figure 3-20. Existing Peak Hour Traffic Volumes



(Source: Volkert 2019)

Figure 3-21. Background Peak Hour Traffic Volumes (2022)

3.16.2 Environmental Consequences

Direct impacts to community facilities occur when a community facility is displaced or access to the facility is altered. Indirect impacts occur when a proposed action or project results in a population increase that would generate greater demands for services and/or affect the delivery of such services.

3.16.2.1 Alternative A – The No Action Alternative

Because construction, operation, and maintenance of the proposed project components would not occur under the No Action Alternative, no direct effects to transportation resources within the project area are anticipated. No additional construction traffic would result from this alternative.

Under Alternative A, the SOC would remain at its current location in Chattanooga. Additionally, the existing travel patterns of TVA workforce in support of the SOC would remain unchanged. The TVA commuter traffic would continue to contribute to traffic and parking in the Chattanooga central business district and there would be no change in the existing transportation networks.

3.16.2.2 Alternative B – TVA Constructs a New Standalone SOC, Gunstocker Creek 161-kV Substation, and Associated 161-kV Transmission Line

3.16.2.2.1 Construction Impacts

The workforce during the construction phase of Alternative B is expected to range from 40-230 workers per month during the three-year period. Workforce traffic would predominantly consist of a mix of passenger cars and light to medium duty trucks (such as delivery trucks). Assuming one person per commuting vehicle, the estimated peak worker and construction truck traffic is shown in Table 3-22. 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 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 construction activities would be localized to the immediate site, intermittent and short-term in nature.

Table 3-22. Estimated Daily Peak Construction Traffic

Peak Daily Construction Worker Traffic(1)	Estimated Peak Daily Construction Truck Traffic(2)	Total Estimated Construction Daily Traffic
460	10	470

(1) Based on highest average number of 230 workers/month in 2021, with all working on a single day and all workers arriving and departing during the work day.
(2) Construction truck traffic can include concrete, materials, equipment deliveries, waste removal, inspectors, etc.

In the event blasting is required during construction, road closures and traffic delays are not anticipated given the location of the blasting (concentrated around the substation area near the center of the parcel) and the distance to the nearest roadways and other sensitive receptors. Transport of explosives would be directed by the blasting contractor and would adhere to the requirements of the NFPA 495, Explosives Material Code to ensure safety and security during transport. Drivers and helpers assigned to transport vehicles would be required to be physically fit and able to read English and understand instructions.

3.16.2.2.2 Operational Impacts

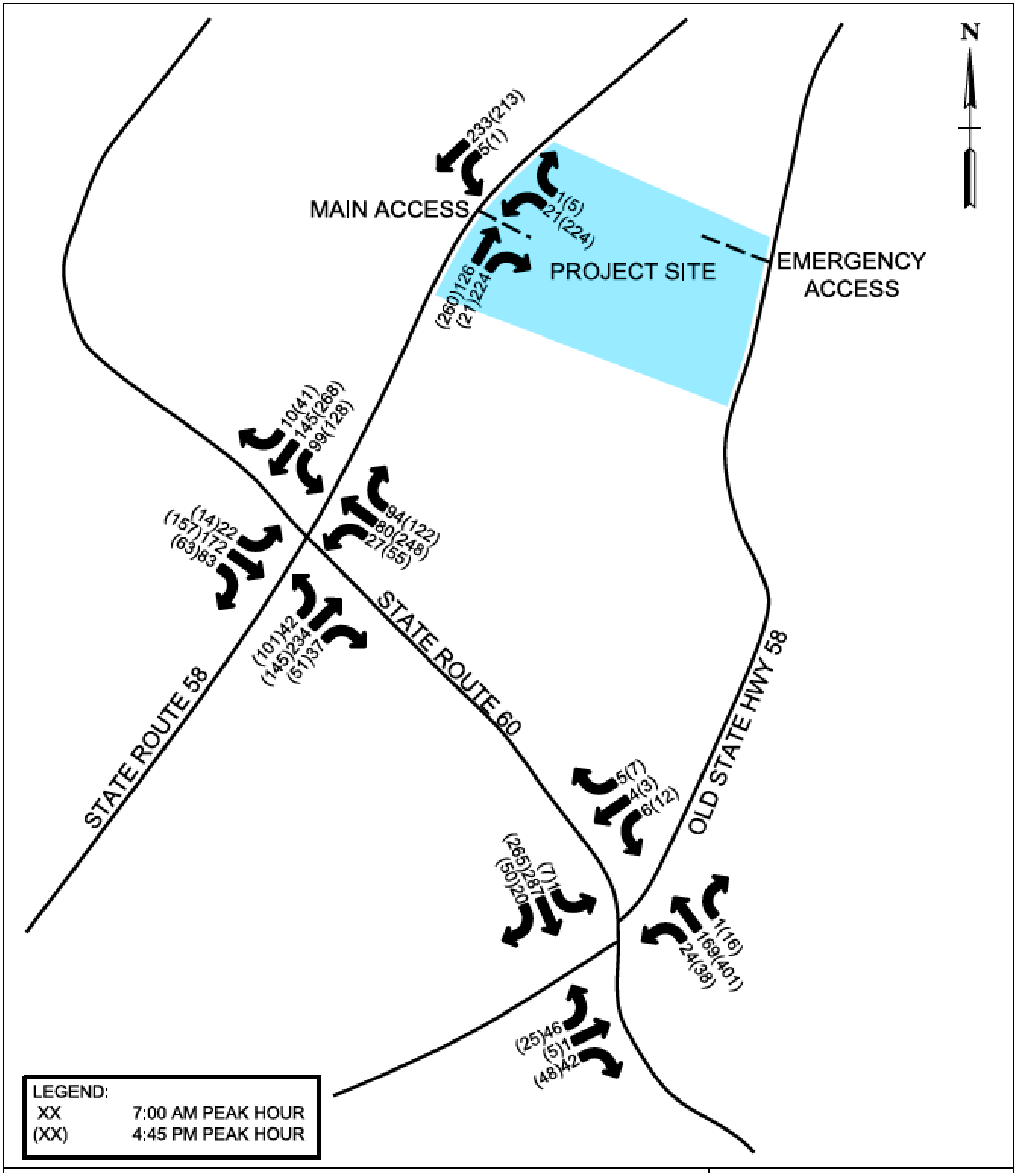
Under Alternative B, approximately 200 workers would commute to the new facility daily. The highest percentage of commuters reside in the Greater Chattanooga Metropolitan area. Some commuting may be from more distant locations (up to about 60 miles) such as Trenton, Georgia to the south and Spring City to the north. Based on existing employee residency data, it is anticipated that approximately 77 percent of these would access the site along State Highway 58 from the south. Impact along the major roadways due the revised commuting pattern is expected to be minor as there would be no change in LOS.

The existing roadway network near the proposed project consists of moderate volume rural routes currently operating well below capacity. Based on a conservative assumption of one person per vehicle, the traffic generated under Alternative B would be approximately 502 new trips per day (Volkert 2019). The total traffic volumes anticipated around the site is shown in Figure 3-22. This additional traffic is not anticipated to affect the general operation of these roadways as they would remain well below capacity and would continue to operate in free-flow conditions away from any intersections (Table 3-23).

Table 3-23. Worst Case Change in Level of Service under Action Alternative

Intersection	Critical Movement	LOS Before	Before Delay (sec/veh)	LOS After	After Delay (sec/veh)
State Highway 58 and State Highway 60	Overall Intersection	C	23.8	C	25.0
State Highway 60 and Old Highway 58/Ooltewah Georgetown Road	Eastbound Left Turn	A	8.3	A	8.3
	Westbound Left Turn	A	8.0	A	8.1
	Northbound Left/Thru/Right	B	14.7	C	15.4
	Southbound Left/Thru/Right	C	18.1	C	18.5
State Highway 58 and TVA Access	Southbound Left/Thru	NA	NA	A	8.1
	Westbound Left Turn	NA	NA	C	15.4
	Westbound Right Turn	NA	NA	A	9.8

Source: Volkert 2019



(Source: Volkert 2019)

Figure 3-22. Total Projected Traffic Volumes under Action Alternative

The only movement that changes in LOS is the northbound left, through and right turn movement at State Highway 60 and Old Highway 58 for which the LOS changes from B to C. The delay at this location increases less than one second but exceeds the 15-second delay threshold that delineates the difference between LOS B and LOS C for unsignalized intersections. The maximum increase in delay for any location is only 1.2 seconds at the signalized intersection of State Highway 58 and State Highway 60.

The Action Alternative includes the construction of a right turn lane on State Highway 58 at the proposed TVA main entrance. This right turn land would include at least 100 feet of storage and would be designed according to the Manual on Uniform Traffic Control Devices, AASHTO, and TDOT standards. Because the new intersection of State Highway 58 at the proposed facility access point is unsignalized, there would be no delay for northbound and southbound through travelers. However, there would be a delay for the commuters and visitors turning into or out of the facility. The proposed northbound right turn land on State Highway 58 for traffic entering the facility would further reduce any impact to the northbound Route 58 traffic.

In summary, additional traffic generated during the construction phase is expected to disperse into the surrounding road network and have negligible effects on these roads and associated traffic conditions. Any impacts to traffic operations would be localized to the immediate site, intermittent and short-term in nature. Impacts due to the operations of the SOC would include a minor delay for the northbound traffic at State Highway 60 and Old Highway 58. While this results in a change in LOS from B to C, the maximum increase is only 1.2 seconds. Additionally, SOC operations would involve occasional helicopter traffic in the vicinity, all of which would abide by FAA and any local regulations. Therefore, Alternative B would result in minor impacts to traffic patterns near the SOC site.

3.17 Transmission Line Post-Construction Effects

3.17.1 Electric and Magnetic Fields

TLs, like all other types of electrical wiring, generate both electric and magnetic fields (i.e., EMFs). The voltage on the conductors of a TL generates an electric field that occupies the space between the conductors and other conducting objects such as the ground, TL structures, or vegetation. A magnetic field is generated by the current (i.e., the movement of electrons) in the conductors. The strength of the magnetic field depends on the current, the design of the TL, and the distance from the TL.

The fields from a TL are reduced by mutual interference of the electrons that flow around and along the conductors and between the conductors. The result is even greater dissipation of the low energy. Most of this energy is dissipated on the ROW, and the very low amount of residual energy is reduced to background levels near the ROW or energized equipment.

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

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

Under certain weather conditions, high-voltage TLs, such as the proposed 161-kV TL, may produce an audible low-volume hissing or crackling noise (Appendix H). This noise is generated by the corona resulting from the dissipation of energy and heat as high voltage is applied to a small area. Under normal conditions, corona-generated noise is not audible. The noise may be audible under some wet conditions, but the resulting noise level away from the ROW would be well below the levels that can produce interference with speech. Corona-generated noise is not associated with any adverse health effects in humans or livestock.

Other public interests and concerns related to EMFs include potential interference with A.M.-band radio reception, television reception, satellite television, and implanted medical devices. Interference with radio or television reception is typically due to unusual failures of power line insulators or poor alignment of the radio or television antenna and the signal source. Both conditions are readily preventable and correctable.

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

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

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

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

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

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

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

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

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

3.17.2 Lightning Strike Hazard

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

3.17.3 Transmission Structure Stability

The structures that would be used on the proposed TL are similar to those shown in Section 2.5.1.3 and are the result of detailed engineering design. They have been used by TVA, with minor technological upgrades over time, for over 70 years with an exceptional safety record. They are not prone to rot or crack like wooden poles, nor are they subject to substantial storm damage due to their low cross-section in the wind.

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

3.18 Cumulative Impacts

The CEQ regulations (40 CFR 1500-1508) implementing the procedural provisions of the NEPA of 1969, as amended (42 USC 4321 et seq.) define cumulative impact as:

> …the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions (40 CFR § 1508.7).

Baseline conditions reflect the impacts of past and present actions. The impact analyses summarized in preceding sections are based on baseline conditions and either explicitly or implicitly consider cumulative impacts.

3.18.1 Environmental Resources Considered for Cumulative Effects Analysis

For this project, the full range of environmental resource issues was considered for inclusion in the cumulative effects analysis. However, this analysis is appropriately limited to only those resource issues potentially adversely affected by project activities. Accordingly, such resources as air quality, groundwater and geology, soils and prime farmland, floodplains, wildlife, cultural and historic resources, natural areas, parks, and recreation, noise, and socioeconomics and environmental justice are not included in this analysis as these resources are either not adversely affected or the effects are considered to be minimal. As a result, primary resource categories considered in this cumulative effects assessment include surface water, aquatic ecology, vegetation, threatened and endangered species, wetlands, visual resources, and transportation.

3.18.2 Geographic Area of Analysis

The appropriate geographic area over which past, present, and future actions could reasonably contribute to cumulative effects is variable and dependent on the resource evaluated. Based upon the defined list of resources potentially affected by cumulative effects, the land and water resources within a 1-mile radius of the proposed actions was considered appropriate for consideration in this analysis.

3.18.3 Identification of Other Actions

Past, present, and reasonably foreseeable future actions identified within the geographic areas of analysis are listed in Table 3-24. These actions are identified as having the potential to, in aggregate, result in larger, and potentially significant adverse impacts to the resources of concern. Actions listed as having a timing that is "past" or "present" inherently have environmental impacts that are integrated into the base condition for each of the resources analyzed in this chapter. However, these actions are included in this discussion to provide for a more complete description of their characteristics.

Actions that are not reasonably foreseeable are those that are based on mere speculation or conjecture, or those that have only been discussed on a conceptual basis. These can include projects that have not been approved by the proper authorities or have not yet submitted license/permit applications.

Table 3-24. Summary of Other Actions

Actions	Description	Timing and Reasonable Foreseeability
Previously Constructed Transmission Line	Existing transmission line and associated ROW adjacent to proposed project.	Past, Present
Land Use and Development	Agricultural land use that has resulted in vegetation and drainage and soil disturbance. Construction of various infrastructure projects including roads, utilities, transmission lines, industrial facilities, residential areas, and recreational facilities. Woodlands managed by logging and other forest management techniques.	Past, Present, Reasonably Foreseeable Future

3.18.4 Previously Constructed Transmission Line

Several TVA high voltage TLs are present in the geographic area of analysis. The Sequoyah-Hiwassee 500-kV TL aligns east to west near the northern portion of the project area. There are two 69-kV TLs that once connected to the old Georgetown Substation located near the intersection of State Highways 60 and 58. The East Cleveland Primary-Georgetown 69-kV TL essentially parallels the west side of State Highway 60 and currently ends approximately 1,900 feet short of the substation where it ties to the Georgetown-McDonald 69-kV TL. The Georgetown-McDonald 69-kV TL runs in more of a northern but slightly eastern direction and is located on the western side of the project area. The original construction of the TL adjacent to the project area resulted in temporary land disturbance and vegetation clearing. On-going maintenance within the corridor includes vegetation maintenance to clear woody vegetation on the TL ROW.

3.18.5 Land Use and Development

Land cover within the areas potentially affected by the proposed SOC, Gunstocker Creek 161-kV Substation, and associated TL is reflective of the range of land uses including extensive agricultural practices, forested and recreational lands, development of transportation infrastructure, residential and commercial development in downtown

Georgetown and scattered elsewhere in the study area, and other uses. Such past uses have had an effect in conversion and modification of natural vegetative cover types and fragmentation of ecological communities within the natural landscape. Agricultural use represents the land use type having had the greatest past and lasting effect on land uses within the vicinity of the proposed project. Agricultural lands, intermingled with forested areas, are readily apparent in the region surrounding the proposed project, and such land use has effectively reduced the environmental quality to a relatively low level, given the repeated and recurring disturbances associated with cultivation practices.

In addition, a developed transportation infrastructure consisting of roadways, including State Highways 58 and 60, Ooltewah Georgetown Road, Old Highway 58, Mt. Zion Road, and White Oak Valley Road have had the effect of creating heavily disturbed areas and narrow corridors of developed rights of way intermingled with otherwise undeveloped lands. As such, these land uses have had the prior effect of fragmenting the landscape.

3.18.6 Analysis of Cumulative Effects

To address cumulative impacts from Alternative B, the existing environment surrounding the proposed project was considered in conjunction with the environmental impacts presented in Chapter 4. The combined impacts of the incremental actions are defined by the CEQ as "cumulative impact" in 40 CFR 1508.7 and may result from other individually minor but collectively significant actions taking place over a period of time.

3.18.6.1 Surface Water and Aquatic Ecology

Soil disturbances associated with ROW clearing and site grading for structures, access roads, and buildings can potentially result in adverse water quality impacts. Soil erosion and sedimentation can clog small streams and threaten aquatic life. Removal of the tree canopy along stream crossings can increase water temperatures, algal growth, dissolved oxygen depletion, and cause adverse impacts to aquatic biota. Improper use of herbicides to control vegetation could result in runoff to streams and subsequent aquatic impacts.

Land disturbance in the vicinity of the project area related to agriculture or development could extend the period of exposure of soils as a result of incomplete revegetation. These exposed soils may increase the potential for soil erosion or sediment transport via overland flow during precipitation events resulting in sedimentation in surface waterbodies. These increased loads could have the potential to temporarily impact water quality and sensitive fish eggs, fish fry, and invertebrates inhabiting nearby waterbodies. However, it is assumed that other projects considered in this analysis would be subject to regulation by federal and state agencies and that the implementation of erosion and sediment control measures specified in the project SWPPP would decrease the potential for increased sediment loading from terrestrial sources.

Spills or leaks of hazardous liquids during construction and operation of the proposed project, or other projects in the vicinity, have the potential to result in long-term impacts on surface and groundwater resources as well as aquatic life resources. However, construction impacts would be mitigated by the proper design and implementation of BMPs and ensure avoidance, minimization, and/or mitigation of potential impacts on water resources and aquatic resources, as required by the various regulating agencies. Therefore, the potential cumulative impacts on water resources and aquatic resources would be minor.

3.18.6.2 Vegetation

Routine maintenance of both the proposed TL ROW and existing TL ROWs adjacent to the project area would have periodic direct effects on plant communities within the TLs over the long-term. Vegetation control methods may vary but are likely to include use of herbicides and various mechanical measures. As such maintenance measures would result in cutting, damage and mortality to treated plants. However, as discussed in TVA's final programmatic EIS regarding TL vegetation management, it is expected that such practices would result in localized impacts but generally minor impacts to established TL ROWs (TVA 2019b). Such potential impacts would be minimized by the integration of TVA's O-SAR process and appropriate BMPs as described in the programmatic (TVA 2019b) EIS. Further, with the implementation of TVA's preferred alternative, vegetation management would be undertaken on a condition-based manner (i.e., as needed) and would result in the development of a higher quality plant community that is inherently more compatible with TLs. Therefore, cumulative impacts of the proposed TL on vegetation, when combined with other TL maintenance activities in the region, would be minor.

3.18.6.3 Wetlands

Potential impacts associated with the other actions identified in Table 3-24 are considered to be minimal and non-contributing to additional wetland-related impacts associated with the proposed activities. Additionally, their impacts are integrated into the baseline condition of the environmental setting. Consequently, no additional synergistic and cumulative effects from these actions are identified.

As discussed in Section 3.10.2, the proposed project would result in permanent wetland impacts associated with the filling of a 0.17-acre wetland present on the SOC parcel and clearing of a 0.04-acre forested wetland along proposed TL ROW. In addition, vehicular access along the ROW would temporarily impact three wetlands during the construction phase. Given the small scale of the impact areas relative to the total wetland resources in the region, no cumulative effects are anticipated. In addition, compensatory mitigation of wetland impacts associated with the conversion from forested to emergent type, as required by USACE, would ensure no net loss of wetland resources at a watershed scale. Similarly, future construction within the watershed would be subject to USEPA, USACE, and TDEC regulations, such that any potential future impacts to wetlands would not result in a cumulative loss. Therefore, in accordance with the CWA no-net-loss of wetland resources mandate, no cumulative wetland impacts are anticipated as a result of the proposed Action Alternative.

3.18.6.4 Terrestrial Ecology and Sensitive Species

Potential impacts associated with the other actions identified in Table 3-24 are considered to be minimal and non-contributing to additional impacts to sensitive species associated with the proposed activities. For previous actions, their impacts are expected to have been coordinated with the appropriate agencies and mitigated by appropriate BMPs. Consequently, no additional synergistic and cumulative effects from these actions are identified.

Because projects that involve tree removal are commonly involved in coordination with the USFWS regarding the Indiana bat and northern long-eared bat, summer roosting habitat surveys were performed, and 296 suitable roost trees were identified along the proposed ROW and within the SOC site. Probable absence of Indiana and northern long-eared bat from the SOC site was established using mist net surveys in 2018 exempting this area (113 suitable acres) from “take”; however, about 4 acres of suitable summer roosting habitat would be removed for the proposed ROW and is subject to “take”. 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 2017c). 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 F) and would be reviewed/implemented as part of the proposed project. Therefore, no cumulative impacts are anticipated.

3.18.6.5 Visual Resources

Operation, construction, and maintenance of the proposed SOC, Gunstocker Creek 161-kV Substation, and associated TL would result in long-term changes in the visual setting for motorists on the nearby roads and adjacent landowners; however, these effects would be mitigated by landscaping plans and undisturbed portions of forest around the site. The proposed project’s contribution to regional, long-term aesthetic changes would be minor. As reasonably foreseeable residential and community projects develop, there would be increased areas of visual sensitivity, due primarily to greater numbers of residents located near the ROW and utility facilities. While visual sensitivity may increase, the project’s contribution to cumulative adverse impacts would remain minor compared to the existing conditions.

There may be some minor cumulative visual discord during the construction period due to an increase in personnel and equipment and the use of laydown and materials storage areas. These minor visual obtrusions would be temporary until the ROW and laydown yards have been restored with the use of TVA standard BMPs. Therefore, any cumulative visual impacts anticipated as a result of implementing this project would be minor.

3.18.6.6 Transportation

Additional traffic generated during the construction phase of the proposed project is expected to disperse into the surrounding road network and have negligible effects on these roads and associated traffic conditions. Impacts due to the operations of the SOC would include a minor delay for the northbound traffic at State Highway 60 and Old Highway 58, resulting in minor impacts to traffic patterns near the SOC site. These effects could occur simultaneously with other potential developments in the area. However, no transportation projects or other major developments are planned in the geographic area of influence, and any traffic impacts would be mitigated through coordination with other local agencies regarding construction plans and schedules. Therefore, cumulative impacts to transportation as a result of implementing the proposed project would be minor.

3.18.6.7 Summary

In summary, there would be no significant cumulative adverse environmental impact from the construction and operation of the proposed SOC, Gunstocker Creek 161-kV Substation, and associated 161-kV TL when considered together with other past, present, and reasonably foreseeable future actions in the area.

3.18.7 Unavoidable Adverse Environmental Impacts

Unavoidable adverse impacts are the effects of the proposed action on natural and human resources that would remain after mitigation measures or BMPs have been applied. Mitigation measures and BMPs are typically implemented in accordance with various environmental laws and regulations aimed at minimizing and compensating for unavoidable adverse environmental impacts.

Construction and operation of the proposed SOC facility and new build section of the TL would occur on land currently undeveloped that supports forested and herbaceous vegetation. Clearing and grading of the site and the new build section of the TL would result in an unavoidable alteration of habitats. These habitat alterations would result in related long-term impacts to localized species composition and wildlife habitat for the lands immediately affected. However, due to the abundant habitat of similar quality within the vicinity of the project site, the overall impact to vegetation and wildlife is considered minor.

The construction of the proposed SOC would also result in unavoidable adverse effects to surface water and wetland resources that include the relocation of 621 feet of intermittent stream, the encapsulation of 328 feet of ephemeral stream, and filling of one wetland (0.17 acres). These impacts would be mitigated through adherence to CWA permit requirements and implementation of applicable compensatory mitigation measures identified through the permitting process. Temporary impacts to water quality from runoff during construction, as well as vegetation maintenance along the TL, could impact nearby receiving water bodies but would be reduced with application of appropriate BMPs.

In the context of the availability of regional resources that are similar to those unavoidably adversely affected by the project, coupled with the application of appropriate BMPs and adherence to permit requirements, unavoidable adverse effects would be minor.

3.18.8 Relationship of Local Short-Term Uses and Long-Term Productivity

This EA focuses on the analyses of environmental impact and resulting conclusions associated with the environmental impacts of construction and operation of the proposed SOC facility, construction, operation, and maintenance of a new TL, substation and access roads. These activities are considered short-term uses of the environment for purposes of this section. In contrast, the long-term productivity is considered to be that which occur beyond the conclusion of decommissioning the SOC site and associated facilities. In conjunction with this analysis it is assumed that all site facilities, infrastructure, and associated roadways would be removed and restored as part of decommissioning. This section includes an evaluation of the extent that the short-term uses preclude any options for future long-term use of the associated project areas.

Most environmental impacts during construction activities would be relatively short-term and would be addressed by BMPs and mitigation measures. Site preparation coupled with noise from construction activities, may displace some wildlife and alter existing vegetation. Construction and operational phase activities would have a limited, yet favorable short-term impact to the local economy through the creation of construction jobs and associated revenue.

Construction of the SOC and associated facilities would cause some short-term deterioration in existing air quality during construction. These impacts would be mitigated through implementation of measures to reduce emissions from construction phase equipment and fugitive dust. Long-term impacts to air quality would be minor because operation of the SOC would not emit pollutants into the atmosphere in quantities that would affect the attainment status of the region. Therefore, no effects on the maintenance and enhancement of long-term productivity related to air quality would occur as a result of construction and operation of the SOC. The short-duration construction project-generated traffic would result in some decrease in convenience to users of roads adjacent to the site to accommodate construction traffic. In terms of the long-term operation of the transportation system, no disturbance is expected after completion of construction activities and long-term productivity should not be affected.

The project area consists of a variety of fragmented and contiguous forested habitat, wetlands, stream crossings, ponds, early successional habitat (i.e., pasture and agricultural), and residential or otherwise disturbed areas. The principal change in short-term use of the project area would be the loss of vegetation within the areas impacted for construction and operation of the facility. Because the vicinity of the project area includes similar vegetation and habitat types and land uses (including prime farmland), the short-term disturbance to support operations is not expected to significantly alter long-term productivity of wildlife, agriculture or other natural resources.

Construction of the SOC facility including the installation of a water supply line, new build TL, and substation would reduce the productivity of the land for other purposes while the facility is in operation. However, after decommissioning the lands could be reused and made available for other uses.

3.18.9 Irreversible and Irretrievable Commitments of Resources

This section describes the expected irreversible and irretrievable environmental resource commitments used to support construction and operation of the new facility. A resource commitment is considered irreversible when impacts from its use would limit future use options and the change cannot be reversed, reclaimed, or repaired. Irreversible commitments generally occur to nonrenewable resources such as minerals or cultural resources and to those resources that are renewable only over long timespans, such as soil productivity. A resource commitment is considered irretrievable when the use or consumption of the resource is neither renewable nor recoverable for use by future generations until reclamation is successfully applied. Irretrievable commitments generally apply to the loss of production, harvest, or natural resources and are not necessarily irreversible.

The land used for the proposed SOC facility and associated structures is not irreversibly committed because once TVA ceases operations at the location and the facility is decommissioned, the land supporting the facilities could be returned to other commercial or noncommercial uses. The ROW used for the new TL would constitute an irretrievable commitment of onsite resources, such as wildlife habitat, forest resources, and forested wetlands in that the approximate previous land use and land cover could be returned upon retirement of these facilities. In the interim, compatible uses of the ROW for the TL could continue.

Resources required by construction activities, including labor, fossil fuels and construction materials, would be irretrievably lost. Nonrenewable fossil fuels would be irretrievably lost through the use of gasoline and diesel-powered equipment during construction. The materials used for the construction of the proposed site would be committed for the life of the facility. However, they are not in short supply and their use would not have an adverse effect upon continued availability of these resources. Some building materials may be irrevocably committed; however, some metal components and structures could be recycled.

The materials used for construction of the proposed TL would be committed for the life of the TL. Some materials, such as ceramic insulators and concrete foundations, may be irrevocably committed, but the metals used in equipment, conductors, and supporting steel structures could be recycled. The useful life of steel-pole transmission structures or laced-steel towers is expected to be at least 60 years. Thus, recyclable materials would be irretrievably committed until they are eventually recycled.

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CHAPTER 5 – ENVIRONMENTAL ASSESSMENT RECIPIENTS

Following is a list of who has received copies of this NEPA document or notices of its availability with instructions on how to access the EA on the project web page.

5.1 Federal Agencies

Federal Aviation Administration

U.S. Army Corps of Engineers

U.S. Fish and Wildlife Service

5.2 Federally Recognized Indian Tribes

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

Jena Band of Choctaw Indians

Mississippi Band of Choctaw Indians

Kialegee Tribal Town

Shawnee Tribe

The Muscogee (Creek) Nation

The Seminole Nation of Oklahoma

Thlopthlocco Tribal Town

United Keetoowah Band of Cherokee Indians in Oklahoma

5.3 State Agencies

Tennessee Department of Environment and Conservation (TDEC)

Tennessee Department of Transportation (TDOT)

Tennessee State Historic Preservation Office (SHPO)

5.4 Other Consulting Parties

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CHAPTER 6 – LITERATURE CITED

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